**Programme : Diploma in CE/**EE/ET/ME/MT/CM/IT/DDGM
**Programme Code : 01/**02/03/04/05/06/07/08/**21**/22/23/24/26/**15**/16/17/18/19
**Name of Course : English**
**Course Code : HU181**

**Teaching Scheme:**

| | **Hours/Week** | **Total Hours** |
|---|---|---|
| **Theory** | **02** | **32** |
| **Practical** | **02** | **32** |

**Evaluation Scheme:**

| | **Progressive Assessment** | **Semester End Examination** | | | |
|---|---|---|---|---|---|
| | | **Theory** | **Practical** | **Oral** | **Term Work** |
| Duration | **Two Class Tests each of 60 Minutes** | **03 Hrs.** | --- | --- | --- |
| Marks | **20** | **80** | --- | --- | **25** |

## Course Rationale:

This is been noticed that diploma pass outs lack in grammatically correct written and oral communication in English. It is also been noticed that communication is not a problem of students, communication in correct English is the basic problem of Diploma pass outs. Students will have to interact in this language so far as their career in industry is concerned. In order to enhance this ability in students English is introduced as a subject to groom their personality.

## Course Objectives:

After studying this course, the student will be able to

- Comprehend the passage.
- Answer correctly the questions on unseen passages.
- Increase the vocabulary.
- Apply rules of grammar for correct writing.
- Speak correct English

## Course Content:

| **Chapter No.** | **Name of Topic/Subtopic** | | **Hrs** | **Marks** |
|---|---|---|---|---|
| **1** | **GRAMMAR** | | | |
| | 1.1 | Tenses : Past Perfect, Past Perfect Continuous | 12 | 20 |
| | 1.2 | Types of Sentences: Simple, Compound and Complex. | | |
| | 1.3 | Verbs | | |
| | 1.4 | Reported Speech : Complex Sentences | | |
| | 1.5 | Uses of ‘too’ and ‘enough’ : Conversion and Synthesis | | |
| | 1.6 | Modal Auxiliary : Will, shall, can, could | | |
| | 1.7 | Articles | | |
| | 1.8 | Preposition | | |
| | 1.9 | Conjunctions Interjections | | |
| | 1.10 | Affirmative and negative, interrogative | | |
| | 1.11 | Question tag | | |

| | | | | |
|---|---|---|---|---|
| **2** | | **PARAGRAPH WRITING** | | |
| | 2.1 | Types of paragraphs (Narrative, Descriptive, Technical) | 04 | 10 |
| **3** | | **COMPREHENSION** | | |
| | 3.1 | Unseen passages | 10 | 40 |
| **4** | | **VOCABULARY** | | |
| | 4.1 | Homophones: To understand the difference between meaning and spelling of words | 04 | 06 |
| | 4.2 | Vocabulary : Understanding meaning of new words | 02 | 04 |
| | **Total** | | **32** | **80** |

## List of Practicals/Experiments/Assignments:

| Sr. No. | Name of Practical/Experiment/Assignment | Hrs. |
|---|---|---|
| 1 | Building of Vocabulary – 2 assignments 25 new words for each assignment with sentence | 04 |
| 2 | Conversational Skills – Role play student will perform the role on any 6 situations. Dialogue writing for the given situations. | 04 |
| 3 | Grammar – 2 assignments | 04 |
| 4 | Write paragraphs on given topics. 2 assignments. | 04 |
| 5 | Errors in English 2 assignments.<br>Find out the errors and rewrite the sentences given by the teacher. | 04 |
| 6 | Essay writing 2 assignments.<br>Write 2 assays on topic given by the teacher. | 04 |
| 7 | Biography (Write a short biography on your role model approximately in 250-300 words) | 04 |
| 8 | Idioms and phrases<br>Use of idioms and phrases in sentences(20 examples) | 04 |
| **Total** | | **32** |

The term work will consist of 10 assignments.

## Instructional Strategy :

| Sr. No. | Topic | Instructional Strategy |
|---|---|---|
| 1 | Grammar | Class room Teaching |
| 2 | Paragraph Writing | Class room Teaching |
| 3 | Comprehension | Class room Teaching |
| 4 | Vocabulary | Class room Teaching |

## Reference Books :

| Sr. No. | Author | Title | Publication |
|---|---|---|---|
| 1 | J.D.O. Connors | Better English Pronunciation | London Cambridge University Press ELBS |
| 2 | Geofrey Leech | A communicative Grammar of English | Essex Longman Group Ltd. : ELBS |
| 3 | Randolf Quirk | University Grammar of English | Essex Longman Group Ltd. : ELBS |

**Learning resources :** Books, Audio Visual aids

**Specification Table :**

| Sr. No. | Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| 1 | Grammar | -- | 10 | 10 | 20 |
| 2 | Paragraph Writing | -- | 05 | 05 | 10 |
| 3 | Comprehension Of Unseen Passages | -- | 30 | 10 | 40 |
| 4 | Vocabulary/Homophones | 02 | 04 | 04 | 10 |
| | **Total** | **02** | **49** | **29** | **80** |

Prepared by

| | | |
|---|---|---|
| ( M.A.Surdikar) | ( S.V.Chaudhari) | ( M.S.Satarkar ) |
| Lect.in English | Member Secretary PBOS | Chairman PBO |

**Programme : Diploma in CE/**EE/ET/ME/MT/CM/IT/DDGM

**Programme Code : 01/**02/03/04/05/06/07/08/**21**/22/23/24/26/**15**/16/17/18/19

**Course : Communication Skills**

**Course Code : HU182**

**Teaching Scheme:**

| | **Hours/Week** | **Total Hours** |
|---|---|---|
| **Theory** | **02** | **32** |
| **Practical** | **02** | **32** |

**Evaluation Scheme:**

| | **Progressive Assessment** | **Semester End Examination** | | | |
|---|---|---|---|---|---|
| | | **Theory** | **Practical** | **Oral** | **Term Work** |
| Duration | **One Class Tests of 60 Minutes and an Oral** | **03 Hrs.** | **--** | **--** | **--** |
| Marks | **20** | **80** | **--** | **25** | **--** |

**Course Rationale:**

Classified under human sciences this subject is intended to introduce students with the process of communication so that they can identify conditions favorable to effective communication. They will also be taught basic and applied language skills viz. listening, speaking, reading and writing – all useful for the study of a technical course and communication. Specifically, writing and oral presentation skills are two top ranking capabilities needed for professional careers and must be developed systematically.

**Course Objective:**

After studying this course, the student will be able to

- Understand and use the basic concept of communication and principles of effective communication in an organized set up and social context.
- Give a positive feedback in various situations to use appropriate body language & to avoid barrier for effective communication.
- Write the various types of letters and office drafting with the appropriate format.
- Communicate with the Industry Professionals.

**Course content:**

| **Chapter No.** | **Name of Topic/Subtopic** | | **Hrs** | **Marks** |
|---|---|---|---|---|
| **1** | **Basic Concepts And Principles Of Communication** | | | |
| | 1.1 | **The Communication Event**<br>The Communication event : Definition<br>The elements of communication: The sender, receiver, message, channel, feedback | 12 | 24 |
| | 1.2 | **The communication Process**<br>The Communication Process : Definition<br>Stages in the process : defining the context, knowing the audience, designing the message, encoding, selecting the proper channels, transmitting, receiving, decoding and giving feedback. | | |
| | 1.3 | **Principles of Effective communication**<br>Effective Communication : definition<br>Communication Barriers and how to overcome them at each stage of | | |

| | | | | |
|---|---|---|---|---|
| | | communication process.<br>Developing effective message: Thinking about purpose, knowing the audience, structuring the message, selecting proper channels, minimizing barriers and facilitating feedback. | | |
| **2** | **Organizational Communication** | | | |
| | 2.1 | What is an organization? Goal.<br>Patterns of communication : Upward, Downward, Horizontal and Grapevine | 04 | 12 |
| **3** | **Non-verbal Communication** | | | |
| | 3.1 | Non Verbal Codes : Kinesics (eye-contact, gesture, postures, body movements and facial expressions) Proxemics (using space), Haptics (touch), Vocalics (aspect of speech like tone, emphasis, volume, pauses etc.) Physical Appearance, Chronemics (manipulating time), Silence. | 06 | 12 |
| **4** | **Business Correspondence and Office Drafting** | | | |
| | 4.1 | Business Correspondence :<br>Letter of Enquiry, Order letter, Complaint Letter. | 10 | 32 |
| | 4.2 | Office Drafting :<br>Circular, Notice and Memo | | |
| | 4.3 | Job Application with Resume. | | |
| | **Total** | | **32** | **80** |

**List of Practicals/Experiments/Assignments:**

| Sr. No. | Name of Practical/Experiment/Assignment | Hrs. |
|---|---|---|
| 1 | Self Introduction | 02 |
| 2 | Elocution | 04 |
| 3 | Extempore | 04 |
| 4 | Mock Interview | 04 |
| 5 | Debate | 02 |
| 6 | Variety Application/Reports | 02 |
| 7 | Writing Paragraphs on Technical Subjects | 02 |
| 8 | Business letter | 02 |
| 9 | Individual/Group Presentation on identified topics | 02 |
| 10 | Group discussion | 02 |
| 11 | Role play | 06 |
| | **Total** | **32** |

**Reference Books:**

| Sr. No. | Author | Title | Publication |
|---|---|---|---|
| 1 | MSBTE | Communication skills | MSBTE |
| 2 | Joyeeta Bhatacharya | Communication skills | Macmillan Co. |
| 3 | Sarah Freeman | Written communication in English | Orient Longman Ltd. |
| 4 | Krishna Mohan and Meera Banerji | Developing Communication skills | Macmillan India Ltd. |

**Learning Resources:** Books, Audio - Visual aids

**Specification Table:**

| Sr. No. | Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| 1 | Basic Concepts and Principles of communication | 08 | 08 | 08 | 24 |
| 2 | Organizational communication | 04 | 04 | 04 | 12 |
| 3 | Non Verbal communication | --- | --- | 12 | 12 |
| 4 | Business Correspondence and Office Drafting | --- | --- | 32 | 32 |
| | **Total** | **12** | **12** | **56** | **80** |

Prepared by

| | | |
|---|---|---|
| ( M.A.Surdikar) | ( S.V.Chaudhari) | ( M.S.Satarkar ) |
| Lect.in English | Member Secretary PBOS | Chairman PBOS |

**GOVERNMENT POLYTECHNIC, PUNE**
**(AN AUTONOMUS INSTITUTE OF GOVT. OF MAHARASHTRA)**

Name of Programme: **CE /**EE/ ET/ME/MT/CM/IT

Programme code: **01/**02/03/04/05/06/07/**21**/22/23/24/26

Name of Course: Engineering Physics

Course Code: SC183

**Teaching Scheme:**

| | Hours/Week | Total Hours |
|---|---|---|
| Theory | 03 | 48 |
| Term Work/Practical | 02 | 32 |

**Evaluation:**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term Work |
| Duration | 1hr | 3 Hrs | 2 Hrs | -- | -- |
| Marks | 20 | 80 | 50 | -- | -- |

**Course Aim:**

1. To understand various phenomena, principles and concepts in physics.

2. To understand the applications in Engineering Physics.

3. To solve the applied numerical problems.

**Course Objective:**

1. The student should able to appreciate the role of physics.

2. The student should able to think in scientific manner and apply the basic knowledge in different situations.

| Sr. No | Topic / Sub topic | Hrs | Weightage |
|---|---|---|---|
| 1 | **Motion** | 06 | 08 |
| | **1.1 Introduction**<br>**1.2 Circular Motion**: UCM, angular displacement, angular velocity, angular acceleration, radial velocity, tangential velocity, periodic time, frequency, relation between linear and angular velocity, explanation of centripetal and centrifugal force, with application, relation between velocity frequency and wavelength.<br>**1.3 SHM**: Definition, SHM as a projection of UCM on the diameter, Equation of SHM, displacement and graphical representation. | | |
| 2 | **Properties of Matter** | 08 | 12 |
| | **2.1 Surface Tension :**<br>Molecular theory of surface tension, Cohesive and adhesive forces, Angle of contact, shape of liquid surface in capillary tube, capillary action (Examples). Surface tension by capillary rise method, (no derivation), simple problem, effect of impurity and temperature on surface tension.<br>**2.2 Viscosity:** Definition, velocity gradient, Newton's & Stokes' law of viscosity, terminal velocity, coefficient of viscosity by stokes method(No derivation), type of flow of liquid - stream line flow, turbulent flow, Reynolds's number (significance), applications and simple problems.<br>**2.3 Elasticity:** Elastic, plastic and rigid bodies, stress and strain, Hook's law, types of elastic modulii with its relation, problems. Behaviour of wire under continuously increasing load. | | |
| 3 | **Sound** | 03 | 06 |
| | Wave motion, Transverse and longitudinal waves, free and forced vibrations, Resonance - explanation and example. absorption, reflection and transmission of sound. | | |
| 4 | **Heat** | 04 | 06 |
| | Explanation of Gas laws, Boyle's law, Charles's law, Gay Lussac's law, General Gas Equation, problems on gas laws, units of temperature $^0$C, $^0$K with their conversion, absolute scale of temperature, modes of heat transfer, conduction, convection and radiation. | | |
| 5 | **Optics** | 06 | 12 |
| | **5.1** Introduction to reflection and refraction of light, Snell's law, physical significance of refractive index, critical angle, total internal refraction of light.<br>**5.2 Fiber optics** : Propagation of light through optical fiber, numerical aperture, types of optical fibers, applications and comparison with electrical cable.<br>**5.3 LASER:** Definition, spontaneous and stimulated emission, population inversion, He-Ne laser- construction and working, applications and properties of LASER. | | |

| | | | |
|---|---|---|---|
| **6** | **Electrostatics** | 06 | 10 |
| | **6.1 Electric charge**, Coulomb's law in Electrostatics, unit of charge, electric field, intensity of electric field, electric lines of forces (Properties), electric flux, flux density.<br>**6.2 Electric potential:** Explanation, definition**,** potential due to a point charge, potential due to a charged sphere, absolute electric potential, simple problems. | | |
| **7** | **Current Electricity** | 06 | 10 |
| | **7.1 Current**, resistance, specific resistance, Whetstone's network, meter bridge, balancing condition of meter bridge, measurement of unknown resistance using meter bridge, problems.<br>**7.2 Principle of potentiometer,** potential gradient, E.M.F., comparison of E.M.F. using potentiometer.<br>**7.3 Electric work**, electric power, energy, units and calculations of electric bill. | | |
| **8** | **Electromagnetism** | 03 | 06 |
| | **8.1 Magnetic effect of electric current**, Ampere's rule, intensity of magnetic field, magnetic induction, Biot- Savert's Law (Laplace's Law), Fleming's left hand rule, force experienced by current carrying straight conductor placed in magnetic field, problems. | | |
| **9** | **Modern Physics** | 06 | 10 |
| | **9.1 X- ray's**, principle, production, properties and applications.<br>**9.2 Photo electricity**: Plank's quantum theory, photoelectric effect (circuit diagram and working), threshold frequency, stopping potential, work function, Einstein's photoelectric equation, photocell, problems. | | |
| | **Total** | **48** | **80** |

## List of Practical's: (Any Eight)

| Sr. No. | Name of Experiment |
|---|---|
| 1 | Use of vernier calliper to measure the dimensions of different objects. |
| 2 | To understand the concept of error in instrument and to measure the dimensions of different objects using micrometer screw gauge. |
| 3 | To determine the velocity of sound using resonance tube method. |
| 4 | To determine period of simple pendulum. |
| 5 | To determine surface tension by capillary rise method. |
| | Repeat turn for experiments No.1 to 4 |
| 6 | To determine the specific resistance using Ohm's law |
| 7 | To understand the concept of Whetstone's network and to determine the specific resistance using the meter bridge. |
| 8 | Comparison of EMF using single cell method. |
| 9 | To understand the concept of viscosity and hence to determine the coefficient of viscosity using Stokes' method. |
| 10 | Study of concept of total internal reflection. |
| 11 | Study of characteristics of photoelectric cell. |
| 12 | To determine permittivity of free space. |
| | Repeat turn for experiments No.5 to 8 |

## Reference Books:

| Author/s | Title | Publisher |
|---|---|---|
| R.K. Gaur and S. L. Gupta | Engineering Physics | Dhanpat Rai and Sons Publications |
| Manikpure, Prakash Deshpande and Dagwar | Basic Applied Physics | S. Chand and Co. New Delhi. |
| Modern Physics | Text book in Physics for diploma Engg. Student. | Sony Publications Pvt. Ltd. |
| Applid Physics | Schum's Series. | |
| Kshirsagar, Avdhanalu- | Engineering Physics | |
| M.S.Pawar, M.A.Sutar | Basic Physics (E Scheme) | |

**Learning Recourses :**

1. Chart 2. Black Board 3.Television 4. Internet 5. Educational CD's
6. Models 7. Experimentation 8. Diagram Demonstration

## Specification Table :

| Sr. No | Topic | Cognitive Level | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Applications | |
| 1 | General Physics | 02 | 04 | 02 | 8 |
| 2 | Properties of matter | 04 | 04 | 04 | 12 |
| 3 | Sound | 02 | 02 | 02 | 06 |
| 4 | Heat | 02 | 02 | 02 | 06 |
| 5 | Optics | 04 | 04 | 04 | 12 |
| 6 | Electrostatics | 04 | 02 | 04 | 10 |
| 7 | Current Electricity | 04 | 02 | 04 | 10 |
| 8 | Electromagnetism | 02 | 02 | 02 | 06 |
| 9 | Modern Physics | 04 | 02 | 04 | 10 |
| | Total | 26 | 24 | 30 | 80 |

| (Mrs. Y.D.Bhide) | (S.V. Chaudhari) | (M.S.Satarkar) |
|---|---|---|
| Prepared By | Member Secretary, PBOS | Chairman, PBOS |

# GOVERNMENT POLYTECHNIC, PUNE-16

(An Autonomous Institute of Government of Maharashtra)

**Name of Programme - CE/EE/ET/ME/MT**

**Programme Code - 01/02/03/04/05/21/22/23/24**

**Name of Course - ENGINEERING CHEMISTRY**

**Course Code - SC184**

**Teaching Scheme:**

| | **Hours /Week** | **Total Hours** |
|---|---|---|
| **Theory** | 03 | 48 |
| **Term Work /Practical** | 02 | 32 |

**Evaluation:**

| | **Progressive Assessment** | **Semester End Examination** | | | |
|---|---|---|---|---|---|
| | | **Theory** | **Practical** | **Oral** | **Term work** |
| **Duration** | Two class tests of 60 minutes duration | 03 Hrs | 02 Hrs | -- | -- |
| **Marks** | 20 | 80 | 50 | -- | -- |

**COURSE AIM:**

Applications of Material Science and Chemical Principles have resulted into the Development of new materials used in modern medicines and automobiles, synthetic fibers polymers, alloys, new energy sources and many other important products and processes.

Hence, Material Science is an important and expanding branch in scientific engineering and economic field of our society. Thus the principles of Material Science have a wide application in all the branches of engineering and technologies. In this syllabus, the coverage of various topics will orient the students to appreciate the principles Material Science in the fields of engineering and Technology.

The topic atomic structure includes the basic structure of matter, which governs the Mechanical, Electrical and Magnetic properties of the matter. Steels, alloys, plastic and Elastomers are included considering their present extensive use in automobiles, chemicals and heavy engineering industries. The contents of this curriculum which provide knowledge of cells and batteries, selection of appropriate materials for engineering applications and methods of protection by metallic and non-metallic coatings. This satisfies the need of the students to cope with the recent use of these materials and processes in their world of work.

Corrosion and methods of prevention will make students realize importance of care and maintenance of machines and equipments. Study of different polymers, insulators, adhesives and their chemical behavior will be useful in their applications in electrical appliances and electronics industries. Study of impurities and hardness in water and methods for water softening will help the students to make proper use of water. The knowledge of environmental pollution and its awareness is helpful to change the attitude towards society and development by caring approach.

Nanomateials are widely used in engineering field .It will help to understand the need of nonmaterial in different engineering fields.

**COURSE OBJECTIVES: The student will be able to**

- Develop interest in the fundamental structure of matter, which governs the properties of matter.
- Understand applications of basic concepts in chemistry
- Understand various Chemical Technological processes
- Apply principles and concepts of chemistry, to Engineering situations.
- Identify and formulate the changes and Analyze the chemical changes and effects
- Appreciate effect of chemical changes.
- Aware and Care about the environment

**COURSE CONTENT-**

| Sr No | Name of the Topic | Hours | Marks |
|---|---|---|---|
| 1 | **ATOMIC STRUCTURE AND CHEMICAL BONDING**<br>**1.1 Atomic Structure :**<br>Definition of atom, structure of modern atom,<br>Characteristics of fundamental particles of an atom, definition of atomic number, atomic mass number and their difference, Orbits: Bohr's energy levels, sub-energy levels, s, p, d, f orbital, shapes and description of s and p orbital. Definition and significance of quantum numbers:, Aufbau's principle, Hund's rule, orbital electronic configurations (s, p, d, f) of elements having atomic number 1 to 30,<br>**1.2 CHEMICAL BONDING**<br>• Definitions of valence electrons, valency.<br>• Definition of electrovalency, positive and negative electrovalency, formation of Electrovalent compounds-*Nacl,Alcl*$_3$ Definition of covalency, single, double and triple covalent bonds, formation of Covalent compounds *H2O,CO2,N2* | 04 | 08 |
| 2 | **Electrochemistry**<br>**2.1 Introduction**<br>Definition of an electrolyte, electrolysis ,ionization, Assumptions of Arrhenius theory of electrolytic dissociation degree of ionization ,factors affecting degree of ionization, Difference between atom and ion, Activity series, Mechanism of electrolysis of i)Cuso$_4$ solution by using platinum ,cu rods.<br>**2.2 Faraday's law of electrolysis.**<br>Statements, explanation Numerical examples based on Faraday's laws of electrolysis.<br>**2.3 Cell and cell reactions**<br>Concept of electrode potential, standard electrode potential ($E^O$), significance of oxidation –reduction potential, type of electrodes, reference electrode and indicator electrode. Construction and working of hydrogen electrode and calomel electrode. EMF series and its application, constructions and working reactions of lead acid cell, Daniel cell with porous vessel and salt bridge. Applications of Electrolysis Electroplating and Electrore fining | 08 | 12 |

| | | | |
|---|---|---|---|
| 3 | **METAL AND ALLOYS**<br>**3.1 METAL**<br>Occurrence of metals, definitions of mineral, ore, flux, matrix, slag and metallurgy, mechanical properties of metal, flow chart showing different processes in metallurgy, classification, properties and application of carbon steel, heat treatment(definition, purposes and methods)<br>**3.2 Alloys**<br>Definition of alloy, purposes of making alloys with examples, classification of alloys(ferrous and non-ferrous), effects of alloying elements on the properties of steel(Ni, Co, Si, Mn, V, W) composition, properties and uses of heat resisting steel, magnetic steel ,shock resistance steel, stainless steel ,high speed steel spring steel, tool steel, duralumin, woods metal, brass and monel metal. | 06 | 08 |
| 4 | **4.1 PLASTIC AND RUBBER (POLYMER AND ELASTOMER)**<br>Definition of monomer and polymer, types of polymer (Addition, and Condensation) Definition example-(formation of Polythene, PVC, Teflon, Bakelite) Thermo softening and thermosetting (definition and comparison), applications of Plastic based on its properties. Definition and applications of Conductive polymer, Definition of elastomer, isoprene unit. Natural rubber-drawbacks, vulcanization, properties of rubber and applications based on its properties. Difference between synthetic and natural rubber.<br>**4.2 ENGG.MATERIALS-**<br>Definition Properties and Applications of-<br>1) Cement and lime2) Ceramics and composites3) Glass and Insulating materials 4) Paint and adhesives. | 05 | 10 |
| 5 | **WATER**<br>Definition of hard water and soft water, causes of hardness, types of hardness, analysis of degree of hardness in calcium carbonate equivalent(numerical), bad effect of hard water in industries (paper, textile, dye, sugar), removal of hardness by lime soda method, zeolite, ion exchange method, reverse osmosis, PH scale, applications of PH in engineering. Numerical based on PH and hardness. | 05 | 08 |
| 6 | **CORROSION**<br>Definition, causes of corrosion types of corrosion-definition (atmospheric and electro chemical) Types of oxide films , mechanism of atmospheric and electrochemical corrosion (evolution of hydrogen, absorption of oxygen), factors affecting rate of atmospheric corrosion and electrochemical corrosion. Protection Methods- Galvanization and tinning processes, sherardizing, metal spraying , metal cladding. | 05 | 08 |
| 7 | **LUBRICANT**<br>Definition and functions of lubricant, mechanism of lubrication(fluid film, boundary, extreme pressure lubrication), classification of lubricant, properties of lubricating oils(physical and chemical), selection of lubricant for light machines, I.C.E., gears, cutting tools, high pressure and low speed machines, transformers, spindles in textile industry, for refrigeration system. | 04 | 08 |

| | | | |
|---|---|---|---|
| 8. | **FUELS**<br>Definition, classification of fuels, characteristics of good fuel, comparison between solid, liquid and gaseous fuel, types of coal, analysis of coal by proximate and ultimate analysis, refining of crude petroleum, fractions obtained by distillation of crude oil, gasoline, kerosene, diesel as a fuel( properties and uses) | 04 | 08 |
| 9. | **MATERIAL SCIENCE AND ENGINEERING**<br>Definition of material science, terminology and scales, properties of materials, (mechanical, electrical, magnetic, optical, thermal with example) structure depended properties (example of hardness versus structure of steel.)Types of materials- metals, semiconductor, polymer ceramic and composites (examples and properties and applications).Engineering nanomaterial and its applications. | 04 | 04 |
| 10 | **ENVORNMENTAL EFFECT** (Awareness Level)<br>Definition, types of pollution, air, water, soil, sound, nuclear pollution. (Causes, effect, control method), E-waste (origin effect control) deforestation, ozone depletion, greenhouse effect, preventative environmental management activities. | 03 | 06 |

**LIST OF EXPERIMENTS:**

| SR NO. | NAME OF THE EXPERIMENT | Hours |
|---|---|---|
| 1. | Write the electronic configuration of atoms (atomic no.1-30)<br>Write the formation of compounds Nacl, $Alcl_3$,$H_2o$,$Co_{2,}N_{2.}$ | 04 |
| 2. | Determine acidic and basic radical from unknown solution (any two) | 04 |
| 3. | Measure the voltage developed due to chemical reactions by setting up Daniel cell. | 02 |
| 4. | To determine the percentage of iron in given steel sample by redox titration. | 02 |
| 5. | To determine total hardness of sample of water by EDTA method. | 02 |
| 6. | To determine chloride content in given sample of water by Mohr's method | 02 |
| | Revision / Repetition ( Expts.1 to 6 ) | 02 |
| 7. | To determine the percentage of Ca content in cement. | 02 |
| 8. | To determine electrode potential of various metals to study their tendency to corrosion | 02 |
| 9. | To determine the acid value of lubricant by using KoH | 02 |
| 10. | To determine coefficient of viscosity by using Ostwald's viscometer. | 02 |
| 11. | To determine percentage of ash or moisture in a given coal sample by proximate analysis. | 02 |
| 12. | To determine the strength of hydrochloric acid by titrating against sodium hydroxide solution by using PH meter. | 02 |
| | Revision / Repetition ( Expts.7 to12 ) | 02 |

**LEARNING RESOURSES:**

| Author | Title | Publisher |
|---|---|---|
| V. P. Mehta | Polytechnic Chemistry | Jain Brothers, New Delhi. |
| P.C. Jain and Monica Jain | Applied Chemistry | Dhanpat Rai & sons, New Delhi |
| M.M. Uppal | Engineering Chemistry | Khanna Publisher, Delhi. |
| S.N. Narkhede,<br>M.M. Thatte | Applied Chemistry | Nirali Prakashan, Pune. |

Internet, You tube ,Videos etc.

**Specification Table:**

| Sr. No. | Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| 1 | Atomic structure and chemical bonding. | 04 | 02 | 02 | 08 |
| 2 | Electrochemistry | 04 | 06 | 02 | 12 |
| 3 | Metal and alloys | 04 | 02 | 02 | 08 |
| 4 | Polymer ,Elastomer and Engg materials | 04 | 02 | 04 | 10 |
| 5 | Water | 02 | 03 | 03 | 08 |
| 6 | Corrosion | 04 | 02 | 02 | 08 |
| 7 | Lubricant | 03 | 03 | 02 | 08 |
| 8 | Fuel | 03 | 03 | 02 | 08 |
| 9 | Material science and Engineering. | 00 | 02 | 02 | 04 |
| 10 | Environmental effects | 02 | 02 | 02 | 06 |
| | Total | 30 | 27 | 23 | 80 |

Prepared by

( Smt.K.V. Mankar) ( S.V.Chaudhari) ( M.S.Satarkar )
Lect.in Chemistry Member Secretary PBOS Chairman PBOS

**Name of Programme** : **CE**/EE/ET/ME/MT/CM/IT

**Programme Code** : **01**/02/03/04/05/06/07/**21**/22/23/24/26

**Name of Course** : **Applied Mathematics - I**

**Course Code** : **SC 181**

**Prerequisite** : **Nil**

**Teaching Scheme:**

| | Hours / Week | Total Hours |
|---|---|---|
| Theory | 03 | 48 |
| Term Work /Tutorial | 01 | 16 |

**Evaluation:**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term work |
| Duration | Two class tests of 60 minutes duration | 3 Hrs | -- | -- | -- |
| Marks | 20 | 80 | -- | -- | -- |

**Course Aim:**

The students of Diploma in Engineering and technology must acquire some essential Competencies in Mathematics.

**Course Objectives:**

The students will be able to think logically and systematically. They will learn the importance of accuracy and develop attitude of problem solving with diligence and perseverance**.**

**Course Contents:**

| Sr. No. | Name | Periods | Marks |
|---|---|---|---|
| 1 | **ALGEBRA** | **18** | **32** |
| **R** | **1.1 Logarithms**: Definition, Laws of Logarithms, Simple examples based on laws. | 02 | 04 |
| | **1.2 Determinants**: Determinants of second and third orders, solution of simultaneous equations in two and three unknowns (Cramer's Rule), Properties of determinants of order 3 and examples. | 03 | 06 |
| | **1.3 Partial fractions**: Rational fractions, resolving given rational fraction into partial fraction (Type : Denominator containing non-repeated, repeated linear factors and non repeated quadratic factor) | 03 | 06 |
| | **1.4 Matrix Algebra** - Definition of a matrix, types of matrices, Equal matrices, Addition, subtraction, multiplication of matrices. Scalar multiple of a matrix. Transpose of a matrix, Singular and Non singular matrix. Adjoint of a square matrix. Inverse of a matrix. Solution of simultaneous linear equations in 3 unknowns by Adjoint method. | 06 | 10 |
| | **1.5 Binomial Theorem**<br>Definition of factorial notation, definition of permutation and combinations with formula,<br>Binomial theorem for positive index,<br>General term,<br>Binomial theorem for negative index,<br>Approximate value (only formula) | 04 | 06 |
| 2. | **TRIGONOMETRY** | **20** | **32** |
| | 2.1 Trigonometric ratios and fundamental identities. | 04 | 08 |
| | 2.2 Trigonometric ratios of allied angles, compound angles, multiple angles (2A, 3A), submultiples angle. | 06 | 08 |
| | 2.3 Sum and product formulae. | 06 | 08 |
| | 2.4 Inverse Circular functions. (definition and simple problems) | 04 | 08 |
| 3. | **COORDINATE GEOMETRY** | **10** | **16** |
| | **3.1 Straight Line**<br>Slope and intercept of straight line. Equation of straight line in slope point form, slope-intercept form, two-point form, two-intercept form, normal form. General equation of line. Angle between two straight lines. Condition of Parallel and Perpendicular lines. Intersection of two lines. Length of perpendicular from a point on the line and perpendicular distance between parallel lines. | 06 | 10 |
| | **3.2Circle**<br>Equation of circle in standard form, Centre-radius form, Diameter form, two intercept form. General equation of a circle and its centre & radius. | 04 | 06 |

**(For Tutorials a batch of 20 students)**

**Reference Books:**

| Author | Title | Publisher |
|---|---|---|
| Shri S.P. Deshpande | Mathematics for Polytechnic Students | Pune Vidyarthi Griha |
| Shri S.L. Loney | Plane Trigonometry | Macmillan and London |
| Shri H.K. Dass | Mathematics for Engineers ( Vol.I) | S.Chand and Comp. |
| Shri Shantinarayan | Engg. Maths Vol.I and II | S. Chand and Comp. |

**Learning Resources** – Chalk, Board etc.

**Specification Table :**

| Sr. No. | Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| 1. | Algebra | 08 | 16 | 08 | 32 |
| 2. | Trigonometry | 08 | 16 | 08 | 32 |
| 3. | Co-ordinate Geometry | 04 | 08 | 04 | 16 |
| | Total | 20 | 40 | 20 | 80 |

Prepared by

| | | |
|---|---|---|
| ( V.B.Shinde) | ( S.V.Chaudhari) | ( M.S.Satarkar ) |
| Lect.in Mathematics | Member Secretary PBOS | Chairman PBOS |

**Name of Programme** : **CE/**EE/ET/ME/MT/CM/IT

**Programme Code** : **01**/02/03/04/05/06/07/**21**/22/23/24/26

**Name of Course** : **Applied Mathematics –II**

**Course Code** : **SC 182**

**Prerequisite** : **NIL**

**Teaching Scheme:**

| | Hours /Week | Total Hours |
|---|---|---|
| Theory | 03 | 48 |
| Term Work /Tutorial | 01 | 16 |

**Evaluation:**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term work |
| Duration | Two class tests of 60 minutes duration | 3 Hrs | -- | -- | -- |
| Marks | 20 | 80 | -- | -- | -- |

**Course Aim:**

This subject intends to teach students basic facts, concepts, principles and procedure of Mathematics as a tool to analyze Engineering problems and as such it lays down foundation for the understanding of engineering science and core technology subjects.

**Course Objectives:**

The students will be able to,

1. Under stand basic facts of Mathematics about the field of analysis of any Engineering problem.
2. Know the standard ways in which the problem can be approached.
3. Apply basic concepts to engineering problems.

**Course Contents:**

| Sr. No. | Name | Periods | Marks |
|---|---|---|---|
| **1** | **FUNCTIONS AND LIMITS :** | **13** | **18** |
| | 1.1 Functions: Concept of functions, Types of functions; ( only definitions) | 03 | 06 |
| | 1.2 Limits: Concept of limits and limits of functions. ( algebraic, trigonometric, logarithmic and exponential.) | 10 | 12 |
| **2** | **DERIVATIVES:** | **16** | **24** |
| | 2.1 Definition of the derivative, derivatives of standard Functions. | 03 | 04 |
| | 2.2 Differentiation of sum, difference, product and quotient of two or more functions | 03 | 04 |
| | 2.3 Differentiation of composite, inverse, implicit functions. | 04 | 06 |
| | 2.4 Differentiation of parametric, exponential and logarithmic Functions. | 04 | 06 |
| | 2.5Successive differentiation. | 02 | 04 |
| **3** | **APPLICATIONS OF DERIVATIVES:** | **05** | **08** |
| | 3.1 Geometrical meaning of derivative ( Equations of tangents and Normals) | 03 | 04 |
| | 3.2 Maxima and minima of functions. | 02 | 04 |
| **4.** | **VECTORS** | **06** | **14** |
| | 4.1 Definition of vector, position vector, Algebra of vectors (Equality, addition, subtraction and scalar multiplication) | 01 | 02 |
| | 4.2 Dot (Scalar) product with properties. | 02 | 04 |
| | 4.3 Vector (Cross) product with properties. | 02 | 04 |
| | 4.4 Workdone and moment of force about a point & line | 01 | 04 |
| **5.** | **NUMERICAL METHODS** | **08** | **16** |
| | 5.1 Solution of algebraic equations : Bisection method, Regulafalsi method and Newton – Raphson method. | 04 | 08 |
| | 5.2 Solution of simultaneous equations containing 2 and 3 Unknowns : Gauss elimination method. Iterative methods- Gauss Seidal and Jacobi's method | 04 | 08 |
| | | **48** | **80** |

**(For Tutorials a batch of 20 students)**

**Reference Books:**

| Author | Title | Publisher |
|---|---|---|
| Vishwanath | Engineering Mathematics Vol.I | Satya Prakashan, New Delhi |
| S.P. Deshpande | Mathematic for polytechnic students I & II | Pune Vidyarthi Griha Prakashan |
| H.K. Dass | Mathematics for Engineering Vol-I | S.Chand and Company |
| Shantinarayan | Engineering Mathematics vol-I and II | S.Chand and Company |

**Learning Resources:** Chalk, Board etc.

**Specification Table:**

| Sr. No. | Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| 1 | Function And Limits | 04 | 08 | 06 | 18 |
| 2 | Derivatives | 08 | 16 | 00 | 24 |
| 3 | Applications Of Derivatives | 00 | 00 | 08 | 08 |
| 4 | Vectors | 04 | 04 | 06 | 14 |
| 5 | Numerical Methods | 04 | 04 | 08 | 16 |
| | Total | 20 | 32 | 28 | 80 |

Prepared by

| | | |
|---|---|---|
| ( V.B.Shinde) | ( S.V.Chaudhari) | ( M.S.Satarkar ) |
| Lect.in Mathematics | Member Secretary PBOS | Chairman PBOS |

**GOVERNMENT POLYTECHNIC, PUNE**
**( An Autonomous Institute of Govt. of Maharshtra )**

**Programme : Diploma in CE/ EE/ ME / MT**
**Programme Code : 01/02/04/05/15/16/18/19**
**Name of Course : Engineering Mechanics**
**Course Code : AM - 281**

## Teaching Scheme :

| | Hours/Week | Total Hours |
|---|---|---|
| **Theory** | **4** | **64** |
| **Practical** | **2** | **32** |

## Evaluation Schemes :

| | Progressive Assesment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term Work |
| Duration | Two class tests, Each of 60 minutes | 3 Hours | - | - | - |
| Marks | 20 | 80 | - | - | 25 |

## Course Rationale :

To find solutions to various practical problems, it is essential for the student to study and get acquainted with the various aspects in Statics and Dynamics. The fundamental concepts to be studied in this ciurse are required for study of strengh of materials, Mechanics of Structures and other course of Mechanical & Civil Engineering to be studied at higher level.

## Course Objectives :

After studying this course, the student will be able to

I Understand various concepts & principles in Engineering Mechanics
ii Apply those principles for evaluating various problems coming across various fields of engineering.

**Course Content :**

| Chapter No | Name of Topics / Sub Topic | Hrs | Weightage |
|---|---|---|---|
| 1 | **Introduction** | 2 | 2 |
| | 1.1 Fundamental Concepts such as Fundamental Units, Deprived unit, system of uniy, Scalars, Vectors. | | |
| | 1.2 Mechanics, Statics, Dynamics, Kinematics, Kinetics. | | |
| | 1.3 Gravity, Mass, Weight, Inertia, Newton's law of Gravitation and Newton's law of motion. | | |
| 2 | **Resolution and composition of Forces** | 8 | 12 |
| | 2.1 concept of force, unit force, graphical represntation, Principle of transmissibility. | | |
| | 2.2 System of forces, coplanar, non coplanar, concurrent non-concurrent, parallel. | | |
| | 2.3 Resolution of a force, resolved parts, orthogonal andnon-orthogonal components of a force. | | |
| | 2.4 Concept of composition & resultant of forces | | |
| | 2.5 Law of Paralleogram of forces, Triangle law of forces, Polygon law of forces. | | |
| | 2.6 Moment of a force, Varignon's Theorm, couple & characteristics of couple | | |
| | 2.7 Composition of Coplanar forces- Concurrent, parallel ( like and unlike) non concurrent forces by analytical methods. | | |
| | | | |
| 3 | **Equilibrium** | 8 | 12 |
| | 3.1 Concepts of equilibrium, equilibrant, Relation between resultant & equilibrunt. Analytical conditions. | | |
| | 3.2 Equilibrium of coplanar concurrent forces, Lami's theorm and it's application. | | |
| | 3.3 Equilibrium of coplanar parallel and non concurrent forces. | | |
| | 3.4 Beams reaction - simply supported beams subjected to concentrated and distributed loads, beam suppoorted on roller and hinge supports, overhanging beams. | | |

| | | | |
|---|---|---|---|
| **4** | **Centroid and Centre of Gravity** | | |
| | 4.1 Concept of Centre of Gravity & Centroid. | | |
| | 4.2 Centroid of regular plane areas & compound areas consisting of regular plane areas. Centroid of hollow solids such as hollow cylinder, hollow cone hollow sphere. | 6 | 8 |
| | 4.3 Centre of gravity of simple solids-cylinder, cone, sphere etc. and C.G of compound solid objects made up of simple solids. | | |
| | | | |
| **5** | **Friction** | | |
| | 5.1 Introduction to Friction. | | |
| | 5.2 Types of friction, laws of static friction, coefficient of friction, angle of friction and angle of repose. | 8 | 10 |
| | 5.3 Equilibrium of body on horizontal & inclined planes. | | |
| | 5.4 Ladder friction. | | |
| | | | |
| **6** | **Kinetics** | | |
| | 6.1 Concept of force,mass, accleration, momentum, impulse,& impact. | | |
| | 6.2 Types of friction, laws of static friction, coefficient of friction, angle of friction and angle of repose. | 8 | 10 |
| | 6.3 Principles of conservation of momentum, principles - its application, recoil velocity of gun. | | |
| | | | |
| **7** | **Work, Power, Energy** | | |
| | 7.1 Defination and units of work, graphical representation of work, work done by constant and variable force. | | |
| | 7.2 Energy, forms, law of conservation of energy, work energy principle and it's applications. | 8 | 8 |
| | 7.3 Power- Defination, units. | | |
| | | | |
| **8** | **Simple Machines** | | |
| | 8.1 defination of simple machine, mechanical advantage, velocity ratio,, efficiency,. Relation between them, friction in machines. | | |
| | 8.2 Reversbility, law of machine, max MA and max efficiency. | 10 | 10 |
| | 8.3 study of machine - levers, pulleys, wheel and axle, screws, worm & worm wheel, winches, gears etc. | | |
| | **Total** | **58** | **72** |

## List of Practicals / Experiments / Assisgnments :

| Sr.No | Name of Experiment / Assignment | Hrs. |
|---|---|---|
| | | |
| 1 | Law of polygon of Forces. | 2 |
| 2 | Law of Moments. | 2 |
| 3 | Lami's Theorem. | 2 |
| 4 | Beam Reactions. | 2 |
| 5 | Graphic Statics Two problems each on composition of concurrent and parallel forces. | 6 |
| 6 | Graphic statics- Two problems on beam reactions. | 4 |
| 7 | Centroid of regular and irregular Laminas | 2 |
| 8 | Determination of coefficient of friction for different surfaces. | 2 |
| 9 | To study various lifting machines - Differential axle and wheel, Worm and worm wheel,simple screw jack, Single purchase crab, Double purchase crab. | 10 |
| | **Total** | **32** |

## Instructional Strategy :

| Sr.No | Topic | Instructional Strategy | | |
|---|---|---|---|---|
| | | | | |
| 1 | Introduction | Lect. Method, demonstration | | |
| 2 | Resolution & composition of forces | Lect. Method, demonstration | | |
| 3 | Equilibrium | Lect.Methods, Transparencies | | |
| 4 | Graphic statics | Lect.Methods, Transparencies | | |
| 5 | Centroid and centre of Gravity | Lecture,Demonstration & Discuss. | | |
| 6 | Friction | Lect. Method, demonstration | | |
| 7 | Kinetics | Lect. Method, demonstration | | |
| 8 | Work, Power, Energy | Lect. Method, demonstration | | |
| 9 | Simple lifting machines | Lect. Method, demonstration | | |

## Text Books :

| Sr.No | Author | Title | Publication |
|---|---|---|---|
| | | | |
| 1 | Junnarkar, Adavi | Applied Mechanics | Charotkar |
| 2 | Dafhe, Jamdar, Walawalkar | Applied Mechanics | Sarita Prakashan |
| 3 | Khurmi | Applied Mechanics | S.Chand |

## Refrence Books :

| Sr.No | Author | Title | Publication |
|---|---|---|---|
| 1 | Beer & Jhonson | Vector Mechanics For Engineers.(Statics and Dynamics) | Mc- Graw Hill Co., USA |
| 2 | McLean & Nelson ( Schaum's series) | Engineering Mechanics | Mc- Graw Hill Co., USA |
| 3 | Timoshenko & Young | Engineering Mechanics | Mc- Graw Hill Co., USA |

**Learning Resources : Books, Models.**

**Specification Table :**

| Sr.No | Topic | Cognitive Levels | | | |
|---|---|---|---|---|---|
| | | **Knowledge** | **Comprehension** | **Application** | **Total** |
| | | | | | |
| 1 | Introduction | 2 | … | … | 2 |
| 2 | Resolution & composition of forces | 2 | 4 | 6 | 12 |
| 3 | Equilibrium | 2 | 2 | 8 | 12 |
| 4 | Graphic Statics | 4 | 4 | … | 8 |
| 5 | Centroid and centre of Gravity | 2 | 2 | 4 | 8 |
| 6 | Friction | 2 | 2 | 6 | 10 |
| 7 | Kinetics | 2 | 2 | 6 | 10 |
| 8 | Work, Power, energy | 2 | 2 | 4 | 8 |
| 9 | Simple lifting machines | 2 | 4 | 4 | 10 |
| | **Total** | **20** | **22** | **38** | **80** |

| **(R.S. Pathade)** | **( S.V. Chaudhari )** | **(M.M.Ganorkar )** | **( M.S. Satarkar )** |
|---|---|---|---|
| Prepared By | CDC Incharge | HOD Applied Mech. Deptt. | HOD ( Civil ) |

**Programme : Diploma in CE/**ME/MT/EE
**Programme Code : 01**/04/05/**21**/24/**15**/18/19
**Name of Course : Workshop Practice**
**Course Code : WS281**

**Teaching Scheme:**

| | **Hours/Week** | **Total Hours** |
|---|---|---|
| **Theory** | NIL | NIL |
| **Practical** | **04** | **64** |

**Evaluation Scheme:**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term Work |
| Duration | --- | --- | --- | --- | --- |
| Marks | --- | --- | --- | --- | 50 |

**Course Rationale:** To make the students conversant with the use of various workshop tools used in smithy, carpentry, fitting, welding ,plumbing and sheet metal shops.

**Course Objectives:**

After studying this course, the student will be able to

- Interpret the assigned job drawing.
- Identify various tools used in different shops of Work shop.
- Select appropriate tool set to perform a specific job.
- Acquire skills to use various tools.
- Take care and maintain the tools.
- Do practices in respective trades.
- Adopt safe practices during working.

**List of Practicals/Experiments/Assignments:**

| **Sr. No.** | **Name of topic/Subtopic** | **Hrs.** |
|---|---|---|
| 1 | Demonstration of job involving minimum three operations. e.g. Upsetting, Drawing Down, Bending, Setting down. | 08 |
| 2 | One carpentry job involving carpentry joints and wood turning. | 14 |
| 3 | One fitting job involving Marking, Filing, Sawing, Drilling, Tapping. | 14 |
| 4 | One welding job involving welding joints. | 14 |
| 5 | One job in plumbing of pipe threading and pipe joints. | 06 |
| 6 | One job in sheet metal | 08 |
| | **Total** | **64** |

**Instructional Strategy :**

| Sr. No. | Topic | Instructional strategy |
|---|---|---|
| 1 | Smithy and forging | Explanation, Demonstration, exhibition of Models/Samples pieces. |
| 2 | Carpentry | |
| 3 | Fitting and filling | |
| 4 | Welding | |
| 5 | Plumbing | |
| 6 | Sheet Metal | |

**Reference Books :**

| Sr. No. | Author | Title | Publication |
|---|---|---|---|
| 1 | S. K. Hajara Chaudhari<br>A.K. Hajara Chaudhari | Elements of Workshop Technology - Vol. I | Media Promoters and Publishers Pvt. Ltd., Mumbai-7 |
| 2 | V. Kapoor | Workshop Practice Manual | Dhanpat Rai and Sons, New Delhi-32 |
| 3 | B.S. Raghuwanshi | A course in Workshop Technology Vol.- I | Dhanpat Rai and Sons, New Delhi-32 |

**Learning resources:** Demonstration kit, charts, models/sample pieces and books.

**Specification Table :**

| Sr. No | Topic | Knowledge | Imitation | Manipulation | Perfection | Total |
|---|---|---|---|---|---|---|
| 1 | Smithy and forging | 5 | --- | --- | --- | 5 |
| 2 | Carpentry | 3 | 2 | 3 | 2 | 10 |
| 3 | Fitting and filling | 3 | 2 | 3 | 2 | 10 |
| 4 | Welding | 3 | 2 | 3 | 2 | 10 |
| 5 | Plumbing | 3 | 2 | 3 | 2 | 10 |
| 6 | Sheet Metal | 5 | --- | --- | --- | 5 |
| | **Total** | **25** | **25** | **25** | **25** | **50** |

Prepared By

| | | | |
|---|---|---|---|
| ( C. S. Ashtekar)<br>Workshop Superintendent | ( S. V. Chaudhari)<br>Member Secretary, PBOS | (M. S. Deshmukh )<br>Chairman, PBOS | (M.S.Satarkar)<br>H.C.E.D. and Chairman, PBOS |

**Name of programme** : Civil Engineering
**Programme Code** : 01/ 21/ 15
**Name of course** : Real Estate Management
**Course code** : CE 281

**Teaching Scheme:**

| | Hours/Week | Total Hours |
|---|---|---|
| Theory | 02 | 32 |
| Term work / Practical | 02 | 32 |

**Evaluation Scheme:**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term Work |
| Duration | Two class tests of 60 minutes. | 3 Hours | -- | -- | -- |
| Marks | 20 | 80 | -- | -- | 25 |

**Course Aim:** Now a days Site Engineers are not expected to supervise the construction only but also are required to look after in activities like land purchasing, plotting , developing, and licensing with agencies like Land Record, Revenue Department, Consumer Court, etc. Hence the knowledge of this course will enable the students to make them work fit.

**Course Objectives:**

The student will able to-

- Understand the customers' (Buyers and sellers) needs.
- Interpret legal aspects of deals.
- Workout alternatives for Financing, Taxes, Insurance, Loan Proposals, etc. services.
- Negotiate with customers about deals.

**Course Content:**

| Sr. No | Topic/Subtopic | Hours | Weightage |
|---|---|---|---|
| 1. | **Introduction to Real Estimate Management**<br>1.1 Real Estate market in India<br>1.2 Scope of Civil Engineer as consultant in Real Estate Management<br>1.3 Skills required for consultants<br>1.4 Investments in Real Estate | 05 | 12 |
| 2. | **Types of Real Estates**<br>2.1 Types of Real Estates-Lands-Agriculture, Industrial, Residential, Amenity, Non Agricultural Plots, Flats, Industries, Commercial Market, etc.<br>2.2 Legal title of Real Estate, Types - freehold, lease hold, Co-op. societies, Apartments.<br>2.3 Valuation of properties, Government Ready Recknor, Use for Stamp Duties Charges & Registration | 06 | 16 |
| 3 | **Customer Care**<br>3.1 Understanding needs of customers.<br>3.2 Types of customers, Handling customers<br>3.3 Customers' satisfaction<br>3.4Consumer court organization, procedure & jurisdiction of the court. | 04 | 08 |
| 4 | **Documents**<br>4.1 List of documents for legal status of property<br>4.2 Procedure for obtaining 'Clear Title' certificate<br>4.3 Arranging finance for purchase of properties. Types of financial Institutes. Processing procedure & fees of financing Institutes.<br>4.4 Transfer of property ownership-Agreement for safe, sale deed, 7/12 Extract, Property card, Electricity bills. | 06 | 16 |
| 5 | **Property Taxes**<br>5.1 Types of Taxes in Real Estates - Stamp duty, Registration charges, GST, Property tax, Vacant plot tax, N.A. tax.<br>5.2 Audit Report of Important taxes.<br>5.3 Accounts in Real Estates. | 06 | 16 |
| 6 | **Human Recourses in Real Estate Management**<br>6.1 Organization in Real Estate Managements.<br>6.2 Types of personnel , Duties & Responsibilities of Personnel, Organization chart Leadership, Need of Networking, Team building<br>6.3 Use of computers<br>6.4 Promotion & publicity of real Estate. | 05 | 12 |

**Instructional Strategy:**

| Sr | Topic | Instruction Strategy |
|---|---|---|
| 1. | Introduction to Real Estimate Management | Class room teaching, transparencies |
| 2. | Types of Real Estates | Class room teaching, transparencies |
| 3. | Customer Care | Class room teaching, site visit, transparencies |
| 4. | Documents | Class room teaching, site visit, transparencies |
| 5. | Property Taxes | Class room teaching, transparencies |
| 6. | Human Recourses in Real Estate Management | Class room teaching, transparencies |

**Text Books:**

| Author | Title | Publisher |
|---|---|---|
| Sandeep Mantri | A to Z of Practical Building Construction and its Management | Satya Prakashan, New Delhi |
| N.R.Patwardhan | *Bandhakamacha Onama* | Pune Vidyarthi Gruha, Pune |
| | | |

**Reference Book:**

| Author | Title | Publisher |
|---|---|---|
| | Real Estate Observer Magazine | |
| | | |

**Web Sites for Reference**

www.99.acres.com

www.magicbricks.com

**Specification Table:**

| Sr. No. | | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| 1 | Introduction to Real Estimate Management | 04 | 04 | 04 | 12 |
| 2 | Types of Real Estates | 06 | 06 | 04 | 16 |
| 3 | Customer Care | -- | 04 | 04 | 08 |
| 4 | Documents | 06 | 06 | 04 | 16 |
| 5 | Property Taxes | 06 | 06 | 04 | 16 |
| 6 | Human Recourses in Real Estate Management | 04 | 04 | 04 | 12 |
| Total | | 26 | 30 | 24 | 80 |

Prepared by

(R.H.Dhorje)
L.C.E.

(S V Chaudhari)
C.D.C. Incharge &
Member Secretary

(M.S Satarkar)
H.C.E.D. &
PBOS Chairman

**Name of programme** : Civil Engineering
**Programme Code** : 01/ 21/ 15
**Name of course** : Construction Materials and Processes
**Course code** : CE 281

**Teaching Scheme:**

| | Hours/Week | Total Hours |
|---|---|---|
| Theory | 03 | 48 |
| Term work / Practical | 02 | 32 |

**Evaluation Scheme:**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term Work |
| Duration | Two class tests of 60 minutes. | 3 Hours | -- | -- | -- |
| Marks | 20 | 80 | -- | 25 | 50 |

**Course Aim:**

To study the various building materials used in various components of building. It is essential for the student to study and get acquainted about various aspects in Building construction. The fundamental concepts to be studied in this course are required for study of various components of building with their functions, types of material used.

**Course Objectives:**

The students will able to:-
1. Understand various types materials used in Civil Engineering Construction.
2. Understand various Construction processes followed in Civil Engineering.

**Course Content:**

| Sr. No | Topic/Subtopic | Hours | Weig htage | Practical |
|---|---|---|---|---|
| 1. | **Introduction**<br>1.1 Types of building<br>1.2 Components of building with their functions & materials used<br>1.3 Technical terms & definitions<br>1.4 Types of structures- Load bearing framed & composite with their comparison<br>1.5 Requirements of parts of building | 06 | 08 | |
| 2. | **Engineering Materials**<br>**Stones**<br>2.1 Classification of rocks- geological physical, chemical , uses of stone<br>2.2 Qualities of good building stones.<br>2.3 Criteria for selection of site for quarry.<br>2.4 Artificial stone- procedure of making artificial stone, forms of artificial stone & their advantages<br>2.5 Field tests applicable to stone at site | 06 | 08 | |
| 3 | **Bricks**<br>3.1 Manufacturing process, shapes & sizes, classification of bricks, uses of bricks<br>3.2 Comparisons of brickwork & stonework, qualities of good brick, field test applicable to bricks at site. | 04 | 08 | |
| 4 | **A)Timber**<br>4.1 Classification of timber, seasoning of timber-natural & artificial methods, market forms of timber,<br>4.2 Application of timber in construction industry, defects in timber<br>**B) Mortar**<br>4.3 Definition, classification, preparation, properties, uses, precaution to be taken while using mortar | 04 | 10 | |

| | | | | |
|---|---|---|---|---|
| 5 | **Masonry**<br>5.1 Stone masonry- terms used in stone masonry, through stone<br>5.2 Classification of stone masonry Rubble- coursed & uncoursed, random rubble, dry rubble<br>Ashlar- fine, rough, tooled, rock or quarry faced, chamfered,<br>5.3 Brick masonry- types of bricks, terms used in brick masonry,<br>Bonds in one brick &one and half brick thick wall-Stretcher, Header, English, Flemish bonds.<br>5.4 Points to be observed while supervising brick masonry work | 06 | 08 | |
| 6 | **Hollow block masonry and Clay Products**<br>6.1 Hollow block masonry Construction method of hollow block masonry,<br>6.2 situations where hollow block masonry is used, Merits and demerits of hollow block masonry<br>6.3Clay Tile-Characteristics of good tiles, types of common tiles & uses. | 04 | 08 | |
| **7** | **Glass, Plastic and Fibres**<br>7.1 Glass-classification, composition of glass, properties of glass, Types of glass & their suitability in building construction industry<br>7.2 Classification of plastic, advantages & uses of plastic in construction industry<br>7.3 Types of Fibres –Jute, Coir, Steel Fibres, Carbon Fibres, Glass Fibres, Plastic Fibres, Asbestos fibres, Properties of fibres and uses | 04 | 10 | |
| 8 | **Plumbing Materials**<br>8.1Objectives of plumbing, Purpose of plumbing, role of plumber, licensing of plumbers & their functions | 02 | 04 | |
| 9 | **A) Electrical works in Buildings**<br>9.1Purpose of residential Electrical Installation<br>9.2 Selection & specification of wires and cables<br>9.3 Purpose, selection, use of wiring components- main switch, DP switch, two way switch, DPDT switches, S.P. | 12 | 16 | |

| | | | | |
|---|---|---|---|---|
| | switch, fuses, MCB, ELCB, Ceiling roses, Fixtures, socket outlet lamp holder, sub-circuit board, distribution board<br>9.4 Need of earthing and its use<br>9.5 Indian electricity rule for safety of person<br>**B) Heat Ventilation & Air-Conditioning in Buildings**<br>9.6 Basic principle of Refrigeration & Air Conditioning, concept of one Tonne of refrigeration<br>9.7 Bellcoleman cycle<br>9.8 Basic of pstycometry<br>9.9Insulating Materials-Properties and different types of materials for insulation | | | |

**Practical Works:**

1) Market survey for collecting information regarding brand name, unit of measurement, name of manufacturer, rates, pamphlet of the construction and plumbing materials.
2) Market survey for collecting information regarding brand name, unit of measurement, name of manufacturer, rates, pamphlet of glass, plastic sheets.
3) Field tests on bricks
4) Water absorption test for bricks.
5) Field tests on cement.
6) Use of construction material by visiting different types of building within and off campus and making list of at least ten construction materials used there in.
7) Thumb rules for taking measurement of tile, bricks, window, and door room.
8) Visit to load bearing and framed structure to identify various component of building.
9) Visit to institutional building for observing electrical and heat ventilation and air-conditioning systems.
10) Visit to building for observing plumbing, (water supply) drainage works.

**Instructional Strategy:**

| Sr. No. | Topic | Instructional Strategy |
|---|---|---|
| 1 | Introduction | Lecture method, Demonstration |
| 2 | Stones | Lecture method, Demonstration, visit to building |
| 3 | Bricks | Lecture method, Demonstration , visit to building |
| 4 | Timber and mortar | Lecture method, Demonstration, visit to building |
| 5 | Masonry | Lecture, Demonstration & visit to building |
| 6 | Hollow block masonry and clay products | Lecture method, Demonstration, visit to building |
| 7 | Glass plastic and fibres | Lecture method, Demonstration, visit to building |
| 8 | Plumbing materials | Lecture method, Demonstration, visit to building |
| 9 | a)Electrical works in buildings<br>b)Heat ventilation and air-conditioning. | Lecture method, Demonstration, visit to building |

**Text Books:**

| Sr. No | Author | Title | Publication |
|---|---|---|---|
| 1 | S.C.Rangawala | Building Materials | Charotar Publishing House |
| 2 | Sushilkumar | Building Construction | Standard Publishers |
| 3 | Amarjt Agrawal | Building Materials | New India Publication |
| 4 | P.C.Varghese | Building Materials | Prentice Hall India |
| 5 | D.N.Ghosh | Construction Materials | Tata Mc Graw- Hill Publishing Co. |
| 6 | S.Deolalikar | Plumbing Design & Practices | Jain Book Depot, New Delhi |
| 7 | Anant Narayanan | Principles of Refrigeration & Air Conditioning | Tata Mc Graw- Hill Publishing Co. |
| 8 | Subhash M.Patil | Plumbing Materials | Patil Publications, Goregaon, Mumbai |

**Reference Books:**

| Sr. No | Author | Title | Publication |
|---|---|---|---|
| 1. | B.C.Punmia, Ashokkumar Jain, Arunkumar Jain | Building Construction | Laxmi Publication Ltd. |
| 2. | S.C.Ragawala | Building Construction | Charotar Publishing House |
| 3. | S.K.Duggal | Building Materials | New International |
| 4. | NITTTR Chandigarh | Civil Engineering Materials | NITTTR Chandigarh |
| 5. | S.M.Patil | Building Services | Patil Publications, Goregaon, Mumbai |

**Learning Resources:** Books, Models

**Specification Table:**

| Sr. No. | Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| 1 | Introduction | 4 | 4 | -- | 8 |
| 2 | Stones | 4 | -- | 4 | 8 |
| 3 | Bricks | 4 | 4 | -- | 8 |
| 4 | Timber and mortar | 8 | 2 | -- | 10 |
| 5 | Masonry | 4 | 4 | -- | 8 |
| 6 | Hollow block masonry and clay products | 6 | 2 | -- | 8 |
| 7 | Glass plastic and fibres | 6 | 4 | -- | 10 |
| 8 | Plumbing materials | 4 | -- | -- | 4 |
| 9 | a)Electrical works in buildings b)Heat ventilation and air-conditioning. | 8 | 4 | 4 | 16 |
| Total | | 48 | 24 | 08 | 80 |

Prepared By

(V.M.Kolhe)
L.C.E.

(S. V. Chaudhari)
Member Secretary, PBOS

( M.S.Satarkar)
H.C.E.D. and
Chairman, PBOS

**Programme** : Diploma in **CE**/ ET/ME/ MT
**Programme Code** : **01**/ 03/04 /05/**21**/24/**15**/18/19
**Name of Course** : Engineering Graphics
**Course Code** : ME 281

## Teaching Scheme:

| | **Hours /Week** | **Total Hours** |
|---|---|---|
| **Theory** | **02** | **32** |
| **Practical** | **04** | **64** |

## Evaluation Scheme:

| | **Progressive Assessment** | **Semester End Examination** | | | |
|---|---|---|---|---|---|
| | | **Theory** | **Practical** | **Oral** | **Term work** |
| Duration | Two class tests, each of 90 minutes | 4 hrs. | -- | -- | -- |
| Marks | **20** | **80** | -- | -- | **25** |

## Course Rationale:

Engineering drawing is the graphical language. It is used by engineers, designers, planners, supervisors and also the workers to express their thoughts, ideas and concepts. The expression by drawing is very accurate, precise and brief. At a glance one can understand detailed description of any part to be manufactured or a dam to be built or an electric circuit to be used. For all technicians through understanding of principles of engineering drawing (Graphic Skills) is essential.

## Course Objectives:

After studying this course, the student will be able to

- Draw various engineering curves.
- Incorporate Indian Standards in drawings.
- Sketch various orthographic and isometric views.
- Draw all different views from given components vis-à-vis.
- Draw free hand sketches.

## Course Content:

| **Sr. No.** | **Name of Topic/Sub topic** | | **Hrs** | **Weigh tage** |
|---|---|---|---|---|
| **1.** | **Introduction of Drawing Instruments, Lines, Letters etc.** | | | |
| | 1.1 | Use of different drawing equipments. | **02** | -- |
| | 1.2 | Type of letters. | | |
| | 1.3 | Conventions of lines. | | |
| | 1.4 | Scales. | | |

| | | | | |
|---|---|---|---|---|
| **2.** | **Curve and Tangential Exercises** | | | |
| | 2.1 | Geometrical constructions and tangential exercises. | **04** | **12** |
| | 2.2 | To draw an ellipse by concentric circle method. | | |
| | 2.3 | To draw a parabola by :<br>i) Directrix focus method. | | |
| | 2.4 | To draw a hyperbola by :<br>i) Directrixfocus method. | | |
| | 2.5 | To draw involute of circle, Regular polygon such as pentagon | | |
| | 2.6 | To draw a cylindrical helix (limited to two turns ) | | |
| | 2.7 | To draw cycloid, epicycloids and hypocycloid. | | |
| **3.** | **Orthographic Projections** | | | |
| | | Introduction to orthographic projections first and third angle method of projection. Conversion of simple pictorial view, Dimensioning technique. | **05** | **12** |
| **4.** | **Sectional Orthographic Projections** | | | |
| | | Introduction, converting the given pictorial view into sectional views. | **03** | **12** |
| **5.** | **Isometric Views** | | | |
| | 7.1 | Isometric scale and isometric views of simple objects. | **04** | **14** |
| | 7.2 | Isometric views of rectangular, cylindrical objects,<br>Slots on sloping surface. | | |
| **6.** | **Projection of Line** | | | |
| | 6.1 | Line inclined to one plane and parallel to another plane | **02** | **06** |
| **7.** | **Projection of Planes** | | | |
| | 7.1 | Surface planes inclined to one plane and perpendicular to another plane. | **04** | **08** |
| **8.** | **Projection of Solids** | | | |
| | **8.1** | Axis inclined to one plan only Concept of true length of regular solids such as Cylinder, Prism Cone and Pyramid, cube and tetra hedron | **06** | **08** |
| **9.** | **Free Hand Sketches** | | | |
| | **9.1** | Fasteners, temporary threaded fasteners, locking arrangement, Foundation Bolts. | **02** | **08** |
| Total | | | **32** | **80** |

## List of Practicals / Experiments/Assignments:

| **Sr. No.** | **Name of Experiment/Assignment** | Hrs |
|---|---|---|
| Six sheets on topics covered in the syllabus. | | |
| 1. | Line letters and numbers. (Sheet No.1) | 06 |
| 2. | Engineering curves and tangential exercises. Any four problems (Sheet No.2) | 06 |
| 3. | Orthographic projection, Sectional views. One on each (Sheet No.3) | 16 |
| 4. | Projection of lines, planes. Two problems each (Sheet No.4) | 12 |
| 5. | Projection of solids.Two problems (Sheet No. 5) | |
| 6. | One sheet Isometric projection. Minimum Two Problems. (Sheet No.5) | 16 |
| 7. | Free hand sketches.Any Eight elements (Sheet No.6) | 08 |
| Total | | **64** |

**Instructional Strategy:**

| Sr. No. | Topic | Instructional Strategy |
|---|---|---|
| 1. | Introduction to Drawing instruments lines letters etc. | Classroom teaching and Demonstration. |
| 2. | Curves and tangential exercises | Demonstrations and classroom teaching. |
| 3. | Orthographic projection | Use of models and classroom teaching. |
| 4. | Sectional orthographic projection | Use of models, transparencies and classroom teaching. |
| 5. | Isometric views | Classroom teaching, self study and assignments. |
| 6. | Projection of lines. | Classroom teaching and assignments. |
| 7. | Projection of planes. | Classroom teaching and use of models. |
| 8. | Projection of solids | Classroom teaching and use of models. |
| 8. | Free hand sketches | Classroom teaching and assignments & use of Models. |

**Text Books:**

| Sr. No | Author | Title | Publication |
|---|---|---|---|
| 1. | N.D. Bhatt | Elementary Engg. Drawing ( Including plan and solid geometry ) | Charotar Publication, Anand. |
| 2. | Mali, Chaudhari | Engineering Drawing | VrindaPrakashan, Jalgaon |

**Reference Books:**

| Sr. No | Author | Title | Publication |
|---|---|---|---|
| 1 | N.D. Bhatt | Geometrical and Machine Drawing | Charotar Publication, Anand. |
| 2 | -- | I.S. 696 Latest version | B.I.S. |
| 3 | Curriculum Development Centre, TTTI, Bhopal | A Workbook in Engineering Drawing | Somaiyya Publication Pvt. Ltd., Mumbai |
| 4 | -- | SP 46 – 1988 | B.I.S. |
| 5 | G.R. Nagpal | Machine Drawing | -- |
| 6 | K. Venugopal | Engineering Drawing and Graphics + AutoCAD | New Age International Publishers. |

**Learning Resources:** Video cassettes No. 122, 123 of G.P.P. Library

**Specification Table:**

| Sr. No. | Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| 1. | Introduction to Drawing instruments lines letters etc. | -- | -- | -- | -- |
| 2. | Curve and Tangential exercises | 12 | -- | -- | 12 |
| 3. | Orthographic Projection | -- | 12 | -- | 12 |
| 4. | Sectional orthographic projection | -- | 12 | -- | 12 |
| 5. | Isometric views | -- | -- | 08 | 08 |
| 6. | Projection of lines. | -- | 12 | -- | 12 |
| 7. | Projection of planes. | -- | -- | 12 | 12 |
| 8. | Projection of solids | 06 | -- | -- | 06 |
| 9. | Free hand sketches | 06 | -- | -- | 06 |
| Total | | **24** | **36** | **20** | **80** |

Prepared By :

| | | | |
|---|---|---|---|
| ( D. P. Khadse) | (S. V. Chaudhari) | ( M. S. Deshmukh ) | (M.S.Satarkar) |
| L.M.E. | Member Secretary, PBOS | Chairman, PBOS | H.C.E.D. & Chairman P.B.O.S. |

| | | |
|---|---|---|
| **Programme** | **:** | **CE**/ EE/ET/ME/MT/DDGM |
| **Programme Code** | **:** | **01**/02/03/04/05/08/**21**/22/23/24/**15**/16/17/18/19 |
| **Name of Course** | **:** | Computer Fundamentals |
| **Course Code** | **:** | CM 286 |

**Teaching Scheme:**

| | **Hours /Week** | **Total Hours** |
|---|---|---|
| **Theory** | **1** | **16** |
| **Practical** | **2** | **32** |

**Evaluation Scheme:**

| | **Progressive Assessment** | **Semester End Examination** | | | |
|---|---|---|---|---|---|
| | | **Theory** | **Practical** | **Oral** | **Term work** |
| **Duration** | -- | -- | **2 hours** | -- | **2 hours** |
| **Marks** | -- | -- | **50** | -- | **25** |

**Course Rationale:**

In this world of high speed computing it is essential for diploma in computer engineering students to know about device of computers, its operation and graphical base applications and latest technologies in the market. This course is designed for basic perspective for first year diploma students.

**Course Objectives:**

After studying this course, the student will be able to

1. Use computer system effectively.
2. Describe and use different application software's.
3. Use the basic functions of an operating system.
4. Use five essential utility programs.
5. Compare major OS like Linux and MS-Windows
6. Understand working of input output devices.
7. Understand working of secondary storage devices.
8. Set the parameter required for effective use of hardware combined with and application software's
9. Understand connectivity, internet multimedia and web

**Course Content:**

| Chapter No. | Name of Topic/Sub topic | | Hrs | Weightage |
|---|---|---|---|---|
| **1** | **Introduction to computer peripherals** | | **3** | -- |
| | 1.1 | Hardware: Input-output devices, CPU and general PC layout | | |
| | 1.2 | Data storage devices: RAM, ROM, External storage – magnetic & USB | | |
| **2** | **Introduction to system softwares** | | **3** | -- |
| | 2.1 | Operating systems: Introduction to various operating systems like DOS, Windows, Android, Unix, Linux. | | |
| | 2.2 | Windows: working with Windows operating system | | |
| | 2.3 | Utility software: Application and working of various utility softwares like Antiviruses, Internet browsers, Adobe reader, office suite, media players etc. | | |
| **3** | **GUI Based Editing, Spreadsheets, Tables & Presentation** | | **8** | -- |
| | 3.1 | Application Software Common Features | | |
| | 3.2 | Word Processors: Working with word processor for creating documents & drafts. | | |
| | 3.3 | Spreadsheets :: Features Creating and Working with spread sheets | | |
| | 3.4 | Presentation Graphics : Features .Working with Presentation Graphics to create presentations | | |
| | 3.5 | Software suites<br>Introduction to Data Base Management System-Microsoft Access. | | |
| **4** | **Communication & Connectivity** | | **2** | |
| | 4.1 | Introduction to communication systems: Telephone, fax, e-mails, messengers (chatting), voice messaging system(voice mail), video-conferencing system . | | |

**List of Practical/Experiments/Assignments:**

| Sr. No. | Name of Practical/Experiment/Assignment | Hrs |
|---|---|---|
| 1 | Understanding computer layout and its peripherals. | 2 |
| 2 | Study of printing and scanning devices | 2 |
| 3 | Working with operating systems like windows XP and understanding the working environment (Desktop, My Computer, My Documents, Recycle bin, Programme files & control panel.) | 2 |
| 4 | Working with MS world (at least four programs including use of pictures/ clipart, wrd ar, shapes, tables, mail merging options) | 6 |
| 5 | Working with MS Excel (at least three programs including creating spreadsheets, performing arithmetic operations, creating charts & graphs). | 6 |

| | | |
|---|---|---|
| 6 | Working with MS Powerpoint ( at least three programs including creating simple presentation, use of hyperlinks, use of animation ). | 6 |
| 7 | Page setting, page layout and printing Word, Excel & powerpoint documents. | 2 |
| 8 | Study of different types of networks and communication devices. | 2 |
| 9 | Internet practices: i)Getting started with internet, ii) Use of search engines iii)creating an email account, iv)E-travel & E-trading . | 2 |
| 10 | Assignment on cyber laws and ethics. | 2 |
| | **Total** | 32 |

**Text Books:**

| Sr. No. | Author | Title | Publication |
|---|---|---|---|
| 1 | Timothy J. O. Leary and Linda I.O' Leary | Computing Essentials (Solving The Puzzles of IT Literacy) | TMH |
| 2 | Vikas Gupta | Comdex Computer Course Kit | Dreamtech |

**Reference Books:**

| Sr. No. | Author | Title | Publication |
|---|---|---|---|
| 1 | P.K. Sinha | Computer Fundamentals | BPB |
| 2 | Henry C. Lucas, Jr. | Information Technology for Management | Tata McGraw Hill |
| 3 | | Windows XP/2000/2003/ Vista Users Guide | Manuals |

Prepared By

(Mrs. Seema Kolhe)
L C E

( S.V.Chaudhari)
Member Secretary, PBOS

(M.S.Satarkar)
Chairman, PBOS

**Name of Programme** : **Diploma in Civil Engineering**

**Programme Code** : **01/21/15**

**Name of Course** : **Mini Project**

**Course Code** : **CE381**

**Teaching Scheme:**

| | Hours / Week | Total Hours |
|---|---|---|
| Theory | -- | -- |
| Term work / Practical | 2 | 32 |

**Evaluation:**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term work |
| | | | | | |
| Marks | -- | -- | -- | 25 | 25 |

**Course Aim:**

The Mini Project work is included in the curriculum to encourage the students to undertake and tackle an independent problem related to Civil Engineering field. The project also comprises of literature survey of a problem assigned.

**Course Objectives:**

Students will be acquainted with the skill required for independent thinking and applications to a problem where he can develop in himself, self reliance.

After completing the project work. The student will be able to:

- Work independently as a leader as well as member of a team.
- Collect data and prepare a report of these activities.
- Use and integrate knowledge of different subjects to prepare working drawings of scheme.
- Make simple designs according to data collected with the help of handbooks, standard data books, I.S. codes etc.

Course Content: (A) Mini Project

| Sr. No | Topic / Subtopic | Practical |
|---|---|---|
| 1 | Mini Project | The students will select a topic related to any course in the curriculum and submit a report of the work done. The Project work will be done by a group of 4 to 6 students. Oral will be based on term-work. |

Prepared by

| | | |
|---|---|---|
| (M.S.Satarkar)<br>H.C.E.D. | (S.V.Chaudhari)<br>Member Secretary<br>P.B.O.S | (M.S.Satarkar)<br>H.C.E.D &<br>Chairman P.B.O.S. |

**Name of Programme : Civil Engineering**

**Programme Code : 01/21/15**

**Name of Course : Civil Engineering Drawing**

**Course Code : CE 382**

**Teaching Scheme:**

| | Hours / Week | Total Hours |
|---|---|---|
| Theory | 2 | 32 |
| Term work / Practical | 6 | 96 |

**Evaluation :**

| | Progressive assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term work |
| Duration | Two class tests of 60 min. duration. | 4 hours | 1 hour | -- | -- |
| Marks | 20 | 80 | 25 | -- | 25 |

**Course Aim :**

Drawing is a universal language of Engineers. An Engineer must be well conversant with drawings. It is the language through which Engineers can communicate with skilled, semiskilled and unskilled labour.

The student has to use this subject to develop ability to read, understand and prepare drawings, to use it for different subjects during diploma course. He will be taught to draw Civil Engineering Structures and its various parts using conventions and symbols as per BIS 696.

**Course Objectives :**

The student will able to

- Read and interpret Civil Engineering Drawing
- Draw as per BIS 696
- Prepare working drawing in design and Drawing section as a Draftsman and also interpret drawing for estimating while working as estimator.
- Draw detail drawing considering rules and laws for submission to sanctioning authority.
- Draw perspective drawing and use simple CAD commands.

**Course Content:**

| Sr. No | Topic / Subtopic | Hours | Weig htage | Practical |
|---|---|---|---|---|
| 1 | **Introduction**<br>Purpose of drawing - primary requirements of good drawing.<br>Symbols and notations as per BIS 696 in Civil Engineering drawing.<br>Types of Lines, North direction, Selection of scales.<br>Different types of drawing - preliminary drawing, working drawing, location drawing, layout plans, site plans, submission drawings. Colouring of plans, Reading of drawings of different building services .e.g. fire fighting, water supply, plumbing, air conditioning. | 3 | 06 | 1) Symbols for Doors, windows, materials in section<br>2) Foundation for R.C.C. Framed structure with plinth filling.<br>3) Single shutter flush door without ventilator.<br>4) Fully glazed steel or Aluminum sliding window - double shutter with ventilator.<br>5) Louvered window<br>6) Different types of stairs (Plans only)<br>7) Types of steel trusses, connection of roof covering such as GI, AC sheets, Mangalore tiles and purlin roof.<br>8) Dog - legged stair (R.C.C.)<br>9) Structural steel sections<br>10) Fully paneled door - plan, elevation and section.<br>(Plates on quarter imperial size). |
| 2 | **Principles of Planning**<br>Principles of Planning of buildings, orientation of Building. | 4 | 06 | **Sheet No. 1**<br>Measured Drawing of a building consisting of plan, elevation, section, schedule of opening, and construction notes.<br><br>**Sheet No. 2**<br>Data drawing for two storied Framed (R.C.C.) residential building- 3 rooms at ground floor with sanitary block and minimum two rooms and sanitary block on first floor. The building will have partly |

| | | | | |
|---|---|---|---|---|
| 3 | **Agencies in Building Construction work**.<br>Role of different agencies involved in construction work such as owner, Architect, structural engineer, contractor, promoter, quantity surveyor, and supervisor. List of documents for plan sanctioning and its procedure.<br>Building Bye Laws.<br>Terminology - Building height. Building Line, covered area, floor area and floor area ratio, Built up area, Carpet area, plinth area.<br>Procedure to be followed during different stages of construction with reference to local authorities. Commencement of work, documents required at site, plinth checking, deviations during construction, completion certificate, occupancy certificate, concept of Transfer of Development Rights (TDR), Concept of Measured drawing & its purpose. | 5 | 06 | flat and partly pitched roof. The drawing shall include ground floor plan, first floor plan, front elevation, and sections and schedule of openings, site plan, construction notes and north direction.<br><br>**Sheet No. 3**<br>Drawing of public building/industrial building consisting of plan, elevation, section, site plan, and area statement, schedule of openings, construction notes, and North direction.<br><br>**Sheet No.4**<br>Line plans of at least four public buildings<br><br>**Sheet No. 5**<br>One point & Two point perspective drawing of two small objects, such as steps, pedestal etc.<br><br>**Sheet No 6**.<br>Preparing line plan of a building using Auto CAD. |
| 4 | **Planning of Residential Buildings**<br>Planning of residential building - Development of line plan, drawing of plan, elevation, sections, preparing schedule of doors, windows Construction notes, Area statement site plan etc. | 6 | 40 | |
| **5** | **Planning of public Buildings** - Data required for planning public building such as Library, community centre, post office, high school, primary health centre, market, hospital, bank, hostel. | 4 | 12 | |
| **6** | **Perspective Drawing**<br>Introduction, Terminology, One point and Two point perspective. | 4 | 10 | |

| | | | | |
|---|---|---|---|---|
| 7 | **Introduction to Auto CAD**<br>Basics of Auto CAD, Draw commands- Line, Circle, Arc, Polygon, Ellipse, etc<br>Drawing Aids- O snap, Grid, snap, Ortho, Tracking, Modify commands- Erase, Uno, Redo, Copy, Move, Trim, Break, Extend, Fillet, Chamfer, Text, Mirror, Format- Limits, Unit, Line types, Dimension style, Paper sizes.<br>(No questions should be set for Theory Examinations on this topic.) | 6 | 00 | |

**Instructional Strategy :**

| Topic | Instructional Strategy |
|---|---|
| Introduction | Class room teaching, Plates |
| Principals of Planning | Class room teaching, |
| Agencies in Building Construction work | Class room teaching, |
| Planning of Residential Building | Class room teaching, Readymade drawings |
| Planning of Public Building | Class room teaching, Readymade drawings |
| Perspective Drawing | Class room teaching, Transparencies |
| Introduction to Auto CAD | Class room teaching accompanied with demonstration on Computer |

**Reference Books** :

| Sr.No. | Author | Tilte | Publisher |
|---|---|---|---|
| 1 | Shah, Kale, Patki | Building Drawing | Tata MCGraw Hill New Delhi |
| 2 | Y.S.Sane | Planning and Design of building | Allies bookstall Poona – 4 & Engg. book publishes, Company Pune – 16. |
| 3 | M.Chakraborti | Civil Engg. Drawing | By Author – 21 B Bhabananda Road, Calcutta – 700026 |
| 4 | Shah and Kale | Perspective Drawing | Tata MCGraw Hill New Delhi |
| 5 | S.V.Deodhar | The Test book of Building Drawing | New Vrinda Publishing House, M.G.Road, Jalgaon. |
| 6. | R.S. Malik & G.S. Meo | Civil Engg. Drawing | New Asian Publishers Nai Sadak, New Delhi-6. |
| 7. | Ajeet Singh | Working with Auto CAD 2000 | Tata MCGraw Hill New Delhi |

**Specification Table:**

| Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|
| | Knowledge | Comprehension | Application | |
| Introduction | 2 | 2 | 2 | 06 |
| Principles of Planning | 6 | --- | --- | 06 |
| Agencies in Building Construction work | 2 | 2 | 2 | 06 |
| Planning of Residential Building | 5 | 10 | 25 | 40 |
| Planning of Public Building | -- | 04 | 08 | 12 |
| Perspective Drawing | -- | -- | 10 | 10 |
| Introduction to Auto CAD | -- | -- | -- | -- |
| | 15 | 18 | 47 | 80 |

(J.N.Thorat-Shingte) (S.V.Chaudhari) (M.S.Satarkar)
Prepared by Member Secretary Chairman P.B.O.S.

**Name of Programme** : **CE**

**Programme Code No.** : **01/21/15**

**Name of Course** : **Surveying I**

**Course Code No.** : **CE-383**

**Teaching Scheme :**

| | Hours / Week | Total hours |
|---|---|---|
| Theory | 2 | 32 |
| Practical | 4 | 64 |

**Evaluation :**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term work |
| Duration | Two class tests of 1 hr. duration. | 2hrs. | -- | -- | -- |
| Marks | 10 | 40 | 25 | -- | 25 |

**Course Aims:**

This is basic technology course, which is intended to teach the students' basic facts, concepts, principles, and procedures in surveying and levelling. With this knowledge and skill, he will be able to select appropriate survey and levelling methods depending upon requirement to carry out survey work in Building construction, Transportation engineering, Irrigation engineering, Water supply & Sanitary schemes for investigation of projects before & during execution of work, while working as an investigator for design department.

**Course Objectives:**

- To enable the students to understand working principles, construction, application and handling of various surveying instruments.
- To acquaint the students with the principles and methods of different types of survey.
- To promote the ability of carrying out various types of surveys depending upon the field conditions.

**Course Content:**

| Chapter No. | Name of topic / Sub topic | | Hours | Weightage |
|---|---|---|---|---|
| 1 | **Introduction to Surveying** | | | |
| | 1.1 | Definition of surveying and levelling | 2 | 2 |
| | 1.2 | Objects of surveying | | |
| | 1.3 | Classification of surveying - Plane and geodetic survey | | |
| | 1.4 | General principles of surveying. Uses of surveying | | |
| 2 | **Linear Measurements** | | | |
| | 2.1 | Study of metric chain - 20m & 30m, components | 4 | 8 |
| | 2.2 | Study of metallic and steel tape | | |
| | 2.3 | Instruments for marking stations: pegs, arrows, ranging rod | | |
| | 2.4 | Ranging - Direct and Indirect method. Chaining on level ground and on sloping ground | | |
| | 2.5 | Testing and adjustment of chain | | |
| | 2.6 | Chain corrections, problems on chain corrections | | |
| 3 | **Chain and cross staff surveying** | | | |
| | 3.1 | Principle of chain surveying. Well conditioned and ill-conditioned triangles | 7 | 8 |
| | 3.2 | Reconnaissance survey and Index sketch, location sketches. Survey stations and their selection | | |
| | 3.3 | Survey lines - base line, check line, tie line.<br>Taking offsets - Perpendicular and oblique offsets. Short and long offsets. Number of offsets. Booking field notes. | | |
| | 3.4 | Conventional symbols on survey maps for – cutting, embankment, marshy land, road, railway, river, bridge, tunnel, fencing, transmission line, cultivated land, residential zone, places of worship | | |
| 4 | **Chain and Compass Survey** | | | |
| | 4.1 | Principle of compass surveying | 7 | 8 |
| | 4.2 | Traversing - open and closed traverse. | | |
| | 4.3 | Bearing of lines - True Meridian, Magnetic meridian, Arbitrary meridian. | | |
| | 4.4 | Fore bearing and back bearing of line. Whole circle and Reduced bearing. Conversion of bearings.<br>Calculation of included angles from bearing.<br>Local attraction, Magnetic declination, Dip of needle.<br>Correction of bearings affected by local attraction. Numerical examples on local attraction. | | |
| | 4.5 | Construction, use and adjustment of Prismatic compass. | | |
| | 4.6 | Traversing with chain & compass. Different methods of plotting traverse, closing error, graphical adjustment by Bowditch's Rule. | | |
| 5 | **Levelling** | | | |
| | 5.1 | Definitions of various terms used in levelling. | 10 | 10 |
| | 5.2 | Dumpy level - Fundamental axes, and their desired relationships. Temporary adjustments of dumpy level. | | |
| | 5.3 | Study of auto level. | | |
| | 5.4 | Levelling staff-telescopic and folding type | | |
| | 5.5 | Systems of reducing the level - Plane of collimation method, Rise and Fall method. Arithmetic checks. | | |
| | 5.6 | Classification of levelling - simple levelling, differential levelling, fly levelling, check levelling, profile levelling & cross sectioning. | | |

| | | | | |
|---|---|---|---|---|
| | 5.7 | Sources of errors in levelling and precautions to be taken | | |
| | 5.8 | Numerical problems on levelling and Computation of missing reading | | |
| 6 | **Contouring** | | | |
| | 6.1 | Definitions - Contour, contour interval, horizontal equivalent. | 2 | 4 |
| | 6.2 | Characteristics of contour lines | | |
| | 6.3 | Method of contouring - Direct method, indirect method. | | |
| | 6.4 | Methods of interpolation of contours.<br>Uses of contour maps. | | |

List of Practicals /Assignments:

| | | |
|---|---|---|
| 1 | Study and use of 20m & 30m chain, metallic and steel tape, ranging rod, peg, arrow | 4 |
| 2 | Direct and indirect ranging. Study & use of line ranger. Measurement of distances with chain and tape | 4 |
| 3 | Study and use of open cross-staff and optical square. | 4 |
| 4 | Chain and cross staff survey to locate the boundaries of a field or plot and to determine its area. | 4 |
| 5 | Running a survey line to locate adjacent objects such as building, road, trees, electric poles, fencing, by taking offsets with open cross-staff / optical square. Booking field notes. | 4 |
| 6 | Study and use of Prismatic compass - components, their functions. Observing bearing of lines. Calculation of included angles from the observed bearings. | 6 |
| 7 | Observing fore bearings & back bearings of 4-5 sided traverse, identifying the stations affected by local attraction & calculation of corrected bearings. | 6 |
| | Project No 1: Chain and compass traverse survey - A closed traverse of minimum 5 sides enclosing a small building. Plotting the traverse on A1 size imperial drawing sheet. (1 day for survey & 6 hrs. for drawing) | |
| 8 | Study & use of dumpy level, temporary adjustments, study of levelling staves. | 4 |
| 9 | Simple leveling, recording in level book, reduction of levels by plane of collimation method, arithmetic check. | 4 |
| 10 | Differential leveling, reduction of levels by plane of collimation method, Rise & Fall method, arithmetic check. | 6 |
| 11 | Fly levelling- carrying B.M. from one point to another by fly levelling with double check. | 6 |
| 12 | Study of Auto level, temporary adjustments. | 4 |
| | Project No. 2: Profile levelling and cross-sectioning - Running a base line 240m long With cross-section at 30m c/c. The length of cross-section may be 20m on either side with staff readings at 10m interval. Spot levels should be taken at every 10m along the base line. Plotting the L-section & minimum 3 cross-sections on A1 size imperial sheet (1 day for survey & 6 hrs. for drawing.) | |
| 13 | Contouring by direct method. | 4 |
| 14 | Block countering (40m X 40m) | 4 |
| | Project No.3: Block contouring - A block of 160m X 160m approximately with spot levels at 20m X 20m. Plotting the contours with contour interval of 0.5m/1.0m by arithmetic interpolation on A1 size imperial drawing sheet. (1 day for survey & 8 hrs. for drawing) | |

**Instructional Strategy:**

| Sr. No | Topic | Instructional Strategy |
|---|---|---|
| 1 | Introduction to Surveying | Class room teaching |
| 2 | Linear measurement | Class room teaching & Field practicals |
| 3 | Chain & cross-staff survey | Class room teaching & Field practicals |
| 4 | Chain & compass survey | Class room teaching & Field practicals |
| 5 | Levelling | Class room teaching & Field practicals |
| 6 | Contouring | Class room teaching & Field practicals |

**Reference Books:**

| Sr.No | Author | Title | Publisher |
|---|---|---|---|
| 1 | B.C. Punmia | Surveying & Vol. I | Laxmi Publications, New Delhi. |
| 2 | B.C. Punmia | Surveying & Vol. II | Laxmi Publications, New Delhi. |
| 3 | S. K. Duggal | Surveying & Levelling | Tata Mc-Graw Hill |

**Text Books**:

| Sr.No | Author | Title | Publisher |
|---|---|---|---|
| 1 | Kanetkar T.P. & Kulkarni | Surveying & Levelling Part1. | Pune Vidyarthi Griha/L Prakashan Pune -30 |
| 2 | N.N. Basak | Surveying & Levelling | Tata Mc-Graw Hill |
| 3 | V.S. Gajare | Surveying | Nirali Prakashan, Pune-2. |
| 4 | B.C. Punmia | Surveying Vol. I | Laxmi Publications, New Delhi. |

**Learning Resources:** 1. Books 2. Survey Instruments

**Specification Table:**

| Sr. No | Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| 1 | Introduction to Surveying | 02 | -- | -- | 02 |
| 2 | Linear measurement | 02 | 04 | 02 | 08 |
| 3 | Chain & cross-staff survey | 04 | 02 | 02 | 08 |
| 4 | Chain & compass survey | 02 | 02 | 04 | 08 |
| 5 | Levelling | 04 | -- | 06 | 10 |
| 6 | Contouring | -- | 02 | 02 | 04 |
| | Total | 14 | 10 | 16 | 40 |

Prepared by

(G.P.Pawar)
LCE

(S.V.Chaudhari)
Member Secretary, PBOS

(M.S.Satarkar)
H C E D & Chairman, PBOS

**Name of Programme** : **Diploma in CE**

**Programme Code** : **01/21/15**

**Name of Course** : **Surveying - II**

**Course Code** : **CE-384**

**Teaching Scheme :**

| | Hours / Week | Total hours |
|---|---|---|
| Theory | 02 | 32 |
| Practical | 04 | 64 |

**Evaluation Scheme:**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term work |
| Duration | Two class tests of 1 hr. duration. | 2 hrs. | -- | -- | -- |
| Marks | 10 | 40 | 25 | -- | 25 |

**Course Aims:**

This is basic technology course, which is intended to teach the students' basic facts, concepts, principles, and procedures in surveying and levelling. With this knowledge and skill, he will be able to select appropriate survey and levelling methods depending upon requirement to carry out survey work in Building construction, Transportation engineering, Irrigation engineering, Water supply & Sanitary schemes for investigation of projects before & during execution of work, while working as an investigator for design department.

**Course Objectives:**

At the end of this course the students will be able -

- To understand working principles, construction, application and handling of various surveying instruments.
- To acquaint the students with the principles and methods of different types of survey.
- To promote the ability of carrying out various types of surveys depending upon the field conditions.

**Course Content :**

| Chapter No | Topic / Subtopic | | Hours | Weightage |
|---|---|---|---|---|
| 1 | **Transit Theodolite:** | | | |
| | 1.1 | Types of theodolite-Transit and Non transit, Vernier theodolite, Digital theodolite, Micro-optic theodolite, uses, Component parts, their functions, fundamental axes and their desired relationship. | 8 | 8 |
| | 1.2 | Technical terms used in theodolite survey. | | |
| | 1.3 | Temporary adjustments of transit theodolite. | | |
| | 1.4 | Measurement of horizontal angle by method of repetition, errors eliminated by method of repetition. | | |
| | 1.5 | Measurement of magnetic bearing of a line. | | |
| | 1.6 | Measurement of vertical angle. Measurement of deflection angle. | | |
| | 1.7 | Prolonging and ranging a line. | | |
| 2 | **Theodolite Traversing**: | | | |
| | 2.1 | Traversing with theodolite by method of included angles, Checks in closed traverse, calculation of bearing from angles. | 8 | 8 |
| | 2.2 | Traverse computation: Latitude, Departure ,Consecutive co-ordinates, Independent co-ordinates, error of closure, balancing the Traverse by Bowditch's rule, Gale's traverse table. | | |
| | 2.3 | Numerical problems on traverse computation. | | |
| 3 | **Tacheometric Survey**: | | | |
| | 3.1 | Definition and use of tacheometric survey | **4** | **6** |
| | 3.2 | Instruments used for tacheometric survey. | | |
| | 3.3 | Principles of tachometric survey, use of anallatic lens | | |
| | 3.4 | Methods of tacheometry –Fixed hair method- line of Sight horizontal, inclined & staff held vertical. (No derivations). | | |
| | 3.5 | Contouring by tacheometry. Simple numerical problems. | | |
| 4 | **Plane table Survey:** | | | |
| | 4.1 | Principle and application of plane table survey. | **4** | **6** |
| | 4.2 | Study of plane table and accessories required for plane table survey. Setting up of plane table. Orientation of plane table by magnetic needle and by back sighting | | |
| | 4.3 | Methods of plane tabling - radiation, intersection and traversing. | | |
| | 4.4 | Merits & demerits of plane table surveying. | | |
| 5 | **Planimeter:** | | | |
| | 5.1 | Construction, use and Measurement of area using polar planimeter. | 3 | 4 |
| | 5.2 | Study, use and Measurement of area using digital planimeter. | | |
| | 5.3 | Numerical problems with anchor point inside and outside the figure. | | |
| 6 | **Curves:** | | | |
| | 6.1 | Types of curves, degree of curve and radius of curve, relation between degree of curve and radius of curve. Notation for circular curve. Elements of circular curve. | 3 | 4 |
| | 6.2 | Method of setting out curve by offset from long chord. Simple numerical problems. | | |
| 7 | **Introduction to Total Station and EDM** | | | |
| | 7.1 | Study and use of Total Station. | 2 | 4 |
| | 7.2 | Study and use of EDM. | | |
| | | Total | 32 | 40 |

**List of Practical's /Assignments:**

| Sr No | Title of Practical | Hours |
|---|---|---|
| 1 | Study, use and temporary adjustments of transit theodolite. | 4 |
| 2 | Measurement of horizontal angle by transit theodolite. | 4 |
| 3 | Measurement of horizontal angle by repetition method. | 8 |
| 4 | Observation of magnetic bearing of a line. | 2 |
| 5 | Measurement of vertical angle. | 4 |
| 6 | Measurement of deflection angle. Prolonging and ranging a line using a theodolite | 4 |
| 7 | Study and use of digital theodolite. | 2 |
| 8 | Study and use of Micro-optic theodolite. | 2 |
| | **Project No.1:** Theodolite traverse survey-Running a closed traverse of minimum 5 sides for a small area. Traverse computation by Gale's traverse table. Plotting of traverse on A1 size imperial drawing sheet. (1 day for survey and 8 hrs. for traverse computation and drawing.) | |
| 9 | To find the level difference and horizontal distances using theodolite as a tacheometer. | 4 |
| 10 | Study and use of plane table and its accessories. Temporary adjustments of plane table. Method of radiation. | 4 |
| 11 | Plane tabling by method of intersection. Orientation of plane table by back sighting. | 6 |
| | **Project No.2**: Plane Table Traversing –Running a min. 5-sided traverse enclosing a small building, using method of traversing. Plotting on A1 size imperial drawing sheet.(1 day for survey and 4 hrs. for drawing.) | |
| 12 | Study of Planimeter. Measurement of area by Polar Planimeter. | 4 |
| 13 | Study of digital Planimeter. Measurement of area using digital Planimeter. | 4 |
| 14 | Setting out simple circular curve by offset from long chord. | 4 |
| 15 | Study of total station, temporary adjustment, Measurement of horizontal angle | 4 |
| 16 | Measuring distance between two points by using total station. | 4 |

**Instructional Strategy:**

| Sr.No | Topic | Instructional Strategy |
|---|---|---|
| 1 | Transit Theodolite | Class room teaching, Field practicals |
| 2 | Theodolite Traversing | Class room teaching, Field practicals |
| 3 | Tacheometric Survey | Class room teaching, Field practicals |
| 4 | Plane Table Survey | Class room teaching, Field practicals |
| 5 | Planimeter | Class room teaching, Field practicals |
| 6 | Curves | Class room teaching, Field practicals |
| 7 | Introduction to Total Station and EDM | Class room teaching, Field practicals |

**Reference Books:**

| Sr.No | Author | Title | Publisher |
|---|---|---|---|
| 1 | B.C. Punmia | Surveying & Vol. I | Laxmi Publications, New Delhi. |
| 2 | B.C. Punmia | Surveying & Vol. II | Laxmi Publications, New Delhi. |
| 3 | S K Duggal | Surveying & Levelling | Tata Mc-Graw Hill |

**Text Books:**

| Sr.No | Author | Title | Publisher |
|---|---|---|---|
| 1 | Kanetkar T.P. & Kulkarni | Surveying & Levelling, Part 1. | Pune Vidyarthi Griha Prakashan, Pune -30 |
| 2 | Kanetkar T.P. & Kulkarni | Surveying & Levelling, Part 2. | Pune Vidyarthi Griha Prakashan, Pune -30 |
| 3 | N.N. Basak | Surveying & Levelling | Tata Mc-Graw Hill |
| 4 | Gajare,Gosavi, Khamkar, Bhagwat | Advanced Surveying | Nirali Prakashan |
| 5 | Mrs Pooja D Pawar, V K Kumawat | Advanced Surveying | Tech-Max Publication,Pune |

**Learning Resources:** 1. Books 2. Survey Instruments

**Specification Table:**

| Sr.No | Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| 1 | Transit Theodolite | 04 | 02 | 02 | 08 |
| 2 | Theodolite Traversing | 02 | 02 | 04 | 08 |
| 3 | Tacheometric Survey | -- | 02 | 04 | 06 |
| 4 | Plane Table Survey | 02 | -- | 04 | 06 |
| 5 | Planimeter | -- | 02 | 02 | 04 |
| 6 | Curves | -- | 02 | 02 | 04 |
| 7 | Introduction to Total Station and EDM | 04 | -- | -- | 04 |
| Total | | 12 | 10 | 18 | 40 |

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Member Secretary, PBOS

(M S Satarkar)
H C E D &
Chairman, PBOS

**Name of Programme** : **CE**
**Programme Code** : **01**
**Name of Course** : **Hydraulics**
**Course Code**. : **CE385**
**Teaching Scheme:**

| | Hours / Week | Total Hours |
|---|---|---|
| Theory | 04 | 64 |
| Term work / Practical | 02 | 32 |

**Evaluation:**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term work |
| Duration | Two class tests of 60 min. duration | 3 Hrs | -- | -- | -- |
| Marks | 20 | 80 | -- | 25 | 25 |

**Course Aim:**

The subject of hydraulics is a basic science and application for many Civil Engineering subjects like Irrigation, Water Supply, Sanitary Engineering, and Transportation Engineering etc.

The subject is intended to teach the facts, concepts principles of hydraulics, which will enable the students to apply them to different areas.

**Course Objectives:**

Students will be able to:

- The Appreciate the importance of hydraulics
- Calculate forces, pressure, center of pressure etc. on bodies
- Design pipes for water supply and other purposes.
- Design canal sections and work out capacity of canal
- Understand the working of various pumps.

**Course Content:**

| Sr. No | Topic / Subtopic | Hours | Weig htage | Practicals / Tutorials |
|---|---|---|---|---|
| **1** | **Introduction**<br>Definition of hydraulics, properties of water like density, unit weight, specific gravity, cohesion, adhesion, viscosity, surface tension, bulk modulus / compressibility. Applications of hydraulics. No numerical examples. | **03** | **04** | Tutorial |
| **2** | **Hydrostatics**<br>Liquid pressure, pressure at a point in the liquid, PASCAL's law, variation of pressure and pressure diagram.<br>Atmospheric, gauge and absolute pressure<br>Measurement of pressure - piezometer, simple u - tube manometer, differential monometer, Bourdon pressure gauge - its construction and working.<br>Total pressure and centre of pressure on horizontal, vertical and inclined plane surface. | **10** | **12** | 1.Study of pressure measuring devices<br>Tutorial |
| **3** | **Hydro kinematics**<br>Discharge, classification of flow - Steady and unsteady, uniform and non-uniform, laminar and turbulent, compressible and incompressible flow.<br>Equation of continuity. | **03** | **04** | Tutorial |
| **4** | **Hydrodynamics**<br>Equation of motion, energies of flowing fluid, Bernoulli's theorem, limitations of Bernoulli's theorem, hydraulic gradient and energy gradient lines.<br>Application of Bernoulli's theorem to Venturimeter, Pitot tube. No numerical examples on pitot tube. | **10** | **12** | 2.Verification of Bernoulli's theorem<br>3.Determination of Cd of venturimeter |
| **5** | **Measurement of flow**<br>Coefficient of discharge, Flow through sharp edged circular orifice, Rectangular orifice.<br>Flow over notches and weirs - Rectangular, triangular, trapezoidal, and Cippoletti weir, Francis formula, end contractions, velocity of approach and its effects. | **10** | **12** | 4.Determination of Cd, Cv and Cc of sharp - edged Circular orifice.<br>5.Determination of Cd of rectangular / Triangular notch. |

| | | | | |
|---|---|---|---|---|
| **6** | **Flow through pipes**<br>Laws of fluid friction Darcy - Weis Bach equation $h_f = f\ l\ v^2 / 2\ gd$.<br>Reynolds number, Darcy's friction factor 'f' from Moody diagram, energy gradient and hydraulic gradient lines for pipes.<br>Minor losses - sudden enlargement, sudden contraction, loss at entrance and exit.<br>Flow through pipes in series and parallel, siphon, Nomo gram. | **12** | **16** | 6) Determination of coefficient of friction 'f' pipe.<br><br>7) Determination of 'f' from Moody's chart<br>.<br>8) Nomogram for design of pipes.<br>Tutorial |
| **7.** | **Open channel flow**<br>Types of flows in open channel - steady and unsteady, uniform and non-uniform laminar and turbulent, sub critical, critical an supercritical flow, hydraulic jump, specific energy diagrams<br>Geometric properties of channels, capacity of canal, most economical channel section- Rectangular and Trapezoidal sections only.<br>Measurement of flow by floats and current meter. | **10** | **12** | 9) Study of current meter |
| **8.** | **Pumps**<br>Types of pumps, principle of working, component parts and working of centrifugal and reciprocating pumps.<br>Calculation of power of centrifugal pump, comparison of centrifugal and reciprocating pump, selection criteria for choice of pump, submersible pump. | **06** | **8** | 10) Study of centrifugal pump |

**Instructional Strategy:**

| Sr.No | Topic | Instructional Strategy |
|---|---|---|
| 1 | Introduction | Class room teaching |
| 2 | Hydrostatics | Class room teaching, laboratory demonstration |
| 3 | Hydro kinematics | Class room teaching |
| 4 | Hydrodynamics | Class room teaching, laboratory work |
| 5 | Measurement of flow | Class room teaching, laboratory work |
| 6 | Flow through pipes | Class room teaching, laboratory work |
| 7 | Open channel flow | Class room teaching, laboratory work |
| 8 | Pumps | Class room teaching, laboratory work, transparencies |

**Text Books:**

| Author | Title | Publisher |
|---|---|---|
| 1. Dahigaonkar | Hydraulics | Central Techno Publications |
| 2. Modi, Seth | Hydraulics & Fluid Mechanics | Standard Book House, Delhi |
| 3. Jagdish Lal | Hydraulics | Metropoliton Book Company, Delhi. |

**Reference Books:**

| | | |
|---|---|---|
| 1. King H.W. | Hydraulics | John Maily & Sons |
| 2. Bakhamteff | Hydraulics and open channels | McGraw Hill |
| 3. Chow V.T. | Open channel Hydraulics | McGraw Hill |
| 4. Ray | Fluid Dynamics | S. Chand & Co |
| | Fluid Mechanics | McGraw Hill |

**Specification Table:**

| Sr. No | Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| 1 | Introduction | 04 | -- | -- | 04 |
| 2 | Hydrostatics | 02 | 02 | 08 | 12 |
| 3 | Hydro kinematics | 04 | -- | | 04 |
| 4 | Hydrodynamics | -- | 04 | 08 | 12 |
| 5 | Measurement of flow | -- | 04 | 08 | 12 |
| 6 | Flow through pipes | 04 | 04 | 08 | 16 |
| 7 | Open channel flow | -- | 04 | 08 | 12 |
| 8 | Pumps | 02 | 02 | 04 | 08 |
| | | 16 | 20 | 44 | 80 |

Prepared by

(J.N.Thorat-Shingte)
L.C.E.

(S.V.Chaudhari)
C.D.C. Incharge

(M S Satarkar)
H.C.E.D. &
Chairman P.B.O.S.

**Name of Programme : Civil Engineering**
**Programme Code : 01/21/15**
**Name of Course : Highway and Bridge Engineering**
**Course Code : CE386**
**Teaching Scheme:**

| | Credits / Week | Total Credits |
|---|---|---|
| Theory | 04 | 64 |
| Term work / Practical | 02 | 32 |

**Evaluation :**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term Work |
| Duration | Three class tests of 60 Min. duration | 3 Hours | -- | -- | -- |
| Marks | 20 | 80 | -- | 25 | 25 |

**Course Aim:**

Transportation plays an important role in development of the country. The major share of the budget is allotted to development of transportation. Progress of country is measured by the development of communication system, which has direct relation to prosperity of a nation. The civil engineer must possess knowledge and skills in different areas such as planning, execution, supervision and maintenance of highways, roads and bridges.

**Course Objectives:**

After studying this course, student will be able to :

- Plan and align using available data.
- Understand the geometric design, construction, supervision and maintenance of highways, roads and bridges.
- Know the basic principles of traffic engineering.
- Understand the different conditions prevailing at the bridge site and select the least objectionable site and type of bridge.

**Course content:**

**A) Highway Engineering :**

| Sr. No. | Topic / Subtopic | Hrs | Weig htage | Practical |
|---|---|---|---|---|
| **1.** | **General**<br>Necessity and benefits of roads.<br>Classification of roads according to – location, importance, tonnage.<br>Highway planning in India.<br>Alignment of roads: Requirements and factors affecting alignment. | **02** | **04** | |
| **2.** | **Geometric design of roads-**<br>Highway cross-section -Right of way, width of carriageway, shoulders, formation width<br>Camber-Definition, object.<br>Gradient-Definition object of providing gradients, Factors affecting gradient.<br>Sight distance- necessity , factors affecting ,Types of sight distance<br>Curves- necessity ,factors affecting design of curves,<br>Types of curves-horizontal, vertical, hill road curves<br>Widening of carriageway on horizontal curves.- necessity<br>Super elevation – Definition, necessity, methods of providing super elevation.<br>Design speed, maximum speed, average running speed-definition, factors affecting.<br>(I.R.C. recommendations for each geometric design elements.) | **14** | **18** | Assignment No. 1. Geometric design of highway. |
| **3.** | **Construction of Highway :**<br>Highway pavements – definition, classification – Flexible and rigid pavements., difference between Flexible and rigid pavements.<br>Earthwork and WBM method of preparation of sub grade, in embankment and cutting, balancing of earthwork, borrow pits, spoil bank, lead and lift deadman.<br>Earth roads – construction<br>Soil stabilization – Necessity, methods.<br>W.B.M. roads – specification of materials used as per IRC recommendations, construction, maintenance.<br>Bituminous pavements –Definitions of bitumen, asphalt, cutback, tar and emulsion, Prime coat, | **14** | **16** | Assignment No. 2. Earth roads and W.B.M. Roads.<br>Assignment No.3. Bituminous pavements.<br><br>Assignment No.4. Cement concrete pavements |

| | | | | |
|---|---|---|---|---|
| | tack coat, seal coat, surface dressing,<br>Premix methods – Bituminous carpet, asphaltic concrete, sheet asphalt.<br>Cement concrete pavements- materials used, method of construction, types of joints in cement concrete pavements. | | | |
| **4.** | **Traffic Engineering :**<br>Traffic volume study.<br>Traffic control devices – necessity, markings, islands, traffic signs, signals.<br>Segregation of traffic-Flyovers, clover leaf, divider, service road. | **04** | **06** | Assignment No. 5. |
| **5**. | **Highway drainage and arboriculture :**<br>Highway drainage-Definition, necessity, surface, sub-surface and cross drainage, catch water drains<br>Arboriculture-Necessity, selection of trees | **04** | **04** | |
| **6** | **Hill road-**definition, factors affecting alignment of hill road**,** parts of hill road and their functions, types of curves on hill roads, c/s of hill road, landslides-types, causes of landslides, prevention and control of landslides, | **06** | **08** | |
| **B) Bridge Engineering :** | | | | |
| **7.** | **General :**<br>Definition, factors affecting selection of site for a bridge. | **02** | **02** | |
| **8.** | **Components of a bridge :**<br>Sub-structure-Foundation, pier, abutment, wing wall, Approaches-in cutting and embankment. - function and types.<br>Superstructure-Bearings- Necessity, function, Types-Fixed bearing, neoprene, Pot-type PTFE bearing. Necessity of keeping one bearing free and Other fixed.<br>Bridge girders-function and type.<br>Bridge floors-open and solid floors.<br>Approaches-in cutting and embankment. | **06** | **08** | Assignment No. 6.<br>Component parts of bridges. |
| **9.** | **Types of Bridges :**<br>Types depending upon function, span, materials used in construction, relative levels of bridge floor.<br>Selection criteria for suitable type of bridge. | **04** | **06** | Assignment No. 7.<br>A visit report based on visit to different types of bridges/flyovers in and around Pune. |

| | | | | |
|---|---|---|---|---|
| **10.** | **Culverts & Cause ways** :<br>Definition, types of culverts- R.C.C. slab culvert, Pipe culvert, Box culvert.<br>Cause ways, classification of cause ways. | **04** | **06** | |
| **11.** | **Inspection and maintenance of bridges :**<br>Check list for inspection of bridges.<br>Routine and special maintenance. | **02** | **02** | Assignment No.8. Inspection and maintenance of bridges |

**Instructional Strategy:**

| Sr. No. | Topic | Instructional Strategy |
|---|---|---|
| **A) Highway Engineering**: | | |
| 1 | General | Classroom teaching |
| 2 | Geometric design | Classroom teaching |
| 3 | Construction of Highway | Classroom teaching |
| 4 | Traffic Engineering | Classroom teaching |
| 5 | Highway drainage and arboriculture | Classroom teaching |
| 6 | Hill roads | Classroom teaching |
| | | Visit to road under construction |
| **B) Bridge Engineering:** | | |
| 7 | General | Classroom teaching |
| 8 | Component parts of bridge | Classroom teaching |
| 9 | Types of bridges | Classroom teaching |
| 10 | Culverts & Cause ways | Classroom teaching |
| 11 | Inspection and maintenance of bridges | Classroom teaching |
| | | Visit to bridge under construction |

**Reference Books:**

| | Author | Title | Publisher |
|---|---|---|---|
| 1. | M.S. Satarkar | Transportation Engineering | Govt. Polytechnic for Distance Learning, Pune. |
| 2. | Arora and Luthra | Transportation Engineering | New India Publishing House, Delhi-51. |
| 3. | A. Kamala | Transportation Engineering | Tata McGraw-Hill Publishing Co.Ltd., New Delhi. |
| 4. | Justo and Khanna | Highway Engineering | Nem Chand and Brothers, Roorkee |
| 5. | S. Ponnuswamy | Bridge Engineering | Tata McGraw-Hill Publishing Co.Ltd., New Delhi. |
| 6. | G.V. Rao | Principle of Transportation & Highway Engineering. | Tata McGraw-Hill Publishing Co.Ltd., New Delhi. |
| 7 | G.S.Birdi | Bridge engineering | |

**Learning Resources:** 1) Books 2) visits 3) Internet

**Specification Table:**

| Sr. No. | Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| **A) Highway Engineering:** | | | | | |
| 1 | General | 02 | 02 | - | 04 |
| 2 | Geometric design | 04 | 10 | 04 | 18 |
| 3 | Construction of Highway | 04 | 06 | 06 | 16 |
| 4 | Traffic Engineering | -- | 04 | 02 | 06 |
| 5 | Highway drainage and arboriculture | 02 | 02 | -- | 04 |
| 6 | Hill roads | 02 | 06 | -- | 08 |
| **B) Bridge Engineering:** | | | | | |
| 6 | General | 02 | -- | -- | 02 |
| 7 | Component parts of bridge | 02 | 04 | 02 | 08 |
| 8 | Types of bridges | 02 | 04 | - | 06 |
| 9 | Culverts & causeways | 02 | 04 | -- | 06 |
| 10 | Inspection and maintenance of bridges | 02 | -- | -- | 02 |
| | Total | 24 | 42 | 14 | 80 |

Prepared by

| | | |
|---|---|---|
| (Mrs.Seema Kolhe)<br>Lect. in Civil Engg. | (S.V.Chaudhari)<br>Member Secretary<br>P.B.O.S. | (M.S.Satarkar)<br>H.C.E.D. &<br>Chairman P.B.O.S. |

**Name of Programme** : **Civil Engineering**

**Programme Code** : **01/21/15**

**Name of Course** : **Construction Technology**

**Course Code** : **CE387**

**Teaching Scheme:**

| | Hours / Week | Total Hours |
|---|---|---|
| Theory | 4 | 64 |
| Term work / Practical | 2 | 32 |

**Evaluation:**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term work |
| Duration | Two class tests of 60 min. duration | 3 hours | -- | -- | -- |
| Marks | 20 | 80 | -- | 25 | 25 |

**Course Aim:**

Diploma Engineer has to act as a link between the Architect, Engineer in charge, Structural Designer, Related Specialists and the artisan. By studying this course the student will be aware of various component parts of a building structure and construction processes which will help him to understand, guide and supervise the construction procedures effectively. It will also impart knowledge about co-ordination of various construction activities, repairs and maintenance of the structure.

**Course Objectives:**

The student will be able to

- Know various technical terms related to different components of structure.
- Learn core construction processes in Civil Engineering construction.
- Integrate individual construction process in Civil Engg. Construction.
- Guide the masons, carpenters, labourers to be work in a specified manner.
- Supervise construction work.
- Co-ordinate various items of work.

**Course Content:**

| Sr. No | Topic / Subtopic | Hrs | Weig htage | Practical |
|---|---|---|---|---|
| 1 | **Foundation**<br>Definition and function. Investigation for shallow foundation. Spread footings for walls, columns.<br>Pile foundations – Suitability, classification according to materials used in construction in brief.Timber, concrete - precast and cast- in- situ, Steel, Sand, Composite, prestressed concrete.<br>Comparative merits & Demerits of cast in situ and precast piles.<br>Classification of pile according to function in brief - End bearing, friction, sheet, anchor, dolphin, compaction, Batter.<br>Grouping of piles, pile cap functions<br>Foundations in black cotton soil- Precautions for safety of foundations, method of construction of under reamed pile foundation.<br>Dewatering - Necessity, Pumping, single stage well point and Electro osmosis systems of dewatering. | **10** | **12** | Practical (1)<br>Study of tools required for construction<br>Practical (2)<br>Actual setting out of a small load bearing structure.<br>Practical (3)<br>Transferring level by using water tubes<br>Site Visit (1)<br>A site visit covering Setting out of a framed structure & construction of column footing.<br>Assignment (1)<br>An assignment on pile foundation and under reamed pile foundation. |
| **2** | **Doors and windows**<br>Parts of door frame and shutter<br>Method of fixing door frame<br>Materials used for frame and shutter of door & window. Types of doors - Rolling shutter, Collapsible, sliding, PVC.<br>Various types of windows - MS window, Aluminum, Louvered.<br>Common sizes of doors & windows used in building. | **5** | **6** | Practical (4)<br>Checking the verticality of door frame using plumb bob.<br>Assignment (2)<br>Assignment on erection of door frame |
| **3** | **Lintel & Arches**<br>Function and component parts<br>Materials used for lintels -Stone, wood, steel, concrete, precast and cast - in - situ<br>Types of Arches. | **3** | **4** | -- |
| **4** | **Roofs**<br>Necessity, Types - Pitched and flat,<br>Component parts of pitched roof.<br>Steel trusses - Types.<br>Advantages of steel trusses over timber trusses.<br>R.C.C. flat roof - Method of construction of Precast slab units.<br>Drainage of pitched and flat roofs.<br>Roof covering for pitched roofs - Mangalore tiles, C.G.I. Sheets, A.C. sheets, Method of fixing of sheets | **5** | **6** | Assignment (3)<br>Assignment on Different types of roof coverings for pitched roof |

| | | | | |
|---|---|---|---|---|
| **5** | **Stairs**<br>Function, location & size of stair<br>Technical terms used in stair.<br>Requirement of good stair<br>Thumb rules for design of stair<br>Types of R.C.C. stairs - Dog legged, simply supported, cantilever and balanced cantilever<br>Lift - Location, requirement | **4** | **6** | --- |
| **6** | **Floors**<br>Ground floor - Requirement of floor plinth filling<br>Upper floor - R.C.C. floor<br>Different floor finishes - Types of floor tiles.<br>Flooring for special purposes such as factories, warehouses, railway platforms.<br>Mezzanine floor - requirement and use. | **5** | **6** | --- |
| **7** | **Scaffolding, shoring, under pinning**<br>**Scaffolding** - component parts, uses. Different types such as - single, Double, cantilever. Tubular scaffolding<br>**Shoring** - Necessity, component parts, Diff. types such as - Raking, flying and dead.<br>**Underpinning** - Necessity, points to be considered in under pinning, Methods of underpinning such as – pit, cantilever needle and pile method | **4** | **6** | Assignment (4)<br>An assignment on different types of scaffolding and shoring. |
| **8** | **Finishing Works**<br>**Plastering** – Necessity, preconstruction preparation, Internal plaster - Neeru finish, External plaster - Diff. types such as sponge finish, rough, pebble dash.<br>**Pointing**–Necessity, preconstruction preparation. Different types of pointing<br>**Painting** – Necessity, surface preparation, Different types of paints - white wash, Dry distemper, Oil bound distemper, plastic emulsion, Luster, oil paint, cement paint. | **7** | **8** | Site Visit (2)<br>A site visit should be arranged to demonstrate and observe the different types of plaster. |
| **9** | **Facade Engineering**<br>Use of different materials- Aluminum Composite Panels(ACP), Glass, Polycarbonates, PVC roof ceiling, Properties of ACP, Types of glass, Installation process, Applications, Maintenance-Cleaning, Merits and Demerits of Facade. | **6** | **6** | Site Visit (3)<br>A site visit should be arranged to demonstrate and observe the façade. |
| **10** | **Formwork & Centering**<br>Necessity, materials used for formwork and centering<br>Formwork and centering for column, beam, chajja, slab and stair.<br>Removal of formwork and centering<br>Requirements of good formwork | **5** | **6** | Site Visit (4)<br>A site visit should be arranged to demonstrate the formwork and centering for |

| | | | | |
|---|---|---|---|---|
| | | | | column, beam, chajja and stair.<br>Assignment (5)<br>An assignment on forwork and centering for column, beam, chajja and stair. |
| **11** | **Allied Process**<br>**Water proofing** - Necessity & Importance<br>Different methods of water proofing for R.C.C. slabs such as Bituminous tar felt, brick bat coba and advanced techniques.<br>water proofing for Basements<br>**Damp proofing-**<br>Causes and effects of Dampness<br>Methods of damp proofing at various points in building ,Damp proofing in basement<br>**Termite proofing-** Necessity<br>Pre / post construction treatment | **06** | **08** | Assignment (6)<br>An assignment of water proofing, Damp proofing and Termite proofing. |
| **12** | **Cracks in buildings:**<br>Causes & prevention of cracks in building, principle causes of cracks in R.C.C. members, cracks in concrete. | **04** | **06** | |

**(Report of each site visit should be prepared and will be a part of Term work.)**

**Instructional Strategy:**

| Sr.No | Topic | Instructional Strategy |
|---|---|---|
| 1 | Foundation | Classroom teaching, site visit |
| 2 | Doors & Windows | Classroom teaching, site visit, charts, transparencies |
| 3 | Lintel & Arches | Classroom teaching, site visit, models, transparencies |
| 4 | Roofs | Classroom teaching, site visit |
| 5 | Stairs | Classroom teaching, site visit, models Transparencies |
| 6 | Floors | Classroom teaching, models |
| 7 | Scaffolding shoring, underpinning | Classroom teaching, site visit |
| 8 | Finishing works | Classroom teaching, model, site visit, Transparencies |
| 9 | Facade Engineering | Classroom teaching, site visit |
| 10 | Formwork & centering | Classroom teaching, site visit, Transparencies |
| 11 | Allied processes | Classroom teaching, site visit, Transparencies |
| 12 | Cracks in Buildings | Classroom teaching, site visit |

**Reference Books:**

| Sr.No | Author | Title | Publisher |
|---|---|---|---|
| 1 | Sushilkumar | Building Construction | Standard Publishers distributors, Delhi-6 |
| 2 | T.D. Ahuja and G.S. Birdi | Fundamentals of Building construction | Dhanpat Rai and Sons |
| 3 | S.C. Rangwala | Building construction | Charotar Book Stall |
| 4 | B.C.Punmia | Building construction | |
| 5 | Tomlinson | Advanced construction Tech. | |

**Specification Table:**

| Topic No | Cognitive Levels | | | Total |
|---|---|---|---|---|
| | Knowledge | Comprehension | Application | |
| 1 | 4 | 4 | 4 | 12 |
| 2 | 4 | 2 | -- | 6 |
| 3 | 4 | -- | -- | 4 |
| 4 | 2 | 4 | -- | 6 |
| 5 | 4 | 2 | -- | 6 |
| 6 | 2 | 4 | -- | 6 |
| 7 | 4 | -- | 2 | 6 |
| 8 | 4 | -- | 4 | 8 |
| 9 | 4 | -- | 2 | 6 |
| 10 | 2 | 4 | -- | 6 |
| 11 | 4 | 4 | -- | 8 |
| 12 | -- | 2 | 4 | 6 |
| | 38 | 26 | 16 | 80 |

Prepared by

| | | |
|---|---|---|
| (D.K.Bhandare) | (S.V.Chaudhari) | (M.S.Satarkar) |
| L.C.E. | Member Secretary | Chairman P.B.O.S. |

**Programme : Diploma in CE**
**Programme Code : 01 / 15**
**Name of Course : Concrete Technology**
**Course Code : AM - 382**

## Teaching Scheme :

| | Hours/Week | Total Hours |
|---|---|---|
| **Theory** | **3** | **48** |
| **Practical** | **2** | **32** |

## Evaluation Scheme :

| | Progressive Assesment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term Work |
| **Duration** | Two class tests, Each of 60 minutes | 3 Hrs. | - | - | - |
| **Marks** | 20 | 80 | - | 25 | 25 |

## Course Rationale :

Concrete is the most widely used construction material in all types of Civil Engineering structures . A Civil Engineering technician has to plan , supervise and ensure the quality of final product of concrete , i.e. its durability , strength , tolerance , appearance and finish. To discharge duties effectively , he must be able to supervise the concrete construction at all stages of concrete chain, which broadly consist of making of concrete and interaction of its various ingredients both in plastic and hardened stage. For this purpose, a technician must know the basic properties of concrete as well as of the ingredients like cement, aggregate, water etc. He should learn and practise the basic principles governing the strenght, durability and workability of concrete. He should learn and practice the basic principles of mix design and develop supervisory skills required for various operations in concrete in concrete chain.

## Course Objectives :

At the end of this course the student will be able to -

I To develop overall understanding of concrete operations in Civil Engineering construction.

ii To understand the properties of concrete and its ingredients with the focus on importance and effect of these properties on concrete and concreting operations.

iii Understand basic principles of quality control in construction operation.

iv To develop supervisory skills in all concrete operations prior to, during and after concreting by making use of knowledge acquired and practice tools developd by ISI & IRC.

**Course Content :**

| Chapter No | Name of Topics / Sub Topic | Hrs | Weightage |
|---|---|---|---|
| | | | |
| 1 | **Introduction** | | |
| | 1.1 Definition of concrete, Constituents of concrete, Comparison of concrete with other construction materials. | 2 | 6 |
| 2 | **Cement** | | |
| | 2.1 Uses of cement in construction. | | |
| | 2.2 List of methods of manufacturing of Portland cement. Dry and weight process ( list of method only. No detailed procedure to be asked in theory) Chemical constituents of O.P.C., its physical properties, hydration of cement. | | |
| | 2.3 Characteristics and uses of following types cement only, a) O.P.C b) Rapid Hardening cement c) High strenght cement ( 43 & 53 grade) d) Portland Slag Cement & Portland Pozzolana Cement sulphate resisting cement, white cement. | 6 | 14 |
| | 2.4 Standard tests on cement - consistency, initial and final setting and compressive strenght of cement. | | |
| | 2.5 Storage of cement, adulterations in cement. | | |
| 3 | **Aggregates ( Fine & coarse)** | | |
| | 3.1 General, sources, properties of aggregate, requirements of good aggregate. | | |
| | 3.2 Classification of aggregates as per source, size, gradation, shape. | 6 | 8 |
| | 3.3 Testing of aggregates - sieve analysis, fineness modulus, silt content of fine aggregates, impact, crushing of course aggregates, grading of aggregates | | |
| 4 | **Properties of fresh & Hardened Concrete** | | |
| | 4.1 Quality of water required for concreting. | | |
| | 4.2 Fresh Concrete - Defination of workability, segregation & bleeding effects. Factors affecting workability. Measurment of workability by slump cone, compaction factor method. Suggested workability for different conditions by ISI & IRC. | 12 | 18 |
| | 4.3 Hardened concrete - concept of hydration of cement, Duff Abram's w/c ratio to compressive strenght relationship. Defination of strenght of concrete & grades of concrete, factors affecting strenght of concrete. Properties of hardened concrete, Elasticity, Creep, Shrinkage, Durability & Permeability ( Defination & interpretation). | | |

| | | | |
|---|---|---|---|
| | 4.4 Mix Design - Defination, objective, grades of concrete,<br>Design mixes, principles of mix design, list of methods of mix design, IS code method<br>( only procedural steps.) | | |
| | 4.5 Defination of admixtures, types of admixtures and functions of admixtures. | | |
| **5** | **Concreting Operations** | | |
| | 5.1 Necessity of various operations, method, procedures,<br>advantages, disadvantages ( No detailing of equipment). | | |
| | 5.2 Batching : Types of batching measurement of water. | | |
| | 5.3 Mixing : Types of mixing, mixing time, types of mixers. | | |
| | 5.4 Transporting : Methods of transporting concrete, precautions during transporting. | | |
| | 5.5 Formwork : Materials for formwork & their specifications, time of removal of formwork. | 14 | 18 |
| | 5.6 Placing : Precautions in placing concrete underwater. | | |
| | 5.7 Compaction : Hand and machine compaction, different<br>types of vibrators and precautions during compaction. | | |
| | 5.8 Curing : Defination, necessity and different methods of<br>curing. | | |
| | 5.9 Finishing of concrete, different methods of finishing. | | |
| **6** | **Special Concretes** | | |
| | 6.1 Water proofing of concrete : Necessity, different methods, effect of acids, oils & salts on concrete.<br><br>6.2 Repair & maintenance of concrete works. | | |
| | 6.3 Special Concrete : Precast concrete, ferrocrete, Prestressed concrete, Tremie concrete, shortcrete &<br>Or Fibre Reinforced & Polymer concrete. Guniting Light weight & heavy weight concrete, Air entrained concrete. | 6 | 12 |
| | 6.4 Hot weather & cold weather concreting. | | |
| **7** | **Testing of Concrete** | | |
| | 7.1 Non destructive testing of concrete. | 2 | 4 |
| | **Total** | **48** | **80** |

## List of Practicals / Experiments / Assisgnments :

| Sr.No | Name of Experiment / Assignment | Hrs. |
|---|---|---|
| | | |
| 1 | Fineness of Cement | 2 |
| 2 | Standard Consistency | 2 |
| 3 | Soundness od Cement | 2 |
| 4 | initial & final setting | 4 |
| 5 | Compression strenght of Cement | 2 |
| 6 | Field test of Cement - assignment | 2 |
| 7 | Fineness modulus of fine / coarse aggregates | 2 |
| 8 | Bulk density of aggregate | 2 |
| 9 | Bulking of fine aggregate | 2 |
| 10 | aggregate Impact value | 2 |
| 11 | aggregate crushing value | 2 |
| 12 | measurement of workability by slump cone / compaction factor test | 2 |
| 13 | compressive strenght of Concrete | 6 |
| | **Total** | **32** |

## Instructional Strategy :

| Sr.No | Topic | Instructional Strategy |
|---|---|---|
| | | |
| 1 | Introduction | Lect. Method, demonstration |
| 2 | Cement | Lect. Method, demonstration |
| 3 | Aggregates | Lect. Method, demonstration |
| 4 | Admixture & water | Lect. Method, demonstration |
| 5 | Properties of fresh & Hardened Concrete | Lect. Method, demonstration |
| 6 | Concrete operations | Lect. Method, demonstration |
| 7 | Special Concretes | Lect. Method, demonstration |

## Text Books :

| Sr.No | Author | Title | Publication |
|---|---|---|---|
| | | | |
| 1 | shri. M.S.Shetty | Concrete Technology | S. Chand & Company |
| 2 | Shri. M.L.Gmbhir | Concrete Technology | T.M.H Publ. |
| 3 | K.T.Krishnaswamy<br>A.V.Khandekar | Concrete Technology | Dhanapat Rai & Sons |
| 4 | R.K.Agarwal | Concrete Technology | Indira Publ. Delhi |

## Refrence Books :

| Sr.No | Author | Title | Publication |
|---|---|---|---|
| 1 | Dr.Nevile & Brooks | Concrete Technology | Eddison Wesley London |
| 2 | Dr.Orchard | Concrete Technology | App.Science Publ. Ltd. London |

**Learning Resources : Books, Models, Transparencies, relavant IS codes, video, charts, Concrete manual.**

**Specification Table :**

| Sr.No | Topic | Cognitive Levels | | | |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | Total |
| | | | | | |
| 1 | Introduction | 2 | 4 | … | 6 |
| 2 | Cement | 4 | 4 | 6 | 14 |
| 3 | Aggregates - Fine & coarse | 4 | … | 4 | 8 |
| 4 | Properties of fresh & Hardened Concrete | 10 | … | 8 | 18 |
| 5 | Concrete operations | 6 | 8 | 4 | 18 |
| 6 | Special Concretes | 6 | 6 | … | 12 |
| 7 | Testing of Concrete | 2 | 2 | … | 4 |
| | **Total** | **34** | **24** | **22** | **80** |

**(Smt. S.M.Kulkarni)**
Prepared By

**( S.V. Chaudhari )**
Incharge
CDC

**(R.S. Pathade )**
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Mech. Deptt.

**( M.S. Satarkar )**
HOD ( Civil )

**GOVERNMENT POLYTECHNIC, PUNE**
**( An Autonomous Institute of Govt. of Maharshtra )**

**Programme : Diploma in CE**
**Programme Code : 01**
**Name of Course : Soil Mechanics**
**Course Code : AM - 383**

## Teaching Scheme :

| | Hours/Week | Total Hours |
|---|---|---|
| **Theory** | **3** | **48** |
| **Practical** | **2** | **32** |

## Evaluation Scheme :

| | Progressive Assesment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term Work |
| **Duration** | Two class tests, Each of 60 minutes | 3 Hrs. | - | - | - |
| **Marks** | 10 | 40 | - | 25 | 25 |

## Course Rationale :

All Civil Engineering structures are restimg on soil base. Hence the knowledge of soil and its behaviour is essential for technicians. In laboratory the experiments intregate the knowledge and developed desired skills in the students.

## Course Objectives :

At the end of this course the student will be able to -

| | |
|---|---|
| I | Know the properties and behavior of soils. |
| ii | Know & understand various theories and various principle of the course. |
| iii | Develop the ability of interpriting results. |
| iv | Understend the procedure of testing of soil in Laboratory & in the field. |
| v | Comprehend, think and understand other skills. |

**Course Content :**

| Chapter No | Name of Topics / Sub Topic | Hrs | Weightage |
|---|---|---|---|
| | | | |
| 1 | **Introduction** | 4 | 4 |
| | 1.1 Defination : Soil, Soil Mechanics | | |
| | 1.2 Scope in Civil Engineering. | | |
| | 1.3 Origin of soil, formation of soil. Major soil deposit in India. | | |
| 2 | **Physical Properties of Soil** | 10 | 8 |
| | 2.1 Soil as three phase system. | | |
| | 2.2 Physical properties : Void ratio, porosity, sp. Gravity, bulk density, dry density, unit wt., Water content, degree of saturation, density index. | | |
| | 2.3 Relation between : Void ratio and porosity, void ratio, sp.gravity & degree of saturation. | | |
| | 2.4 Laboratory determination of G, yb, yd,w. | | |
| | 2.5 Field test : Determination of field density. ( Numerical problems on physical properties.) | | |
| 3 | **Index properties of soil** | 8 | 6 |
| | 3.1 Sieve analysis, Mechanical analysis ( Dry only), parcial size distribution curve, Cu & Cc. | | |
| | 3.2 Soil classification : I.S. classification, plasticity chart. Consistency of soil : LL, PL, SL, Plasticity index, Consistency index. | | |
| | 3.3 Laboratory tests : Determination of LL & PL. ( Numerical problems on index properties.) | | |
| 4 | **Compaction** | 8 | 6 |
| | 4.1 Concept of compaction & consolidation. | | |
| | 4.2 Compaction : Light and Heavy compaction, zero air void line, O.M.C, Std.Procter test. Modified Procter test. Factors affecting compaction. | | |
| | 4.3 Field Compaction : Requirement of compaction, compaction control. | | |
| | 4.4 Soil stabilization : Scope, purpose, methods. | | |
| | 4.5 CONSOLIDATION : Concept of consolidation. Difference between consolidation and compaction. | | |
| 5 | **Permeability of soil** | 8 | 6 |
| | 5.1 Defination, concept of permeability. Determination of coefficient of permeability : Constant head permeability test, falling head permeability test, factors affecting permeability. | | |
| | 5.2 Field test of determination of K. Use of Filters. ( Numerical problems on permeability of soil.) | | |

| | | | |
|---|---|---|---|
| **6** | | 6 | 6 |
| | 6.1 Concept of shear strenght. | | |
| | 6.2 Cohesive, Non cohesive soils. Factors affecting shear strenght. | | |
| | 6.3 Determination of shear strenght : Direct shear test and vane shear test. | | |
| **7** | **Application of Soil Engineering** | 4 | 4 |
| | 7.1 C.B.R tets : Necessity, method of application. | | |
| | 7.2 Bearing capacity plate load test. | | |
| | **Total** | **48** | **40** |

**List of Practicals / Experiments / Assisgnments :**

| Sr.No | Name of Experiment / Assignment | Hrs. |
|---|---|---|
| | | |
| 1 | To determine the specific gravity of soil by pycnometer method. | 4 |
| 2 | To determine bulk & dry density of soil by core cutter method | 2 |
| 3 | To determine bulk & dry density of soil by sand replacement method. | 4 |
| 4 | Dry sieve analysis of soil & to plot PSDC. | 4 |
| 5 | To determine plastic and liquid limit of soil. | 2 |
| 6 | Study of Shrinkage limit. | 2 |
| 7 | To determine OMC & ydmax of soil by std. proctor test. | 2 |
| 8 | To determine coeff. Of permeability by variable head method. | 2 |
| 9 | Study of constant head permeability. | 4 |
| 10 | Direct Shear test | 2 |
| 11 | Study of plate load test. | 4 |
| | **Total** | **32** |

**Instructional Strategy :**

| Sr.No | Topic | Instructional Strategy |
|---|---|---|
| | | |
| 1 | Introduction | Lect.Method,Demonstration method |
| 2 | Physical Properties of Soil | Lect.Method,Demonstration method, Group Discussion. |
| 3 | Index properties of soil | Lect. Method, demonstration |
| 4 | Compaction & Consolidation. | Lect.Method,Demonstration method, Group Discussion. |
| 5 | Permeability of soil | Lect.Method,Demonstration method |
| 6 | Shear strenght of soil | Lect.Method,Demonstration method |
| 7 | Application of Soil Engineering | Lect.Method,Demonstration method, Group Discussion. |

**Text Books :**

| Sr.No | Author | Title | Publication |
|---|---|---|---|
| | | | |
| 1 | K.R.Arora | Soil Mechanics | Geotechnical eng. |
| 2 | B.J.Kasmalkar | Introduction to Soil Mechanics | Pune Vidyarthi Griha |
| 3 | S.R.Pathak | Geotechnical engineering | |

**Refrence Books :**

| Sr.No | Author | Title | Publication |
|---|---|---|---|
| 1 | B.C. Punmia | Soil Mechanics | Standard Publ. |
| 2 | V.N.S Murthy | Soil Mechanics | |
| 3 | S.C. Scott | Soil Mechanics | |

**Learning Resources : Books, Models, Transparencies, Relavant IS codes, Video, Charts, Concrete Manual**

## Specification Table :

| Sr.No | Topic | Cognitive Levels | | | |
|---|---|---|---|---|---|
| | | **Knowledge** | **Comprehension** | **Application** | **Total** |
| | | | | | |
| 1 | Introduction | 4 | … | … | 4 |
| 2 | Physical Properties of Soil | 4 | 2 | 2 | 8 |
| 3 | Index properties of soil | 3 | 3 | … | 6 |
| 4 | Compaction & Consolidation. | 2 | 2 | 2 | 6 |
| 5 | Permeability of soil | 2 | 2 | 2 | 6 |
| 6 | Shear strenght of soil | 2 | 2 | 2 | 6 |
| 7 | Application of Soil Engineering | … | … | 4 | 4 |
| | **Total** | **17** | **11** | **12** | **40** |

**(Smt. S.M.Kulkarni)**
Prepared By

**( S.V. Chaudhari )**
Incharge
CDC

**(R.S. Pathade )**
Inch. HOD Applied Mech. Deptt.

**( M.S. Satarkar )**
HOD ( Civil )

**Name of Programme** **: Civil Engineering**

**Programme Code** **: 01/21/15**

**Name of Course** **: Project & Seminar**

**Course Code** **: CE481**

**Teaching Scheme:**

| | Hours / Week | Total Hours |
|---|---|---|
| Theory | -- | -- |
| Term work / Practical | 8 | 128 |

**Evaluation:**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term work |
| | | | | | |
| Marks | 50 | -- | -- | 50 | 50 |

**Course Aim:**

The Project work is included in the curriculum to encourage the students to undertake and tackle an independent problem related to Civil Engineering field. The project also comprises of literature survey of a problem assigned.

**Course Objectives:**

Students will be acquainted with the skill required for independent thinking and applications to a problem where he can develop in himself, self reliance.

After completing the project work. The student will be able to:

- Work independently as a leader as well as member of a team.
- Collect data and prepare a report of these activities.
- Use and integrate knowledge of different subjects to prepare working drawings of scheme.
- Make simple designs according to data collected with the help of handbooks, standard data books, I.S. codes etc.

**Course Content: (A) PROJECT AND SEMINAR**

| Sr. No | Topic / Subtopic | Hour | Weight age | | | Practical |
|---|---|---|---|---|---|---|
| | | | T.W. | Oral | Cont. Assess | |
| 1 | Main Project | 104 | 40 | 40 | 40 | The students will select a topic related to any course in the curriculum, design various units involved & submit a report of the work done. The Project work will be done by a group of 4 to 6 students. Oral will be based on term-work. |
| 2 | Seminar | 24 | 10 | 10 | 10 | Each student will select a topic related to technical field and collect detailed information on it. He / She will prepare a report & deliver a seminar on it. Seminar presentation will be assessed internally. |

**OR**

(B) **INPLANT TRAINING**

| Sr. No | Topic / Subtopic | Hours | Weightage | | | Practical |
|---|---|---|---|---|---|---|
| | | | T.W. | Oral | Cont. Assess | |
| 1 | Inplant training | 768 | 100 | 50 | | The students will be placed in an industry for a period of 16 weeks. He will work 6 days in a week for 8 hours / day (768 hours). During the industrial training programme the students will get familiar with filed-work, skills and can co-relate his theoretical knowledge in the field. He will be familiar with field atmosphere and will get hands on experience on various construction activities, such as interpretation of drawing, Measurements & working out quantities. He will also supervise various activities on construction site such as concreting, masonry work, and finishing works. The students will maintain a daily diary in systematic manner & prepare a report on his inplant training. |

- The inplant training of the student will be monitered by a staff member from the institute twice in a month

Prepared by

| | | |
|---|---|---|
| (M.S.Satarkar) | (S.V.Chaudhari) | (M.S.Satarkar) |
| Head of Civil Deptt | CDC Incharge | Head of Civil Deptt. |
| | Member Secretary | Chairman P.B.O.S. |

**Name of Programme : Civil Engineering**
**Programme Code : 01/ 21/ 15**
**Name of Course : Estimation and Costing**
**Course Code : CE482**

**Teaching Scheme:**

| | Hours / Week | Total Hours |
|---|---|---|
| Theory | 4 | 64 |
| Term work / Practical | 2 | 32 |

**Evaluation:**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term work |
| Duration | Two Tests of 60 min duration | 4 Hrs | -- | -- | -- |
| Marks | 20 | 80 | -- | 25 | 25 |

**Course Aim:**

The subject is from Applied Technology group. Diploma Students will learn concepts, principles and procedures of Estimation and Costing. The student should be able to (i) find the cost of Civil Engg structure (ii) calculate the quantities of materials required (iii) Measurement of quantities during construction and after construction for necessary payments and also for repair and maintenance (v) P.W.D. procedure of Execution of Civil Engg works. (vi) Know administrative procedure to be - followed, for preparing Tender documents.

**Course Objectives:**

- To prepare Estimate before construction
- To know modes and units of measurements, Rules for deduction as per IS 1200 for items.
- To draft specifications.
- To prepare rate analysis.
- To know the procedure for valuation of land and buildings.

**Course Content:**

| Sr No | Topic / Sub Topic | Hour | Weig htage | Practical |
|---|---|---|---|---|
| | **Section - I** | | | |
| **1** | **Types of Estimates**<br>Meaning of the terms - Estimating & Costing & Valuation<br>Purpose of Estimating & costing,<br>Types of Estimates- Approximate Estimates,<br>Uses of approximate estimates, Methods of approximate Estimate for buildings, roads, bridges, irrigation works, water supply and sanitary works. Detailed estimates- uses Detailed Estimate for New works, Revised estimate, Supplementary estimate, Repair - Maintenance and Additions & alteration Estimates | **08** | **10** | -- |
| **2** | **Modes of Measurement**<br>Modes of Measurements of items of work including water supply and sanitary works as per P.W.D. and IS-1200<br>Desired accuracy in taking measurements | **03** | **06** | -- |
| **3** | **Detailed Estimates**<br>Requirements for preparing detailed Estimate<br>Procedure for preparing detailed estimate<br>Procedure of taking out quantities for different items of Load bearing and R.C.C framed structures.<br>Long wall short wall method, Centre line method. Standard measurement sheet and abstract sheet. Preparation of schedule of Bars.<br>Provisions to be made in detailed Estimates- contingencies, Work charged Establishments, water supply and sanitary works, electrification, Tools and plant, Quality control charges.<br>Road Estimates, Quantities for Earth work in roads dams, canals, sectional area method, mean area method, trapezoidal method, prismoidal formula method<br>Provisional quantities, provisional sum<br>Prime cost items. Small Exercises.<br>Study of softwares for Estimating and Costing. | **21** | **24** | 1) Detailed Estimate of load bearing Bldg of 3-4 rooms with Flat roof.<br>2)Estimate of <u>any one</u> of the following (only given below items)<br>i)Two room RCC bldg<br>ii)R.C.C. Cycle stand<br>iii)R.C.C. bus stand<br>a)Concrete Quantities<br>b)Form work<br>c)Steel Quantities<br>3) Detailed Estimate of <u>any one</u> of the following works.<br>i) Septic Tank<br>ii) Sump well<br>iii)Community well<br>4)Detailed Estimate Bitumen Road with Earth work<br>5)Detailed Estimate of <u>any one</u><br>i) Pipe culvert<br>ii) Slab culvert<br>iii) Canal |

| Section - II | | | | |
|---|---|---|---|---|
| **5** | **Rate Analysis**<br>Definition of Rate analysis, factors affecting rate analysis<br>Market rates of materials & labours<br>Requirements for preparing rate analysis<br>Definition of Task work, Task works of items, factors affecting Task work<br>Transportation charges, vehicles for transporting materials and their capacities.<br>Preparing rate analysis for items of Civil Engineering works, Schedule of rates | **10** | **12** | 6) Prepare rate analysis for any five items. |
| **6** | **Specifications**<br>Definition of specifications and its necessity. Types of specifications.<br>Points to be considered in framing the specification of an item<br>List of necessary information to be given in specification of an item<br>Drafting specification for building items<br>Standard specification book | **07** | **12** | 7) Drafting of detailed specification for any five items. |
| **7** | **Valuation**<br>Definition and necessity of valuation<br>Definition of cost, price and value<br>Types of values - book value, scrap value salvage value, speculation value, distress value, factors affecting value.<br>Definition of depreciation and obsolescence, sinking fund<br>Methods of calculating depreciation<br>Straight line method, Sinking fund method, Constant percentage method, Quantity survey method. Computation of capitalized value, Gross income, Types of Outgoings and their percentages, Net-Income, Years Purchase. Valuation of only lands and lands with buildings on it. Fixation of rent as per P.W.D. practice. Land acquisition act and its basic principle. Lease hold property, free hold property, types of lease. Mortgage, Mortgage deed precautions to be taken while making mortgage. | **15** | **16** | |

**Instruction Strategy:**

| Sr.No. | Topic | Instructional Strategy |
|---|---|---|
| Section – I | | |
| 1 | Types of Estimates | Class room teaching |
| 2 | Modes of Measurement | Class room teaching |
| 3 | Detailed Estimates | Class room teaching |
| Section II | | |
| 4 | Rate Analysis | Class room teaching , Market Survey |
| 5 | Specifications | Class room teaching |
| 6 | Valuation | Class room teaching |

**Learning resources:** Books, Schedule of rates, specification book. Tender Documents

**Text Books:**

| Sr. No | Author | Title | Publisher |
|---|---|---|---|
| 1 | B. N. Datta | Estimating & costing | UBS Publishers & Distributors Ltd. 5 Ansari Road, Delhi. |
| 2 | G.S. Birdi | Estimating & costing | Dhanpat Rai & Sons. Delhi |
| 3 | S.C. Rangawala | Elements of Estimating & costing | Charatar Publishers House Anand |
| 4 | B.N. Chakraborty | Estimating & costing, Specification & valuation | M. Chakraborty, Calcatta 700026 |

**Reference Books:**

| Sr. No | Author | Title | Publisher |
|---|---|---|---|
| 1 | -- | Standard specification book | Govt. of Maharashtra |
| 2 | Superintendent Engg. P. W.D. Pune – Circle, Pune | Schedule of Rates | Govt. of Maharashtra |

**Specification Table:**

| Sr. No | Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| Section - I | | | | | |
| 1 | Types of Estimates | 06 | 04 | -- | 10 |
| 2 | Modes of Measurement | 04 | 02 | -- | 06 |
| 3 | Detailed Estimates | 08 | 06 | 10 | 24 |
| | Total | 18 | 12 | 10 | 40 |
| Section – II | | | | | |
| 4 | Rate Analysis | 04 | 04 | 04 | 12 |
| 5 | Specifications | 04 | 04 | 04 | 12 |
| 6 | Valuation | 04 | 04 | 08 | 16 |
| Total | | 12 | 12 | 16 | 40 |

Prepared by

(D.K.Bhandare) (S.V.Chaudhari) (M.S.Satarkar)
(S.V.Chaudhari) Member Secretary, PBOS Chairman, PBOS
Lect. in Civil Engg.

**Name of Programme** : **CE**
**Programme Code** : **01/21/15**
**Name of the Course** : **Irrigation Engineering**
**Course Code** : **CE483**

**Teaching Scheme:**

| | Hours / Week | Total Hours |
|---|---|---|
| Theory | 04 | 64 |
| Term work / Practical | 02 | 32 |

**Evaluation:**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term work |
| Duration | Two class tests of 60 min. duration | 3 Hrs | -- | -- | -- |
| Marks | 20 | 80 | -- | -- | 25 |

**Course Aim:**

India is basically an agricultural country and all its resources depend on agricultural out-put. Also, food production has to be increased to meet the increasing demand of food grains. Water is evidently the most vital resource in increasing agricultural out-put. Water is normally supplied to the plants by nature through rains. However, India has unequal distribution of rainfall over the country. This heads to the famine in one part and flood in other part of the country simultaneously. Proper distributions of water and flood control are the remedial measures, that can be achieved through Irrigation and Irrigation Engineering. Therefore, knowledge of this applied technology course is must for the technicians like diploma holders to perform their duties when they are engaged in the field of Irrigation Engineering.

**Course Objective:**

To understand the procedure of investigation and data collection for Irrigation Projects.
To enable the students to design & check feasibility of components of small Irrigation schemes.
To promote ability of supervision of construction works of new Irrigation structures.
To promote ability to operate, repair and maintain the Irrigation systems.

**Course Content:**

| Sr. No | Topic / Sub-Topic | Hours | Weightage | Practical |
|---|---|---|---|---|
| | **Section - I** | | | |
| 1 | **Introduction to Irrigation Engg.**<br>1.1 Definition and necessity of Irrigation in India<br>1.2 Types of Irrigation, and irrigation projects- according to purpose , administration<br>1.3 Advantages and Disadvantages of irrigation<br>1.4 Data collection for Irrigation projects. | 04 | 04 | -- |
| 2 | **Hydrology**<br>2.1 Precipitation, measurement of rainfall, rain gauges Non-automatic and automatic rain gauge Average rain-fall calculations - Arithmetic, average Method, Thiesson polygon method, Isohyetal Method<br>2.2 Catchments - Definition, types. Runoff – Factors affecting runoff computation of runoff. Inglis formula, Strange's table & curves<br>2.3 Hydrograph. Estimation of yield from catchment. Maximum flood discharge - factors contributing value of MFD. Methods of estimation of MFD - Empirical formula,<br>2.4 River Gauging. | 06 | 08 | Assignment on Hydrology |
| 3 | **Water requirements of crops**<br>3.1 Cropping seasons and crops in Maharashtra<br>3.2 Definitions of terms - Crop season, crop period, base period, crop rotation, Intensity of Irrigation, command area, Gross command area, Culturable command area, Irrigable command area, Crop pattern.<br>3.3 Duty & Delta, Relation between duty & delta, factors affecting duty, Methods of improving duty. Time factor, capacity factor.<br>3.4 Simple problems on water requirements & capacity of Canal | 08 | 10 | Assignment on Water requirement of crops |
| 4 | **Reservoir Planning**<br>4.1 Investigation for reservoir planning - computation of capacity from basin contour map, Capacity - Elevation and Area - elevation curves of a reservoir site. water tightness of reservoir, suitability of foundation,<br>4.2 Selection of site for a reservoir<br>4.3 Reservoir sedimentation - factors affecting silting, | 08 | 10 | Assignment on Reservoir Planning. |

| | | | | |
|---|---|---|---|---|
| | 4.4 Reservoir sediment control,<br>4.5Evaporation from reservoir, method of reducing evaporation.<br>4.6 Calculation of dead storage, live storage, gross storage, flood absorption capacity of reservoir.<br>Fixing control levels of reservoir - dead storage level, full reservoir level, high flood level and top of bund level<br>4.7 Simple numerical examples on fixing control levels | | | |
| 5 | **Minor Irrigation:**<br>5.1 Percolation Tank - Necessity, selection of site, Component parts and construction<br>5.2 Underground bandhara.<br>5.3 Micro Irrigation - types of micro Irrigation – sprinkler and drip Irrigation - component parts, layout, operation and maintenance of scheme, merits &demerits, precautions to be taken for efficient working. | 06 | 08 | Assignment on Minor Irrigation**.** |
| | **Section - II** | | | |
| 6 | **Gravity Dams**<br>6.1 Classification of dams according to its use, hydraulic design, material.<br>6.2 Gravity dams - Forces acting on gravity dam, condition of stability, theoretical and practical profile, High & low dams.<br>6.3 Component parts and construction details of gravity dam.<br>6.4 Function of drainage gallery, transverse gallery, Longitudinal gallery<br>6.5 Outlets in gravity dams, Joints, keys and water seals in gravity dams.<br>6.6 Simple numerical examples on conditions of stability of a gravity dam. | 08 | 10 | Assignment on Gravity Dams |
| 7 | **Earthen Dams**<br>7.1 Types of earthen dams, materials used<br>7.2 Components of earthen dam & their functions<br>7.3 Typical cross-sections of an earthen dam According to nature of foundation strata and its depth.<br>7.4 Seepage through earthen dams, methods to reduce Seepage through embankment & foundation. Concept of Phreatic line & its characteristics. Slope protection,<br>7.5 Criteria for safe design of earthen dam. Construction and causes of failure of earthen dam. | 08 | 10 | Assignment on Earthen Dams. |
| 8 | **Spillways :** | 03 | 04 | Assignment |

| | | | | |
|---|---|---|---|---|
| | 8.1 Definition, purpose, Types of spillways - with & without gates-ogee spillway, conditions favoring each type.<br>8.2 Energy dissipation below spillways, stilling basin.<br>8.3 Spillway crest gates - Radial and vertical lift gates | | | on Spillways |
| 9 | **Diversion head-works**<br>9.1 Layout of diversion head-work - its component parts and their function<br>9.2 Weirs - Functions, site selection, types - situation favoring its construction.<br>9.3 K.T.Weir component & construction. | 03 | 04 | -- |
| 10 | **Canals**<br>10.1 Definition, classification - based on the function and relative importance in the network of canals<br>10.2 Canal alignments - Types<br>10.3 Typical cross section of canals, balancing depth of canal, canal discharge, Design of cross section of canals.<br>10.4 Canal structures - Necessity location & function of Head regulators, cross regulators, canal falls, canal escapes, canal outlets.<br>10.5 Cross-drainage works-Types - Selection of suitable type of C.D. work.<br>10.6 Losses of water in canals.<br>Canal lining- Definition, materials used advantages of providing canal lining, Types of canal lining.<br>10.7 Canal out-lets - location, function, requirement and types of canal outlets.<br>10.8 Maintenance of canals<br>10.9 Simple problems on design of canal cross section.<br>10.10 Definition causes and control of water logging. | 08 | 08 | Assignment on Canals. |
| 11 | **Watershed Development**:<br>11.1 Definition, Necessity of Watershed Development,<br>11.2 Works undertaken-Contour trenching, Nalla bunding, Jalyukt Shivar, Slope protections, plantation. | 02 | 04 | -- |

**Instructional Strategy:**

| Sr.No. | Topic | Instructional Strategy |
|---|---|---|
| Section - I | | |
| 1 | Introduction to Irrigation Engg. | Class-room teaching |
| 2 | Hydrology | Class-room teaching |
| 3 | Water Requirements of Crops | Class-room teaching |
| 4 | Reservoir Planning | Class-room teaching & Visit |
| 5 | Minor Irrigation | Class-room teaching & Visit |
| Section - II | | |
| 6 | Dams | Visits, Class-room teaching |
| 7 | Earthen Dams | Visits, Class-room teaching |
| 8 | Spillways | Visits, Class-room teaching |
| 9 | Diversion Head works | Visits, Class-room teaching |
| 10 | Canals | Visits, Class-room teaching |
| 11 | Watershed Development | Visits, Class-room teaching |

**Test Books:**

| Sr. No | Author | Title | Publisher |
|---|---|---|---|
| 1 | Punmia, B.C., Pande B.B. Lal | Irrigation and water Power Engineering | Standard Publishers & Distributors, Delhi. |
| 2 | Dahigaonkar J.G. | Test Book of Irrigation Engineering | Wheeler Publishing, Allahabad |
| 3 | Gajare V.S. | Test Book of Irrigation Engineering | Nirali Prakashan, Pune - 2. |

**Reference Books:**

| Sr. No | Author | Title | Publisher |
|---|---|---|---|
| 1 | Garg S.K. | Irrigation and water Power Engineering | Khanna Publishers, Delhi - 6. |
| 2 | Priyani V.B. | Irrigation Engineering | Charotar Book Stall, Anand |

**Learning Resources:**

1. Charts / Drawings
2. Models
3. Books

**Specification Table:**

| Sr. No | Topic | Cognitive Level | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| Section - I | | | | | |
| 1 | Introduction to Irrigation Engineering | 02 | 02 | -- | 04 |
| 2 | Hydrology | 02 | 02 | 04 | 08 |
| 3 | Water Requirements of Crops | 02 | 04 | 04 | 10 |
| 4 | Reservoir Planning | -- | 04 | 06 | 10 |
| 5 | Minor Irrigation | 02 | 02 | 04 | 08 |
| Total | | 08 | 14 | 18 | 40 |
| Section - II | | | | | |
| 6 | Dams | 04 | -- | 06 | 10 |
| 7 | Earthen Dams | -- | 04 | 06 | 10 |
| 8 | Spillways | -- | 02 | 02 | 04 |
| 9 | Diversion Head works | -- | 02 | 02 | 04 |
| 10 | Canals | -- | 04 | 04 | 08 |
| 11 | Watershed Development | 02 | 02 | -- | 04 |
| | Total | 06 | 14 | 20 | 40 |

Prepared by

(T.S.Pawar) & (V.M.Kolhe)
L.C.E. L.C.E.

(S.V.Chaudhari)
C.D.C.Incharge

(M.S.Satarkar)
H.C.E.D. &
P.B.O.S.Chairman

**Name of Programme: Diploma in Civil Engineering**
**Programme Code : 01/021/15**
**Name of Course : Environmental Engineering**
**Course Code : CE-484**

**Teaching Scheme:**

| | Hours / Week | Total Hours |
|---|---|---|
| Theory | 4 | 64 |
| Term work / Practical | 2 | 32 |

**Evaluation Scheme: -**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term work |
| Duration | Two class tests of 60 min. duration | 3 hours | -- | -- | -- |
| marks | 20 | 80 | -- | 25 | 25 |

**Course Aims: -**

Water plays a critical role in maintaining a balance between living things and the environment in which they live. The quest for pure water can benefit the life and health of everyone. Water purification is now confronted with a myriad of difficulties. Problems caused due to sources receiving greatly increased pollution loads of domestic and industrial wastes. This course is an attempt to present those essential principles and present day practices necessary to the solution of the problems of water collection, water purification and water distribution.

Every community produces both liquid as well as solid wastes. If the waste matter, created and given out by the human and animal life, is allowed to accumulate, it will get decomposed and will contaminate or pollute air, water and food. Hence it is essential to remove the contaminants from the waste water through appropriate treatment methods. This course is an attempt to present essential principles and modern practices and techniques in the field of sanitary Engineering.

**Course Objectives: -**

Section I – Water supply Engineering

The students will be able to:

1) Know various water demands and demand of water to city.
2) Know standards of purity of water
3) Understand different methods of water treatment and design, construction and maintenance aspects of treatment units.
4) Understand methods of distribution of water.

Section II – Sanitary Engineering

1) Know the methods of collection and disposal of dry refuse in villages and town.
2) Understand significance, use and maintenance of various sanitary fittings used for house drainage.
3) Understand different methods of sewage treatment
4) Understand design, construction and maintenance of water carriage system of sewerage.

**Course Contents:-**

| Sr. No. | Topic / Subtopic | Hours (Periods) | Weightage Marks | Practical Contents. |
|---|---|---|---|---|
| **Section - I (Water Supply Engineering)** | | | | |
| **1.** | **Introduction :**<br>General importance of water supply project.<br>Need for protected water supply,<br>Sources of water supplies Surface and ground water sources, requirements of source of water.<br>Intakes – canal intake, river intake, reservoir intake. Location of intake works. Duties of water works Engineer. | **03** | **04** | -- |
| **2.** | **Quantity of Water :-**<br>Demand – Meaning, factors affecting rate of demand. Types of demand – Domestic, public, industrial, fire fighting, compensate losses demand. Per capita Demand, design period.<br>Estimating population-Methods of population forecasting. Factors affecting estimated population. | **06** | **08** | 1) Assignment-Collecting data regarding population of city / village and forecast population after 3 decades and find out the Total water demand per day. |
| **3** | **Quality of Water** :<br>Potable/wholesome water, Reasons for analysis of water. Impurities present in water. Collection of water samples, precautions to be taken while collecting water samples. Tests on water Physical, Chemical and Bacteriological tests.<br>Standards of water purity for portable water<br>(As per specification). | **03** | **04** | 2) Water Analysis. Conduct tests on water sample to determine its -<br>1) Turbidity<br>2) PH value<br>3)Total dissolved solids<br>4) Dissolved oxygen |

| | | | | |
|---|---|---|---|---|
| **4** | **Treatment of Water**<br>Flow diagram of water treatment plant.<br>Aeration: Objects, Methods of aeration.<br>Sedimentation:<br>Plain sedimentation-objects, theory of plain sedimentation<br>Types of sedimentation tanks.<br>Sedimentation with coagulation<br>Purpose, Principle of coagulation, Chemical coagulants, Advantages of alum, Feeding devices-wet feed and dry feed, Mixing devices, Flocculation, Jar Test.<br>Filtration:- General, Theory of filtration, Requirements of Sand for filtration, Gravel for filtration, Classification of filters- Slow Sand filter (overview), Rapid Sand filters (gravity type)<br>Construction and working of rapid sand filter. Loss of head and negative head, back washing of filter. Disinfection: Objects of Disinfection. Minor methods of disinfection.<br>Chlorination: Properties of chlorine, Action of chlorine. Application of chlorine Forms of chlorination. Break point chlorination and its importance, Residual chlorine, Tests for chlorine-Orthotolodine test. | **10** | **12** | 2) Water Analysis.<br>Conduct tests on water sample to determine its<br>1) Turbidity<br>2) PH value<br>3) Total dissolved solids<br>4) Dissolve oxygen.<br>**Experiments –**<br>1)Conduct test on water<br>Sample for determination of optimum dose of coagulant.<br>*Visit to a water treatment plant to study various treatment units and functions.<br>Prepare detailed visit report and flow chart. |
| 5 | **Conveyance and Distribution of water :**<br>Conveyance :<br>Meaning, pipes used in conveyance of water, Joints in pipes, Laying and testing of pipes,<br>Valves- Sluice valve, Air relief valve, Reflux valve, Scour valve, their functions and location on pipeline.<br>Distribution System:<br>Gravity system, pumping system, Dual system. Layout of distribution system Dead end system, Grid iron system Circular system, Radial system.<br>ESR, GSR, and their purpose, Systems of supply of water- Continuous system, Intermittent system, Water supply arrangement in buildings. | **10** | **12** | |

| Section-II (Sanitary Engineering) | | | | |
|---|---|---|---|---|
| **6** | **Introduction:-**<br>Necessity and principles of sanitation, common terms used in sanitary Engineering, Aims and objects of Sewage-disposal.<br>Conservancy system, Water-carriage system, Merits and demerits of these systems.<br>Types of Systems-Separate, Combined, Partially separate system, their merits & demerits, | **06** | **06** | Study of different fixtures used in Building water supply like water meter, taps, elbow, bend, Junction, showers etc.<br>Study of different types of joints and valves. |
| **7** | **Quantity of Sewage, Sewers and Sewer Appurtenances.**<br>Sources of Sanitary sewage, Factors affecting quantity of Sewage, Variations in quantity of Sanitary sewage, Peak flow, minimum flow, Storm water.<br>Factors affecting storm sewage.<br>Design period, Non-scouring and self-cleansing velocity, Different shape of sewers, Materials for sewers, sewer joints, Laying and testing of sewers.<br>Sewer Appurtenances:-<br>Manholes- types, purpose, location. Inlets, Oil and grease traps. Catch basins, Ventilation of Sewers. | **04** | **10** | -- |

| | | | | |
|---|---|---|---|---|
| **8** | **Quality of Sewage**<br>Characteristics of Sewage-Physical, Chemical, Biological<br>Importance of B.O.D., Aerobic and Anaerobic decompositions. Chemical Oxygen Demand (COD), Significance of BOD & COD in sewage treatment | **04** | **04** | |
| **9** | **Sewage Treatment :-**<br>Objects of sewage treatment, degree of treatment<br>Primary treatment-<br>Screens, Grit chamber, detritus tank Skimming tanks, clarifiers,<br>Secondary treatment-<br>Activated sludge process<br>Trickling filters<br>Sludge disposal methods- drying beds, disposal into sea, Incineration, Sludge digestion tanks.<br>Effluent disposal methods, Septic tank. | **10** | **10** | Visit to sewage treatment plant to study the different units and their functions and preparing layout plan and visit report. |
| **10** | **House drainage (Building sanitation):**<br>Meaning, principles of house drainage Traps- p. q. s. traps, floor trap, gully traps, interceptor traps.. Inspection chambers. Sanitary fittings – sinks, urinals, basins, flushing cisterns, water closets-Indian & European type.<br>Systems of plumbing-single stack, one pipe system, One pipe partially ventilated, Two pipe system.<br>Drainage plans of buildings. Testing & Maintenance of house drainage system. | **08** | **10** | Visit to residential/ public buildings to study different systems of plumbing & sanitary fitting like W.C. Urinals, Flushing cisterns,<br>Assignment –<br>Prepare the layout plan of house drains system for two storied residential building and show all details like pipes, drains, traps I.C. etc. |

**Instructional Strategy:-**

| Sr. No. | Topic | Instructional strategy |
|---|---|---|
| | Section-I | |
| 1. | Introduction | Chalk, board, Transparencies. |
| 2. | Quantity of water | Chalk, board |
| 3. | Quality of water | Chalk, board, Transparencies, Lab Work |
| 4. | Treatment of water | Chalk, board, chart, Visits |
| 5. | Conveyance and distribution of water | Chalk, board, Transparencies, field visit |
| | Section-II | |
| 6. | Introduction | Chalk, board, |
| 7. | Quantity of Sewage, Sewers & Appurtenances. | Chalk board |
| 8. | Quality of Sewage | Chalk, Black board, Models, field visit |
| 9 | Sewage Treatment | Chalk, board, Field visits |
| 10. | House drainage | Chalk, board, Model, Visits |

Specification Table:-

| Sr. No | Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| | Section I | | | | |
| 1 | Introduction | 4 | --- | -- | 4 |
| 2 | Quantity of Water | -- | 4 | 4 | 8 |
| 3 | Quality of Water | -- | 4 | -- | 4 |
| 4 | Treatment of Water | 4 | 2 | 6 | 12 |
| 5 | Conveyance & distribution of water | 4 | 4 | 4 | 12 |
| | Total | 12 | 14 | 14 | 40 |
| | Section II | | | | |
| 6 | Introduction | 6 | -- | -- | 6 |
| 7 | Quantity of Sewage, Sewers & Sewers appurtenances | 2 | 4 | 4 | 10 |
| 8 | Quality of Sewage | -- | 4 | -- | 4 |
| 9 | Sewage Treatment | 4 | 4 | 2 | 10 |
| 10 | House drainage | 4 | 2 | 4 | 10 |
| | Total | 16 | 14 | 10 | 40 |

**Reference Books: -**

| Sr. No | Author | Title | Publisher |
|---|---|---|---|
| 1 | A Kamala | Environmental Engg. | Tata McGraw. |
| 2 | V.N.Gharpure | Water supply Engg | Pune Engg. Book Publishing Co. |
| 3 | V.N.Gharpure | Sanitary Engg. | Pune Engg. Book Publishing Co. |
| 4 | S.C.Rangwala | Water supply & Sanitary Engineering. | Charotar Book Stall, Anand |
| 5 | Santosh Garg. | Water supply & Sanitary Engineering | Khanna Publications New Delhi |
| 6 | G.S. Birdie & J.S. Birdie | Water supply & Sanitary Engineering | Dhanpat Rai & sons. New Delhi. |

Prepared by

| | | |
|---|---|---|
| (D.K. Fad) | (S.V. Chaudhari) | (M.S. Satarkar) |
| L.C.E. | C.D.C. Incharge | H.C.E.D.& P.B.O.S. Chairman |

**Name of Programme : Civil Engineering**
**Programme Code : 01/21/15**
**Name of Course : Contracts and Accounts**
**Course Code : CE485**

**Teaching Scheme:**

| | Hours / Week | Total Hours |
|---|---|---|
| Theory | 3 | 48 |
| Term work / Practical | 2 | 32 |

**Evaluation:**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term work |
| Duration | Two Tests of 60 min duration | 3 Hrs | -- | -- | -- |
| Marks | 20 | 80 | -- | 25 | 25 |

**Course Aim:**

The Students will learn concepts, principles and procedures of Contracts and Accounts. The students will understand the procedure for execution of Civil Engineering works in Government and private sector. The student will know procedure for preparing Tender documents.

**Course Objectives:**
After studying this course the student will be able

- To know methods of Execution of works in Public and Private Sectors.
- To know the procedure for preparing tender documents.
- To understand the procedure for payments to contractor
- To know how to maintain accounts of expenditure of the project

**Course Content:**

| Sr No | Topic / Sub Topic | Hours | Weig htage | Practical |
|---|---|---|---|---|
| | **Section - I** | | | |
| **1** | **Tenders and Tender documents**<br>Purpose for inviting Tender, classification of tenders. Various Tender forms, Tender Notice, Information to be given in tender notice. Tender Documents, Methods of submitting tender, Opening and Scrutiny of tender, Acceptance of Tender, Rejection of Tender, Unbalanced tender Work order. E Tendering | **08** | **12** | 1) Collection of any five Tender Notices.<br>2) Drafting of Tender Notice for Government and Private work.<br>3) Prepare a complete tender document for building work.<br>4) Assignment on E Tendering |
| **2** | **Contract**<br>Definition, object and requirement of Valid contract<br>Types of contracts. Lump sum contract, Item rate contract, Percentage rate contract, Cost plus percentage rate contract, Target contract, Negotiated contract, Labour contract, Sub-contract, B.O.A.T. contract. | **06** | **12** | 5) Assignment on Contract |
| **3** | **Conditions of contract**<br>Earnest Money, Security deposit, Time limit and its importance, Extension of Time, Defect liability period, Liquidated damage, Unliquidated damage, Subletting of contract, Escalation price, Extra items. Termination of contract. Arbitration-Causes of disputes, Purpose of Arbitration, Qualities of Arbitrator, Power of an Arbitrator, Advantages of Arbitration. | **10** | **16** | 6) Assignment on conditions of Contract |
| | **Section - II** | | | |
| **4** | **Methods of Execution of works**<br>Fundamental principles of execution of work in Public & Private sector.<br>Procedure for Administrative approval, technical sanction,<br>Piece work method, Rate list method, Day work method, Departmental method by employing labours on daily wages-Nominal Muster Roll.<br>Class of Contractor's registration with its limits<br>Procedure of Registration and documents required for registration and up gradation as contractor in P.W.D.<br>Procedure of execution or work in private sector by appointing various subcontractors. | **10** | **16** | 7) Assignment on Methods of Execution of works<br>8) Assignment on Procedure of Registration as contractor in P.W.D. |

| | | | | |
|---|---|---|---|---|
| **5** | **Payments of works and supplies**<br>Measurement Book, Inspection and checking the measurement. Method of measurement work and payment in private sector.<br>Interim payment, secured Advance, Advance payment, petty advances, Running Bill and Final Bills, Mobilization Advance, Bill Forms | **08** | **16** | 8) Assignment on Payments of works and supplies |
| **6** | **Accounts**<br>Classification of Accounts, Heads of Accounts Importance of maintaining accounts of works and stores, Daily diary, Imprest, Indent, Bin card, work abstract, Hand receipt, Treasury challan. Computerization of accounts in office and store. | **06** | **08** | -- |

**Instruction Strategy:**

| Sr.No. | Topic | Instructional Strategy |
|---|---|---|
| | Section – I | |
| 1 | Tender & Tender documents | Class room teaching |
| 2 | Contracts | Class room teaching |
| 3 | Conditions of contract | Class room teaching, |
| | Section II | |
| 4 | Methods of Execution of works | Class room teaching |
| 5 | Payments of works & supplies | Class room teaching |
| 6 | Accounts | Class room teaching |

**Learning resources:** Books, Schedule of rates, specification Book, Tender Documents.

**Text Books:**

| Sr.No | Author | Title | Publisher |
|---|---|---|---|
| 1 | B. N. Datta | Estimating & costing | UBS Publishers & Distributors Ltd. 5 Ansari Road, Delhi. |
| 2 | G.S. Birdi | Estimating & costing | Dhanpat Rai & sons |
| 3 | S.C. Rangawala | Elements of Estimating & costing | Charatar Publishers House Anand |
| 4 | B.S. Patil | Contracts and Estimates | Orient Longman Ltd. Delhi |
| 5 | B.S.Chakraborty | Estimating & costing, Specification & valuation | M. Chakraborty, Calcatta 700026 |

**Reference Books:**

| Sr.No | Author | Title | Publisher |
|---|---|---|---|
| 1 | --- | Standard specification book | Govt. of Maharashtra |
| 2 | Superintendant Engg. P. W.D. Pune - Circle Pune | Schedule of Rates | Govt. of Maharashtra |

**Specification Table:**

| Sr. No | Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| Section - I | | | | | |
| 1 | Tender & Tender documents | 06 | --- | 06 | 12 |
| 2 | Contracts | 06 | 06 | --- | 12 |
| 3 | Conditions of contract | 06 | 04 | 06 | 16 |
| | Total | 18 | 10 | 12 | 40 |
| Section – II | | | | | |
| 4 | Methods of Execution of works | 06 | 06 | 04 | 16 |
| 5 | Payments of works & supplies | 06 | 04 | 06 | 16 |
| 6 | Accounts | 04 | 04 | -- | 08 |
| Total | | 16 | 14 | 10 | 40 |

Prepared by

(G.P.Pawar) & (V.M.Kolhe)
L.C.E. L.C.E.

(S.V.Chaudhari)
Member Secretary

(M.S.Satarkar)
H.C.E.D. &
Chairman P.B.O.S.

**Name of Programme** : **Civil Engineering**
**Programme Code** : **01/21 /15**
**Name of Course** : **CAD & Computer Application**
**Course Code** : **CE486**
**Teaching Scheme:**

| | Hours / Week | Total Hours |
|---|---|---|
| Theory | -- | -- |
| Term work / Practical | 04 | 64 |

**Evaluation:**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term work |
| Duration | Two class tests of 60 min duration | -- | 03 | -- | -- |
| Marks | 20 | -- | 80 | -- | 50 |

**Course Aim:**

Diploma engineer student must know more about computer operation & its applications. In order to work in software engineering fields in Civil Engineering the student must know drafting methodologies and their applications to various Civil Engineering fields.

**Course Objectives:-**

After studying this course Students will be able to -
Understand the importance of CAD.
Draw different drawings by using computer aided drafting.
Understand various latest software packages being used in Civil Engineering.

**Course Contents:**

| Sr. No | Topic / Subtopic | Pr. Hrs | Weigh -tage | Practical |
|---|---|---|---|---|
| **1** | **Computer aided drafting (CAD)**<br>Introduction to CAD Applications Advantages of CAD,CAM,CAE, CAD Packages available in market, Auto CAD, Omega Designer, P-CAD, Robo CAD, Felix CAD, Intelli CAD, Lis CAD. Auto CAD and manual drafting, advantages.<br>System requirements, CAD peripherals, Opening screen, functional and control keys. | **12** | **20** | Writing Assignment |
| **2** | **CAD Commands-(Draw & Modify)**<br>Line, Circle, Arc, Redraw, Erase, Undo, Redo. Osnap, Ellipse, Polygon, copy | **24** | **30** | Practising writing Assignment<br>Drafting using DRAW |

| | | | | |
|---|---|---|---|---|
| | move, setting up of drawing, Paper sizes, limits, layers, Grid, snap zoom, pan, Regen, Colour, Array, Rotate, Scale, Trim, Break, Extend, Fillet, Chamfer, Text, mirror, Stretch, Line mode, Arc mode, area list Bblist. | | | and MODIFY commands. |
| **3** | **Dimensioning Commands:** Drawing, Dim, Dimscale, Linear, Angular, Adjustable, Geometric dimension, Editing dimension text and variables. | **12** | **10** | Assignment Showing dimensions on drawing. |
| **4** | **Drawing Organization and Set up :** Organization Drawing with layers, layer state creating new layer changing object properties. Drawing set up – Controlling unit display, sizing the drawing sheet, creating new drawing with Wizards and Templates. | **08** | **15** | To prepare, drawing for G+1 RCC framed residential building, using any available CAD package. |
| **5** | **K.T.Weir & Slab culvert** Drawing of Kolhapur Type Weir or R.C.Slab Culvert with the help of readily available data using AutoCAD. | **08** | **05** | To prepare drawing of Kolhapur Type Weir and R.C.Slab Culvert using AutoCAD. |

**Instructional Strategy:**

| Sr. No | Topic | Instruction Strategy |
|---|---|---|
| 1 | Computer aided drafting | Demonstration on Computer, followed by practice |
| 2 | CAD Commands – (Draw & Modify) | Demonstration on Computer, followed by practice |
| 3 | Dimensioning Commands | Demonstration on Computer, followed by practice |
| 4 | Drawing Organization and Set up | Demonstration on Computer, followed by practice |
| 5 | K.T.Weir & Slab culvert | Practice on computer. |

**Text Books:**

| Author | Title | Publisher |
|---|---|---|
| BPB Publication | Auto CAD Practice | BPB Publication, New Delhi |
| Ajeet Singh | Working with AutoCAD 2000 | Tata Mc-Graw Hill |

**Reference Book:**

| Author | Title | Publisher |
|---|---|---|
| Raker & Rice<br>Alan Miller | Inside Auto CAD<br>The ABC's of Auto CAD-2004 | |

**Specification Table:**

| Sr. No | Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| 1 | Computer Aided drafting | 05 | 10 | -- | 15 |
| 2 | CAD Commands-(Draw & Modify) | 05 | 05 | 24 | 34 |
| 3 | Dimensioning Commands | -- | 05 | 05 | 10 |
| 4 | Drawing Organization and Set up | -- | 05 | 10 | 15 |
| 5 | Study of latest software packages used in Civil Engineering | 06 | -- | -- | 06 |
| Total | | 16 | 25 | 39 | 80 |

Prepared by

| | | |
|---|---|---|
| (Mrs.S.V.Kolhe) | (S.V.Chaudhari) | (M.S.Satarkar) |
| L.C.E. | Member Secretary | Chairman P.B.O.S. |

**Programme : Diploma in CE/** EE/ET/ME/MT/CM/IT/DDGM
**Programme Code : 01**/02/03/04/05/06/07/08/**21**/22/23/24/26/**15**/16/17/18/19
**Name of Course : Construction Management**
**Course Code : MA 481**

**Teaching and Scheme**:

| | Hours/Week | Total Hours |
|---|---|---|
| Theory | 03 | 48 |
| Practical | -- | -- |

**Evaluation Scheme:**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term work |
| Duration | Three class tests of 60 min duration | 3 Hrs | -- | -- | -- |
| Marks | 20 | 80 | -- | -- | -- |

**Course Rationale:**

The Civil Engineer has to plan, Manage and execute Civil Engineering works. He has to manage different resources. He should have knowledge of basic management of basic management processes related to Civil engineering field.

**Objectives:**

The student will able to

1. Understand management techniques.
2. Plan, Monitor and execute various types of construction work
3. Manage different resources (Men, Material, Money, Machines)
4. Read, draw & update bar charts, CPM and PERT.
5. Inspect & control quality of construction.

**Contents: Theory**

| **Topic No.** | **Topic & Subtopic** | **Hours** | **Marks** |
|---|---|---|---|
| 1 | **Construction Industry**<br>1.1 Importance of construction industry in National Development.<br>1.2 Special characteristics of Civil engineering works.<br>1.3 Classification and types of construction works.<br>1.4 Agencies associated with construction works.<br>1.5 Resources of construction industry, Material, Manpower, Money, Machinery.<br>1.6 Stages in construction – Planning stage execution stage.<br>1.7 Objectives of Construction Management. | **05** | **06** |

| | | | |
|---|---|---|---|
| 2 | **Scientific Management**<br>2.1 Definition of Management.<br>2.2 Necessity Of Scientific management.<br>2.3 Principles of Management.<br>2.4 Functions of Management.<br>2.5 Application of Principal and function of management to Civil Engineering works. | **06** | **08** |
| 3 | **Leadership and human relationship**<br>3.1 Leadership – styles of leadership<br>3.2 Desirable qualities of leadership of effective Execution of construction work.<br>3.3 Functions of leadership<br>3.4 Human relation.<br>3.5 Human needs.<br>3.6 Motivation and its importance and need, functions of Motivation.<br>3.7 Hygiene and motivation factors. | **05** | **08** |
| 4 | **Planning and scheduling of construction works**<br>4.1 Levels and stages of planning –(pre & post tenders)<br>4.2 Necessity and Importance of planning.<br>4.3 Planning for owner/client and planning for contractor.<br>4.4 Site selection and orientation of building.<br>4.5 Study of drawing, Design, Raw materials Equipment sand human resources required.<br>4.6 Methods of scheduling, Advantages of scheduling.<br>4.7 Bar chart. Preparing construction schedule. Advantages and limitations of bar charts.<br>4.8 Planning and scheduling by Network Construction, Logic, Determine of various timings EST, EFT, LST, and LFT. Total float preparation of activity table, Example on developing Critical path, Introduction to PERT. Terms used.<br>4.9 Comparison between CPM and PERT.<br>4.10 Preparing Construction schedule comprising of items of work and duration.<br>4.11 Resource Aggregation for labour. | **10** | **24** |
| 5 | **Communication at site**<br>5.1 Importance of communication at construction site.<br>5.2 Types of communication.<br>5.3 Barriers to effective communication.<br>5.4 Techniques to overcome barriers of effective communication. | **04** | **06** |

| | | | |
|---|---|---|---|
| 6 | **Safety in Civil Engineering**<br>6.1 Importance of safely in construction works.<br>6.2 Common Causes of accidents, types of accidents, Remedial measures.<br>6.3 Terms used- Injury frequency rate(IFR), Injury Severity rate (ISR), Injury Index (II), Accident cost.<br>6.4 Effective safety Programme. | **04** | **08** |
| 7 | **Site layout**<br>7.1 Storing and stacking of material site.<br>7.2 Location of Machinery and equipment.<br>7.3 Factors on which site layout depend.<br>7.4 Preparation of site layout. | **05** | **08** |
| 8 | **Inspection and quality**<br>8.1 Concept of quality.<br>8.2 Supervision techniques to establish dimensional control such as line, Level Gradient, Slope, Plumb Camber.<br>8.3 Functions of Inspection Department.<br>8.4 Quality assurance and quality control.<br>8.5 Sampling Techniques. | **05** | **08** |
| 9 | **Application of Computer in Construction Management.**<br>9.1 Types of software<br>9.2 Application of software & Areas.<br>9.3 Merits of software.<br>9.4 Demerits of software. | **02** | **04** |
| 10 | **Entrepreneurship in Construction Management**<br>10.1 Concept of Entrepreneur and Entrepreneurship<br>10.2 Merits of Entrepreneurship and employment.<br>10.3 Types of Construction Management. | **02** | **06** |
| | **Total** | **48** | **80** |

**Suggested Instructional Strategies:**

Lecture Method, Use of teaching aids, Demonstration, Case Study.

**Learning Resources:**

Books, Transparencies, Internet.

**Reference Book:**

| S.N. | Author | Title | Publisher |
|---|---|---|---|
| 1 | M.L.Dhir, Gehlot | Construction Planning & Management | Wiley New Delhi |
| 2 | Harpal Singh | Construction Management & Accounts | Tata McGraw Hill |
| 3 | B.Sengupta and Guha | Construction management and planning | Tata McGraw Hill |
| 4 | R.L.Peurifoy | Construction Planning equipment and methods | McGraw-Hill Co. Ltd. |
| 5 | Banga & Sharma | Origination of Management | McGraw-Hill Co. Ltd. |

Prepared By

( N.G.Waykole )
L.C.E.

( S. V. Chaudhari)
Member Secretary, PBOS

(M.S.Satarkar)
H.C.E.D. &
Chairman P.B.O.S.

**Diploma Programme in Civil Engineering**
**Programme Code : 01**/02/03/04/05/06/07/08/**21**/22/23/24/26/**15**/16/17/18/19
**Name of Course : Industrial Organization Management**
**Course Code : MA482**

**Teaching Scheme:**

| Theory/Practical | Hours/ Week | Total Hours |
|---|---|---|
| Theory | 03 | 48 |
| Practical | -- | -- |

**Evaluation Scheme:**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term Work |
| Duration | Two class tests of 60 min Duration | 3 Hrs | -- | -- | -- |
| Marks | 20 | 80 | -- | -- | -- |

**Course Rationale:**

| **At the end of course, student will be able to** | |
|---|---|
| 1 | Create necessary awareness and motivation of technical student for promoting self-employment and alternative to wage employment |
| 2 | Develop skill for organization market survey and managements. |
| 3 | Appreciate importance of human relations in industry. |

**Course Objectives:**

| **After studying this course, the student will be able to** | |
|---|---|
| 1 | The basic knowledge about entrepreneurship. |
| 2 | Fundamentals of accounting finance, marketing. |
| 3 | Various aspects of management, Taylor's principle. |
| 4 | Management techniques. |
| 5 | Different acts used in factories. |

**Contents:**

| Topic No. | Topic & Subtopic | | Hrs | Marks |
|---|---|---|---|---|
| 1 | **Overview of Business and Entrepreneurship** | | **05** | **08** |
| | 1.1 | Type of Business: Service, Manufacturing, Trade.<br>Industrial sectors introduction to : Engineering Industry, IT Industry, Banking, insurance, Retail.<br>Globalization: Introduction, Advantages and Disadvantages with respect to India. | | |
| 2 | **Organizational Management** | | **08** | **14** |
| | 2.1 | Organization : Defination, Steps in organization,<br>Types of Organization : Line, Functional, Line and Staff, Project.<br>Departmentation : By product, by process by function.<br>Principles of Organization : Authority and responsibility, Span of control, Effective delegation, Communication.<br>Forms of Ownership : Proprietorship, Partnership, Joint stock, Co-operative society, Government sector. | | |
| 3 | **Management Process** | | | |
| | 3.1 | What is management: Evolution, Various definition of management, concept of management, Levels of management, administration of management, scientific management by F.W. Taylor.<br>Principle of management :<br>Function of management: Planning, organizing, directing, coordinating, controlling. | **08** | **14** |
| 4 | **Financial Management and Accounting** | | **07** | **12** |
| | 4.1 | Financial management objective and function.<br>Capital generation and management: type of capital-fixed and working, sources of raising capital, feature of short term, medium term and long term sources.<br>Budget and account: types of budget, production budget-sample format, fixed and variable budget-concept, profit and loss account, important accounting terminology, types of account: rules for debit and credits, systems of book keeping, book keeping, books of accounts.<br>Balance sheet: meaning, sample format, meaning of different terms involved. | | |
| 5 | **Material Management** | | **07** | **12** |
| | 5.1 | Inventory concept, its classification, functions of inventory : ABC analysis-necessity and steps :<br>Economic order quantity concept, graphical representation, determination of EOQ<br>Standard steps in purchasing<br>Modern technique of material management: material resources planning (MRP)-function of MRP, input to MRP, benefits of MRP.<br>Enterprise resource planning (ERP)-concepts, list of modules, advantages and disadvantages of ERP. | | |
| 6 | **Marketing** | | **05** | **08** |
| | 6.1 | Market survey, definition, modern concept of marketing orientation, project report preparation, utility, project report preparation of utility for evaluation, market oriented report, product costing, project costing, format, evaluation of project report, costing and pricing, classification of costs, calculation of breakeven point, packing and advertising. | | |

| | | | | |
|---|---|---|---|---|
| 7 | **Industrial Safety and legislative acts** | | **04** | **06** |
| | 7.1 | Safety management: cause of accident, types of industrial accident, preventive measure, safety procedure.<br>Industrial legislation – necessity of acts: important definition and main provision of following act – workman compensation act, minimum wages act, Indian factory act. | | |
| 8 | **Quality management and ISO** | | **04** | **06** |
| | **8.1** | Meaning of quality: quality management system - activities, benefits, Quality control-objective, function, advantages, quality circle-concepts, characteristics and objectives, quality assurance-concepts, quality assurance system.<br>Meaning of total quality and TQM components of TQM-concept, element of TQM benefits,<br>Modern technique and system of quality management like-Kaizen, 5S, Six Sigma. ISO 9001:2000: benefits, Main clauses. | | |
| | | **Total** | **48** | **80** |

**Instructional Strategy:**

| Sr. No | Topic | Instructional Strategy |
|---|---|---|
| 1 | Overview of Business and Entrepreneurship | Class room teaching |
| 2 | Organizational Management | Class room teaching |
| 3 | Management Process | Class room teaching |
| 4 | Financial management and accounting | Class room teaching |
| 5 | Material management | Class room teaching |
| 6 | Marketing | Class room teaching |
| 7 | Industrial safety and legislative acts | Class room teaching |
| 8 | Quality management and ISO | Class room teaching |

**Reference Book**:

| Sr. No. | Author | Title | Publisher |
|---|---|---|---|
| 1 | Sept. 1988, TTTI, Chandigarh | Entrepreneurship development training material | Sept. 1988, TTTI, Chandigarh |
| 2 | March. 1988, TTTI, Chandigarh | Report for institutional entrepreneurship development and management courses in selected institutions | March. 1988, TTTI, Chandigarh |
| 3 | Uday Parikh, T.V. Rao and D.M. Pestonjee | Behavioural processes in organizations | Tata McGrawhill |
| 4 | O.P. Khanna | Industrial engineering and management | Dhanpat Rai and Sons. |
| 5 | Banga and Banga | Project Planning and entrepreneurship | Khanna Publishers. |
| 6 | David, Kroenke | Management Information Systems | McGraw Hill Book Co. |
| 7 | Lester R. Bittel, John W. Newstrom | What every supervisor should know | McGraw Hill Book Co. |

**Specification Table:**

| Sr. No. | Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| 1 | Entrepreneurship development | 03 | 03 | -- | 06 |
| 2 | Finance and accounting | 06 | 02 | -- | 08 |
| 3 | Marketing Fundamentals of accounting | -- | 04 | 04 | 08 |
| 4 | Organization | 06 | 02 | -- | 08 |
| 5 | Management | 07 | 04 | 04 | 15 |
| 6 | Acts | 10 | 10 | 06 | 26 |
| 7 | Fields of industrial psychology | 04 | -- | -- | 04 |
| 8 | | 05 | -- | -- | 05 |
| | **Total** | **40** | **26** | **14** | **80** |

Prepared By

(C.Y.Totewar) (S.V.Chaudhari) (A.S.Zanpure )
Member Secretary, PBOS Chairman, PBOS

**Diploma Programme in Civil Engineering**
**Programme Code : 01**/02/03/04/05/06/07/08/**21**/22/23/24/26/**15**/16/17/18/19
**Name of Course : Industrial Organization Management**
**Course Code : MA482**

**Teaching Scheme:**

| Theory/Practical | Hours/ Week | Total Hours |
|---|---|---|
| Theory | 03 | 48 |
| Practical | -- | -- |

**Evaluation Scheme:**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term Work |
| Duration | Two class tests of 60 min Duration | 3 Hrs | -- | -- | -- |
| Marks | 20 | 80 | -- | -- | -- |

**Course Rationale:**

| **At the end of course, student will be able to** | |
|---|---|
| 1 | Create necessary awareness and motivation of technical student for promoting self-employment and alternative to wage employment |
| 2 | Develop skill for organization market survey and managements. |
| 3 | Appreciate importance of human relations in industry. |

**Course Objectives:**

| **After studying this course, the student will be able to** | |
|---|---|
| 1 | The basic knowledge about entrepreneurship. |
| 2 | Fundamentals of accounting finance, marketing. |
| 3 | Various aspects of management, Taylor's principle. |
| 4 | Management techniques. |
| 5 | Different acts used in factories. |

**Contents:**

| Topic No. | Topic & Subtopic | | Hrs | Marks |
|---|---|---|---|---|
| 1 | **Overview of Business and Entrepreneurship** | | **05** | **08** |
| | 1.1 | Type of Business: Service, Manufacturing, Trade.<br>Industrial sectors introduction to : Engineering Industry, IT Industry, Banking, insurance, Retail.<br>Globalization: Introduction, Advantages and Disadvantages with respect to India. | | |
| 2 | **Organizational Management** | | **08** | **14** |
| | 2.1 | Organization : Defination, Steps in organization,<br>Types of Organization : Line, Functional, Line and Staff, Project.<br>Departmentation : By product, by process by function.<br>Principles of Organization : Authority and responsibility, Span of control, Effective delegation, Communication.<br>Forms of Ownership : Proprietorship, Partnership, Joint stock, Co-operative society, Government sector. | | |
| 3 | **Management Process** | | | |
| | 3.1 | What is management: Evolution, Various definition of management, concept of management, Levels of management, administration of management, scientific management by F.W. Taylor.<br>Principle of management :<br>Function of management: Planning, organizing, directing, coordinating, controlling. | **08** | **14** |
| 4 | **Financial Management and Accounting** | | **07** | **12** |
| | 4.1 | Financial management objective and function.<br>Capital generation and management: type of capital-fixed and working, sources of raising capital, feature of short term, medium term and long term sources.<br>Budget and account: types of budget, production budget-sample format, fixed and variable budget-concept, profit and loss account, important accounting terminology, types of account: rules for debit and credits, systems of book keeping, book keeping, books of accounts.<br>Balance sheet: meaning, sample format, meaning of different terms involved. | | |
| 5 | **Material Management** | | **07** | **12** |
| | 5.1 | Inventory concept, its classification, functions of inventory : ABC analysis-necessity and steps :<br>Economic order quantity concept, graphical representation, determination of EOQ<br>Standard steps in purchasing<br>Modern technique of material management: material resources planning (MRP)-function of MRP, input to MRP, benefits of MRP.<br>Enterprise resource planning (ERP)-concepts, list of modules, advantages and disadvantages of ERP. | | |
| 6 | **Marketing** | | **05** | **08** |
| | 6.1 | Market survey, definition, modern concept of marketing orientation, project report preparation, utility, project report preparation of utility for evaluation, market oriented report, product costing, project costing, format, evaluation of project report, costing and pricing, classification of costs, calculation of breakeven point, packing and advertising. | | |

| | | | | |
|---|---|---|---|---|
| 7 | **Industrial Safety and legislative acts** | | **04** | **06** |
| | 7.1 | Safety management: cause of accident, types of industrial accident, preventive measure, safety procedure.<br>Industrial legislation – necessity of acts: important definition and main provision of following act – workman compensation act, minimum wages act, Indian factory act. | | |
| 8 | **Quality management and ISO** | | **04** | **06** |
| | **8.1** | Meaning of quality: quality management system - activities, benefits, Quality control-objective, function, advantages, quality circle-concepts, characteristics and objectives, quality assurance-concepts, quality assurance system.<br>Meaning of total quality and TQM components of TQM-concept, element of TQM benefits,<br>Modern technique and system of quality management like-Kaizen, 5S, Six Sigma. ISO 9001:2000: benefits, Main clauses. | | |
| | | **Total** | **48** | **80** |

**Instructional Strategy:**

| Sr. No | Topic | Instructional Strategy |
|---|---|---|
| 1 | Overview of Business and Entrepreneurship | Class room teaching |
| 2 | Organizational Management | Class room teaching |
| 3 | Management Process | Class room teaching |
| 4 | Financial management and accounting | Class room teaching |
| 5 | Material management | Class room teaching |
| 6 | Marketing | Class room teaching |
| 7 | Industrial safety and legislative acts | Class room teaching |
| 8 | Quality management and ISO | Class room teaching |

**Reference Book**:

| Sr. No. | Author | Title | Publisher |
|---|---|---|---|
| 1 | Sept. 1988, TTTI, Chandigarh | Entrepreneurship development training material | Sept. 1988, TTTI, Chandigarh |
| 2 | March. 1988, TTTI, Chandigarh | Report for institutional entrepreneurship development and management courses in selected institutions | March. 1988, TTTI, Chandigarh |
| 3 | Uday Parikh, T.V. Rao and D.M. Pestonjee | Behavioural processes in organizations | Tata McGrawhill |
| 4 | O.P. Khanna | Industrial engineering and management | Dhanpat Rai and Sons. |
| 5 | Banga and Banga | Project Planning and entrepreneurship | Khanna Publishers. |
| 6 | David, Kroenke | Management Information Systems | McGraw Hill Book Co. |
| 7 | Lester R. Bittel, John W. Newstrom | What every supervisor should know | McGraw Hill Book Co. |

**Specification Table:**

| Sr. No. | Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| 1 | Entrepreneurship development | 03 | 03 | -- | 06 |
| 2 | Finance and accounting | 06 | 02 | -- | 08 |
| 3 | Marketing Fundamentals of accounting | -- | 04 | 04 | 08 |
| 4 | Organization | 06 | 02 | -- | 08 |
| 5 | Management | 07 | 04 | 04 | 15 |
| 6 | Acts | 10 | 10 | 06 | 26 |
| 7 | Fields of industrial psychology | 04 | -- | -- | 04 |
| 8 | | 05 | -- | -- | 05 |
| | **Total** | **40** | **26** | **14** | **80** |

Prepared By

(C.Y.Totewar) (S.V.Chaudhari) (A.S.Zanpure )
Member Secretary, PBOS Chairman, PBOS

**Programme** : Diploma in **CE/** EE/ET/ME/MT/CM/ IT/DDGM
**Programme Code** : **01**/02/03/04/05/06/07/08/**21**/22/23/24/26/**15/**16/17/18/19
**Name of Course** : Entrepreneurship Development
**Course Code** : MA483

**Teaching Scheme:**

| | **Hours /Week** | **Total Hours** |
|---|---|---|
| **Theory** | **03** | **48** |
| **Practical** | --- | --- |

**Evaluation Scheme:**

| | **Progressive Assessment** | **Semester End Examination** | | | |
|---|---|---|---|---|---|
| | | **Theory** | **Practical** | **Oral** | **Term work** |
| **Duration** | **Two class tests of 60 Minutes** | **03 Hrs.** | --- | --- | --- |
| **Marks** | **20** | **80** | --- | --- | --- |

## Course Rationale:

To make the students aware of entrepreneurship as one of the career options and hence to teach them the various aspects of starting a enterprise.

## Course Objectives:

After studying this course, the student will be able to

- SWOT analysis.
- Business Environment scanning and opportunity scanning. (Search)
- Market assessment.
- Project formulation.
- Identification of product / Technology / Equipment
- Financial Sources.
- Sales and Marketing
- Reasons of failure of entrepreneurs.

**Course Content:**

| Chapter No. | Name of Topic/Sub topic | Hrs | Weigh - tage |
|---|---|---|---|
| **1.** | **Entrepreneurship Awareness** | | |
| | Entrepreneurship – need, scope & philosophy. Definition of an entrepreneur, attributes, Entrepreneurship. Need Analysis: Human Need, SWOT Analysis, goal setting, business environment, emerging trends, Information & collection techniques, opportunities. Role of Entrepreneur in Indian economy | 08 | 10 |
| **2.** | **Starting & Identification of Project** | | |
| | Product and services, demand availability & resource requirement. Market survey technique – Identification of market, marketing trends, market survey techniques, agencies & organizations to be contacted. Product, suppliers of plant, equipment & raw material technology. Venture Capital Funding | 08 | 14 |
| **3.** | **Preparation of Project report** | | |
| | Structure of project report, purpose of project report. Working & fixed capital, financial institutions, procedures & Norms for financing feasibility criteria, project planning, time management, legal formalities, municipal by laws. Safety considerations, plant layout, commissioning of plant & equipment, trial production. | 10 | 16 |
| **4.** | **Information & support systems** | | |
| | Information needed & their sources. Information related to Project Information related to procedures & formalities.<br>Support systems<br>a) Small scale business planning Requirements<br>b) Govt. & financial Agencies, Formalities.<br>Role of Central Government and State Government in promoting Entrepreneurship- introduction to various incentives, subsidies and grants – Export Oriented Units – fiscal and tax concession available. Role of following agencies in the Entrepreneurship Development - District Industries Centers (DIC), Small Industries Service Institute (SISI), Entrepreneurship Development Institute of India (EDII), National Institute of Entrepreneurship & Small Business Development (NIESBUD), National Entrepreneurship Development Board (NEDB) | 10 | 16 |
| **5.** | **Management of Enterprises** | | |
| | Forms of business Organization. Human behavior, personnel management, sales Management. Marketing practice, distribution channels, Advertisings, Packaging. | 06 | 12 |
| **6.** | **Why do entrepreneurs fail?** | | |
| | The four entrepreneurial pitfalls (Peter Ducker) Case studies of successful entrepreneur. Women entrepreneurs – Reasons for low women entrepreneurs, problems & prospectus. | 06 | 12 |
| | **Total** | **48** | **80** |

**Instructional Strategy:**

| Sr. No. | Topic | Instructional Strategy |
|---|---|---|
| **1.** | Entrepreneurship Awareness | **Lecture, market survey, workshops, interviews.** |
| **2.** | Starting & Identification of Project | |
| **3.** | Preparation of Project report | |
| **4.** | Information & support systems. | |
| **5.** | Management of Enterprises | |
| **6.** | Why do entrepreneurs fail? | |

**Text Books:**

| Sr. No | Author | Title | Publication |
|---|---|---|---|
| **1.** | S. Saini, B.S. Rathore | Entrepreneurship – Theory & Practice | |

**Reference Books:**

| Sr. No | Author | Title | Publication |
|---|---|---|---|
| 1. | Vasant Desai, Pragati Desai | Entrepreneurial development Vol. I | |
| 2. | Vasant Desai, Pragati Desai | Entrepreneurial development Vol. II | |
| 3. | Vasant Desai, Pragati Desai | Entrepreneurial development Vol. III | |
| 4. | Colombo Staff College, Manila | Entrepreneurship Development Plan | TMH, New Delhi |
| 5. | Jerald Greenberg, Robert A. Baron/ Carol A. Sales/ Frances A. Owen / Verlag (1999) | Behaviour in organizations, Pearson Education. | Tata Mcgraw Hill. |
| 6. | The winning Edge, corporate creativity. | Pradip N. Kandwalla | Tata Mcgraw Hill.(2006) |
| 7. | John L. Colley, Jacqueline L. Doyle, | Corporate Governance | Tata Mcgraw Hill. (2003) |
| 8. | Timpe, Dale A | Creativity | Jaico Publishing House, New Delhi.Tata Mcgraw Hill (2005) |

**Learning Resources:** Books, Articles, Case studies

**Specification Table:**

| Sr. No. | Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| 1. | Entrepreneurship Awareness | 02 | 06 | 02 | 10 |
| 2 | Starting & Identification of Project : | 04 | 06 | 04 | 14 |
| 3. | Preparation of Project report business plan. | 03 | 10 | 03 | 16 |
| 4 | Information & support systems. | 04 | 08 | 04 | 16 |
| 5 | Management of Enterprises : | 04 | 06 | 02 | 12 |
| 6 | Why do entrepreneurs fail? | 04 | 04 | 04 | 12 |
| | Total | 21 | 40 | 19 | 80 |

Prepared By

(S.P.Paranjape)
L.M.E.

( S.V.Chaudhari)
Member Secretary,
PBOS

(A.S.Zanpure)
H.A.M.D.

(M.S.Satarkar)
H.C.E.D. &
Chairman P.B.O.S

.

**Programme** : Diploma in **CE/**EE/ET/ME/MT/CM/IT
**Programme Code** : **01/**02/03/04/05/06/07/08/**21/**22/23/24/26/**15/**16/17/18/19
**Name of Course** : Material Management
**Course Code** : MA484

**Teaching Scheme:**

| | Hours /Week | Total Hours |
|---|---|---|
| Theory | 03 | 48 |
| Practical | -- | -- |

**Evaluation Scheme:**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term work |
| Duration | Three class tests of 60 Minutes | 03 Hrs. | -- | -- | -- |
| Marks | 20 | 80 | -- | -- | -- |

**Course Rationale:**

This course deals with management of materials. Smooth running of any industry depends upon the interdepartmental relations and planning for execution of work jointly. Efficiency of production department also depends upon the availability of raw material of required quality and quantity. Therefore there should be proper co-ordination between production department, production planning, stores department and purchase department. Incorrect materials planning can also lead to higher inventories & high cost.

**Course Objectives:**

After studying this course, the student will be able to

- To know the importance of materials and inventory management
- To know the different aspects of buying procedure and price forecasting.
- To acquaint with latest techniques in materials management
- To know procedure for giving requisition of materials along with specifications
- To know different features of negotiation technique and management of obsolete and scrap materials.

**Course Content:**

| Chapter No. | Name of Topic/Sub topic | | Hrs | Weight-age |
|---|---|---|---|---|
| **1** | **Importance of Materials Management** | | | |
| | 1.1 | Growing importance of Materials Management | **10** | **16** |
| | 1.2 | Scope of Materials Management | | |
| | 1.3 | Objectives and functions of Materials Management | | |
| | 1.4 | Organizing for Materials Management | | |
| | 1.5 | Introduction to Materials planning | | |
| | 1.6 | Importance of specifications in Materials Management | | |
| **2** | **Inventory Management** | | | |
| | 2.1 | Selective control – ABC Analysis - Purpose and objectives of ABC Analysis Mechanics | **10** | **16** |
| | 2.2 | Advantages of ABC Analysis limitations of ABC Analysis | | |
| | 2.3 | Order point – Lead Time, safety stock, Re-order point, standard order. Economic order Quantity (EOQ), Graphical & Analytical Method | | |
| **3** | **Buying procedure** | | | |
| | 3.1 | Sourcing, Buy or lease | **10** | **16** |
| | 3.2 | Purchase systems | | |
| | 3.3 | Problems in relations with supplier | | |
| | 3.4 | Value Analysis → Definition & scope | | |
| | 3.5 | Selection of products for value analysis | | |
| | 3.6 | Value analysis framework | | |
| | 3.7 | Implementation & methodology | | |
| | 3.8 | Ethics in purchasing | | |
| **4** | **Price forecasting** | | | |
| | 4.1 | Importance & Approaches | **01** | **02** |
| **5** | **Inventory control & Cost reduction techniques** | | | |
| | 5.1 | Inventory turns ratios | **05** | **08** |
| | 5.2 | Standardization- need & importance | | |
| | 5.3 | Codification- concept, benefits. | | |
| | 5.4 | Value engineering & Value analysis- concept &process | | |
| **6** | **Latest Techniques in Materials Management** | | | |
| | 6.1 | Just in Time (JIT) zero inventory concept | **05** | **10** |
| | 6.2 | Integrated computerized management systems in Materials Management | | |
| | 6.3 | Introduction to SAP. | | |
| **7** | **Management of obsolete Surplus and Scrap material** | | | |
| | 7.1 | Definitions, Reasons for generation and accumulation of obsolete Surplus and scrap, Survey committee, presale preparations, sale, auction, sale by tender. | **07** | **12** |
| | | **Total** | **48** | **80** |

**Instructional Strategy:**

| Sr. No. | Topic | Instructional Strategy |
|---|---|---|
| 1 | Importance of Materials Management | Class room teaching |
| 2 | Inventory Management | Class room teaching |
| 3 | Buying procedure | Class room teaching |
| 4 | Price forecasting | Class room teaching |
| 5 | Inventory control & Cost reduction techniques | Class room teaching |
| 6 | Latest Techniques in Materials Management | Class room teaching |
| 7 | Management of obsolete & scrap material | Class room teaching |

**Text Books:**

| Sr. No | Author | Title | Publication |
|---|---|---|---|
| 1 | Ammer Deans S. | Materials Management | R.D. Irwin Hllions |
| 2 | P. Gopalkrishan and M. Sundaresan | Materials Management An Integrated approach | Prentice – Hall of India Pvt. Ltd. New Delhi. |
| 3 | M.M. Shah | An integrated concept of Materials Management | Tata McGraw Hill Publisher Co. Ltd. New Delhi |

**Reference Books:**

| Sr. No | Author | Title | Publication |
|---|---|---|---|
| 1 | P.G. Menon | Materials Management | |
| 2 | A Deb | Materials Management | Academic Publishers |
| 3 | Dobler D.W. and Lee C | Purchasing and Materials Management | --- |
| 4 | Brandy C.S. | Materials Handbook | --- |

**Learning Resources:** OHP, LCD, Projector, and Transference, White board

**Specification Table:**

| Sr. No. | Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| 1 | Importance of Materials Management | 6 | 6 | 4 | 16 |
| 2 | Inventory Management | 6 | 6 | 4 | 16 |
| 3 | Buying procedure | 6 | 6 | 4 | 16 |
| 4 | Price forecasting | -- | 1 | 1 | 02 |
| 5 | Inventory control & Cost reduction techniques | 2 | 4 | 2 | 08 |
| 6 | Latest techniques in Materials Management | 2 | 4 | 4 | 10 |
| 7 | Management of obsolete and scrap materials | 6 | 6 | -- | 12 |
| **Total** | | **28** | **33** | **19** | **80** |

Prepared By

(Smt.N.S.Kadam)
Head Metallurgy

(S.V.Chaudhari)
Secretary, PBOS

(M.S.Satakar)
H.C.E.D. &
Chairman, PBOS

| | | |
|---|---|---|
| **Programme** | **:** | Diploma in **CE**/EE / ET/ ME/MT/ CM / IT/DDGM |
| **Programme Code** | **:** | **01**/02/03/04/05/06/07/**21**/24/26/**15**/16/17/18/19 |
| **Name of Course** | **:** | **Supervisory Management** |
| **Course Code** | **:** | **MA485** |

**Teaching Scheme:**

| | **Hours /Week** | **Total Hours** |
|---|---|---|
| **Theory** | **03** | **48** |
| **Practical** | -- | -- |

**Evaluation Scheme:**

| | **Progressive Assessment** | **Semester End Examination** | | | |
|---|---|---|---|---|---|
| | | **Theory** | **Practical** | **Oral** | **Term work** |
| Duration | Two class tests, each of 60 Min. duration | 03 Hrs | -- | -- | -- |
| Marks | **20** | **80** | -- | -- | -- |

## Course Aims:

The diploma holders are intended to work as a supervisor in the industry. He has to perform a versatile role in the activities of an industry; he has to coordinate his subordinates and the higher personals.
The students are required to understand to function as a supervisor. He should be able to plan, organize, and direct the subordinates to achieve better results within time for a task assigned to him.

## Course Objectives:

After studying this course, the student will be able to

- Know the basic duties of a supervisor.
- Plan a particular job by splitting the whole job into pieces and monitoring each step.
- Understand human behaviors, identify skills, utilize skills, and observe safety of workers.
- Achieve better overall efficiency and utilize maximum capacity of machineries.

## Course Content:

| Sr. No | Name of Topic/Sub topic | Hrs | Weig htage |
|---|---|---|---|
| 1. | **Introduction** | | |
| | **1.1**Management of a job. Necessity for Scientific Management for supervisor. Handling complexity and achieving optimization. | **02** | **04** |
| 2. | **Planning by Supervisor** | | |
| | **2.1** Objectives of planning. Planning activities. Planning by supervisor. Detailing and following of each step. Prescribing standard forms for various activities. Budgeting at supervisory level for materials and man power. Planning a programme and actions for a job. | **04** | **08** |
| 3 | **Organizing by supervisor** | | |
| | **3.1** Organizing physical resources. Matching human needs with job needs. Allotment of tasks to individual and establishing relationship among persons working in a group. | **04** | **08** |
| 4. | **Directions by supervisor** | | |
| | **4.1** Need for such directions and instructions to subordinates. Need for clarity, completeness and feasibility of instructions. Reviving of effectiveness of communication. Personal counseling. Advance predictions of possible mistakes. Elaborating decisions. On the spot adjustments during execution of job. Laying disciplinary standards in over all working. | **06** | **10** |
| 5. | **Motivation to subordinates** | | |
| | **5.1** Workers participation in management of a job. Achievement motivation. Recognition for devotion. Delegating responsibilities to subordinates. Activities and intensions towards the growth of an individual. Identification of human needs and providing safety to the workers. | **06** | **10** |
| 6. | **Coordination & implementation** | | |
| | **6.1** Understanding link between various departments in respect of process and quality standards. Synchronization of duties of subordinates. Control over the performance in respect of quality; quality of production; time and cost. Measuring performance, comparing with standard, correcting unfavorable deviations. | **10** | **14** |
| 7. | **Check list by supervisor**<br>**7.1** Introduction to subordinates regarding the job undertaken. Planning the days work suitable for the job. Responsibility survey. Checking possibility for acceptance of assignment from new department. | **08** | **10** |
| 8. | **Moving up in the organization** | | |
| | **8.1**Demonstration of job competence. Exhibition of leadership and initiative. Looking for to accept challenging responsibilities and acceptance of the same. Attitude and actions to be followed and avoided. Stressing the value of own contribution.<br>Achievement of trust of subordinates and the higher management. | **08** | **16** |
| | **Total** | **48** | **80** |

**Instructional Strategy:**

| Sr. No. | Topic | Instructional Strategy |
|---|---|---|
| **1.** | Introduction | Lecture method |
| **2.** | Planning by supervisor | Lecture method |
| **3.** | Organizing by supervisor | Lecture method |
| **4.** | Directions by supervisor | Lecture method |
| **5.** | Motivation to subordinates | Lecture method |
| **6.** | Coordination & implementation | Lecture method |
| **7.** | Check list by supervisor | Lecture method |
| **8.** | Moving up in the organization | Lecture method |

**Text Books:**

| Sr. No | Author | Title | Publication |
|---|---|---|---|
| 1 | Industrial Management | Shrinivasan | Khanna publisher,New Delhi |

**Reference Books:**

| Sr. No | Author | Title | Publication |
|---|---|---|---|
| **1.** | Industrial organization and Engineering Economies | Banga and sharma. | Khanna publisher,New Delhi |
| **2.** | Industrial Engineering and Management | O.P. Khanna | Dhanpat Rai and Sons, New Delhi |
| **3.** | What every Supervisor Should Know | Lestec R. Bittel John W. Newstrom | McGraw Hill Publishing Company, ( GREGG Division ) |

**Learning Resources:** Books, Articles, C.D.'s, Visits, Video Cassettes No. 115 and 120

**Specification Table:**

| Sr. No. | Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| **1.** | Introduction | 02 | 02 | - | 04 |
| **2.** | Planning by supervisor: | 06 | 01 | 01 | 08 |
| **3.** | Organizing by supervisor | 04 | 02 | 02 | 08 |
| **4.** | Directions by supervisor | 05 | 03 | 02 | 10 |
| **5.** | Motivation to subordinates | 05 | 03 | 02 | 10 |
| **6.** | Coordination & implementation | 10 | 02 | 02 | 14 |
| **7.** | Check list by supervisor | 06 | 02 | 02 | 10 |
| **8.** | Moving up in the organization | 08 | 04 | 04 | 16 |
| | **Total** | **46** | **19** | **15** | **80** |

Prepared By

| | | |
|---|---|---|
| (S.V.Chaudhari) | (S. V.Chaudhari) | (M.S.Satarkar) |
| L.C.E. | Member Secretary, PBOS | H.C.E.D. & Chairman, PBOS |

**Programme** : Diploma in **CE**/EE / ET/ ME/MT/ CM / IT/ DDGM
**Programme Code** : **01**/02/03/04/05/06/07/08/**21**/22/23/24/26/**15**/16/17/18/19
**Name of Course** : Total Quality Management
**Course Code** : MA 486

**Teaching Scheme:**

| | Hours /Week | Total Hours |
|---|---|---|
| Theory | 03 | 48 |
| Practical / Tutorial | -- | -- |

**Evaluation Scheme:**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term work |
| Duration | Two class tests, each of 60 minutes | 3Hrs. | -- | -- | -- |
| Marks | 20 | 80 | -- | -- | -- |

**Course Rationale:**

In today's international market the quality is another name for universal acceptance for product and services .Hence the mechanical engineers must have consciousness about various quality aspects required for manufacturing /service sector.

To fulfill this need this subject about various factors and philosophies in quality development is introduced. So that student will have most of basic inputs before they enter their profession.

**Course Objectives:**

After studying this course, the student will be able to

To understand the importance of Quality Standards and consumer need for quality items for price paid by him..

To understand Quality Management Foundation and introduction to total quality management

To know about Quality circle, Kaizen and various Quality improvement tools.

To know about Quality Assurance Systems and Quality Management through ISO 9000 series.

To know about Toyota way and Six Sigma concepts.

**Course Content:**

| Chapter No. | Name of Topic/Sub topic | Hrs | Weightage |
|---|---|---|---|
| **1.** | **Introduction** | | |
| | 1.1 Basic concepts related with quality, Various definition of quality. Quality of design and quality of conformance, Service quality Vs product quality. | **06** | **08** |
| | 1.2 Quality policy: definition and objectives. Quality audit. | | |
| | 1.3 Quality assurance: - definition, meaning it's various forms and advantages Quality audit, quality mindedness, inspection and quality control. | | |
| **2.** | **Quality Management Foundation and introduction to total quality management.** | | |
| | 2.1 Strategic quality management (HoshinKanri)<br>Strategic quality planning, quality goals. The vision – future state of organization, good understanding by everyone, inspiration, achievable QCDF (Quality Cost Delivery Flexibility), Customer focus, sharing by all values of the leadership, organization and employees. | **08** | **12** |
| | 2.2 Total Quality:- definition ,objectives, eight dimensional model of total quality. | | |
| | 2.3 Total Quality management:- definition , need ,mission, initiative and concept. Barriers, implementation and advantages.. | | |
| | 2.4 TQM Models :-Juran trilogy , Deming programme , Mckinsey model, Crosby program.. | | |
| **3.** | **Quality Management Processes** | | |
| | 3.1 **Quality planning**<br>Quality culture ( Kaizen and Quality circle )<br>Quality Circle: - concept, objective, structure, steps in formation of quality Circle. Roles of people involved in quality Circle. advantages of quality Circle. | **12** | **20** |
| | 3.2 What is Kaizen.<br>i ) The concept, meaning and definition ,areas for Kaizen<br>ii ) 10 ground rules for change.<br>iii ) Traditional methods Vs Kaizen , Kaizen Vs innovation<br>iv ) Types of waste and Waste elimination, value added work, hidden waste and obvious waste, Identification of wastes.<br>v ) 5S in housekeeping and their meaning<br>vi ) Improvement in work methods. Achievement after Kaizen | | |
| | 3.3 Quality improvement<br>Old statistical and analytical tools for quality.<br>i) Tally-sheet<br>ii) Graphs<br>iii) Histograms<br>iv) Stratification<br>v) Scatter diagram<br>vi) Control chart<br>vii) Pareto diagram | | |
| | 3.4 New tools of quality<br>(At least one example to be introduced for each tool)<br>i) Ishikawa diagram<br>ii) Arrow diagram<br>iii) Relations diagram<br>iv) Tree diagram<br>v) Affinity diagram<br>vi) Matrix diagram | | |

| | | | |
|---|---|---|---|
| | 3.5 Additional tools of quality improvement<br>i) Brains storming<br>ii) Flow charts<br>iii) 5W & 1H<br>iv) 5 WHYS | | |
| **4.** | **Quality Management Infrastructure** | | |
| | 4.1 History of evolution of ISO 9000 standards. European economic community (EEC ), need for quality system standards, International organization for standardization ( ISO ) adopted by Bureau of Indian Standards (BIS ) | **12** | **16** |
| | 4.2 ISO 9000: 2000<br>Quality system ISO 9000 series standards, ISO 9000 elements understanding requirement, assessment with respect to quality system.<br>Documentation and implementation, quality manual, structure, internal quality audit, external audit and certification. | | |
| | 4.3 **Various Quality Systems Vocabulary and features**<br>ISO 9001:2008 Requirements for a quality management system<br>ISO 9004 : 2009 Guidelines for the effectiveness and efficiency of the quality management system<br>IS 14000: 2004 series, its importance<br>ISO 19011: guidance on auditing and environmental management systems. | | |
| **5.** | **Principles of the Toyota way** | | |
| | 5.1 Introduction to Toyota way, Toyota production system (TPS), lean production, '4' P model of Toyota way. | **04** | **12** |
| | 5.2 Toyota way principles and their meaning. | | |
| **6.** | **Six Sigma** | | |
| | 6.1 Introduction to six sigma, Psychology of six sigma, | **06** | **12** |
| | 6.2 Six sigma DMAIC process | | |
| | 6.3 The six sigma players, their roles and Responsibilities. Champions , Master black Belts, Black belts, Green belts. | | |
| | 6.4 Factors to be considered while selecting a project for six sigma, Do's and Don'ts for making six sigma effective. Advantages of six sigma. The zero defects concept. | | |
| | **Total** | **48** | **80** |

**Instructional Strategy:**

| **Sr. No.** | **Topic** | **Instructional Strategy** |
|---|---|---|
| 1. | Introduction | Lecture method |
| 2. | Quality Management Foundation and introduction to total quality management. | Lecture method |
| 3. | Quality Management Processes | Lecture method, Transparencies, Internet surfing. |
| 4. | Quality Management Infrastructure | Lecture method, Transparencies, Internet surfing. |
| 5. | Principles of the Toyota way | Lecture, Ppt& Discussion |
| 6. | Six Sigma | Lecture method, Ppt& Discussion |

**Text Books:**

| Sr. No | Author | Title | Publication |
|---|---|---|---|
| 1 | Dr. K.C.Arora | Total Quality Management | S.K.Kataria and sons |
| 2 | B.Janakiraman and R.K. Gopal | Total Quality Management Text and cases | Prentice Hall of India pvt. Ltd. New Delhi. |
| 3 | Subburaj | Total Quality Management | Tata Mc - Graw Hill Co., New Delhi. |
| 4 | Gupta, Srinivas N & B Valarmathi | Total Quality Management | Tata Mc - Graw Hill Co., New Delhi. |

**Reference Books:**

| Sr. No | Author | Title | Publication |
|---|---|---|---|
| 1 | Peter S.Pande<br>Robert P. Neuman<br>Roland R.Cavanagh | Six Sigma way | Tata Mc - Graw Hill Co., New Delhi. |
| 2 | Jeffrey K. Liker | The Toyota Way | Tata Mc - Graw Hill Co., New Delhi. |
| 3 | Suganthi and Samuel | Total Quality Management | Prentice Hall of India pvt. Ltd. New Delhi |

**Learning Resources:** Books, journals, Internet searches.

**Specification Table:**

| Sr. No. | Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| 1. | Introduction | 08 | -- | -- | 08 |
| 2. | Quality Management Foundation and introduction to total quality management. | 08 | 04 | -- | 12 |
| 3. | Quality Management Processes | 08 | 08 | 04 | 20 |
| 4. | Quality Management Infrastructure | 08 | 08 | -- | 16 |
| 5. | Principles of the Toyota way | 08 | 04 | -- | 12 |
| 6. | Six Sigma | 08 | 04 | -- | 12 |
| | **Total** | **52** | **28** | -- | **80** |

Prepared By

| | | | |
|---|---|---|---|
| (P.U.Garge)<br>L.M.E. | (S. V. Chaudhari)<br>Member Secretary | (A. S. ZANPURE)<br>Chairman, PBOS | (M.S.Satarkar)<br>H.C.E.D. &<br>Chairman, PBOS |

| | | |
|---|---|---|
| **Programme** | **:** | Diploma in **CE**/ EE/ET/ ME/MT/ CM /IT/DDGM |
| **Programme Code** | **:** | **01**/02/03/04/05/06 /07/08/**21**/22/23/24/26/**15**/16/17/18 |
| **Name of Course** | **:** | Management Information System |
| **Course Code** | **:** | MA487 |

**Teaching Scheme:**

| | **Hours /Week** | **Total Hours** |
|---|---|---|
| **Theory** | **03** | **48** |
| **Practical** | --- | --- |

**Evaluation Scheme:**

| | **Progressive Assessment** | **Semester End Examination** | | | |
|---|---|---|---|---|---|
| | | **Theory** | **Practical** | **Oral** | **Term work** |
| **Duration** | Two class tests, each of 60 Min. duration | **03 Hrs.** | --- | --- | --- |
| **Marks** | **20** | **80** | --- | --- | --- |

**Course Rationale:**

MIS is a concept continuous to evolve, emerging trend consistent with the evolution of the MIS concept endures computing. It is the power of computers, which makes MIS feasible. It also deals with the impact of computers and information technology innovation and organizational design and planning. It is used to know how to manage any organization using Software requirement specification Data flow diagrams, coding techniques for evolution of manager. From this point of view, the course is introduced.

**Course Objectives:**

After studying this course, the student will be able to

- Understand the role of MIS in various functional areas of management.
- Understand the determination of requirement and analysis it to design information system necessary.
- Understand the supporting role of MIS in decision-making, problem solving
- Understand the management in finance department.
- Understand the role of coding techniques for authentication
- Develop and use different management skills
- Visualize the impact of information Technology in organizational communication & leadership
- Understand the concept of quality management
- Understand the use of database management system in MIS
- Understand the role of taxation in India by studying the types of taxes such as service tax,income tax,excise duty,VAT
- Determine the alternative solutions
- Understand various steps required to process any organization using system development cycle
- Understand the concept of Profit and loss, details about budgeting system

**Course Contents:**

| Chapter No. | Name of Topic/Sub topic | Hrs | Weigh tage |
|---|---|---|---|
| **1.** | **Information Systems and Organizations** | | |
| | 1.1 Organizational and Information, System Structure, Data and Information, Management and Decision Making, Classification of Information Systems, Information support for functional areas of Management, Impact of Business on Information System ,Organizing Information Systems.<br>1.2 Decision Support Systems:<br>Definition, Evolution of DSS, Characteristics of DSS, Model Management, Group Decisions | **04** | **10** |
| **2.** | **System Analysis and Design** | | |
| | 2.1 Organizational context of System Analysis, Role of System Analyst, System Development Life Cycle, Requirements Analysis<br>2.2 System Requirements Specification:<br>System requirements specification: Example, Data dictionary, Steps in Systems Analysis, Modularizing requirements specifications, Conclusions. | **04** | **10** |
| **3.** | **Feasibility Analysis** | | |
| | 3.1 Deciding on project goals, Examining alternative solutions, Evaluating proposed solution, Cost-benefit analysis, Payback period, Feasibility report, and System proposal.<br>3.2 Data flow diagrams:<br>Symbols used in DFD's Describing a system with a DFD, Good conventions in developing DFDs Leveling of DFDs, Logical and Physical DFDs.<br>3.3 Process Specifications:<br>Process specification methods, structured English Some examples of process specification. | **08** | **15** |
| | 4.1 **Quality Management:**<br>**Specific Objectives:** Meaning of Quality State Principles of Quality Management, Describe Modern Technique & Systems of Quality Management<br>**Quality Management System**: Activities, Benefits<br>Quality Control - Objectives, Functions, Advantages<br>Quality Circle - Concept, Characteristics & Objectives<br>Quality Assurance - Concept, Quality Assurance System<br>**Total Quality:** Meaning of Total Quality<br>**Total QualityManagement:** Components of TQM, Elements of TQM, Benefits Modern Technique & Systems of Quality Management like<br>6-Sigma, ISO 9001:2000 - Benefits, Main clauses.<br>4.2 **Financial Management**<br>**Specific Objectives:** Explain functions of financial management**;** State the sources of finance & types of budgets, Describe concepts of direct & indirect taxes.<br>Financial Management- Objectives & Functions<br>**Budgets and accounts :**Types of Budgets Production Budget - Sample format: Labour Budget - Sample format,<br>**Profit & Loss Account & Balance Sheet**: Meaning, sample format, Meaning of different terms involved.<br>Meaning & Examples of - Excise Tax, ServiceTax, Income Tax,Value Added Tax, Custom Duty | **10** | **15** |

| | | | |
|---|---|---|---|
| | 4.3 Data input Methods: Data input, Coding techniques, Detection of error in codes, Validating input data, interactive data input. | | |
| **5.** | **Executive Information System and Executive Support System** | | |
| | 5.1 Why EIS and ESS? Internal factor and External factor<br>5.2 What is EIS and ESS? Characteristics of EIS and ESS<br>5.3 Informational characteristics, User Interface/Orientation Characteristics, Managerial/Executive Characteristics<br>5.4 EIS/ESS Capabilities and Benefits<br>5.5 Expert System-Definition, Components, Application and Limitations | **10** | **15** |
| **6.** | **Management Issues in MIS** | | |
| | 6.1 Information Security and Control : Why break IT System Security?<br>6.2 Information System Security Threats:<br>External Security Threats: Internet Connections, Remote Dial –in Capabilities Internal Security Threats: Passwords, User Terminations, Authorisation Levels, Special Privileges, Virus Checking, Audit Trails<br>6.3 Ethical And Social Dimensions | **12** | **15** |
| | Total | **48** | **80** |

**Instructional Strategy:**

| **Sr. No.** | **Topic** | **Instructional Strategy** |
|---|---|---|
| 1. | Information and Management | Class room teaching for all |
| 2. | Information Gathering | |
| 3. | Feasibility Analysis | |
| 4. | Decision Table | |
| 5. | Database Management Systems (DBMS) | |
| 6. | Control Audit and security of information systems | |

**Text Books:**

| **Sr. No** | **Author** | **Title** | **Publication** |
|---|---|---|---|
| 1. | V Rajaraman | Analysis & design of Information system | PHI |
| 2. | S.Sadagopan | Management Information Systems | PHI |
| 3. | James A.O`Brien<br>George M.Marakas | Management Information Systems - *Tenth Edition* | McGraw Hill |

**Reference Books:**

| **Sr. No** | **Author** | **Title** | **Publication** |
|---|---|---|---|
| 1. | Gordon B. Davis and Margeth H. Olson | MIS | |
| 2. | Kroenke Davis | Management information System | 2nd edition |
| 3. | Sein | MIS | |
| 4. | Jawadekar W.S. | MIS | |
| 5. | Millind Oka | MIS | |
| 6. | Jayashankar | Decision Support Systems | |
| 7. | Lucas | Information System Concepts for Management | 4th edition |

**Learning Resources:** OHP, LCD, Projector and Transparency.

**Specification Table:**

| Sr. No. | Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| 1. | Information and Management | 04 | 04 | 02 | 10 |
| 2. | Information Gathering | 04 | 02 | 04 | 10 |
| 3. | Feasibility Analysis | 02 | 08 | 05 | 15 |
| 4. | Decision Table | 02 | 08 | 05 | 15 |
| 5. | Database Management Systems (DBMS) | 06 | 04 | 05 | 15 |
| 6. | Control Audit and security of information systems | 04 | 05 | 06 | 15 |
| | Total | 22 | 31 | 27 | 80 |

Prepared By

| | | | |
|---|---|---|---|
| (Smt.A.B.Bhusagare & Smt N.R.Wagh) | (S.V.Chaudhari) Member Secretary PBOS | ( M.U.Kokate) Chairman, PBOS | (M.S.Satarkar) H.C.E.D. & Chairman, PBOS |

**GOVERNMENT POLYTECHNIC, PUNE**
**( An Autonomous Institute of Govt. of Maharshtra )**

**Programme : Diploma in CE**
**Programme Code : 01/15**
**Name of Course : Theory Of Structures**
**Course Code : AM - 481**

**Teaching Scheme :**

| | Hours/Week | Total Hours |
|---|---|---|
| **Theory** | **4** | **64** |
| **Practical** | **1** | **16** |

**Evaluation Scheme :**

| | Progressive Assesment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Tutorial | Oral | Term Work |
| **Duration** | Two class tests, Each of 60 minutes | 4 Hrs. | 1 | - | - |
| **Marks** | 20 | 80 | - | - | 25 |

**Course Rationale :**

Concepts and principles involved in the design of various structures are covered in this subject. The application of theoretical concepts & principles in practical field situations is essential. Integration of the principles used to solve the field problems would help the students in understanding the concepts.

**Course Objectives :**

After studying this course, student will be able to -

I Identify various elements of a structure.
ii Understand basic principles.
iii Appreciate the importance of the principles.
iv Identify and Analyze the given problem
v Apply the basic principles in solving the problem.

**Course Content :**

| Chapter No | Name of Topics / Sub Topic | Hrs | Weightage |
|---|---|---|---|
| | | | |
| | **Section - I** | | |
| 1 | **Direct and Bending Stresses :** | | |
| | 1.1 Concept of direct and eccentric loads. Condition for no tension or zero stress on extreme fibers, limit of eccentricity. | | |
| | 1.2 Maximum and minimum stresses, core of section for solid and hollow rectangular, square and circular sections only. ( No derivation in the examination to be asked.) | | |
| | 1.3 Columns of uniform sections subjected to lateral wind pressure, Coefficient of wind pressure, stress distribution at base. | 10 | 14 |
| | 1.4 Analysis of structures, retaining water and earth- level upto top level, calculation of maximum and minimum stresses at base. | | |
| | 1.5 Stability conditions for dams and retaining walls. | | |
| 2 | **Principal planes and Principal Stresses :** | | |
| | 2.1 Concept of simple shear, complementary shear, normal stress, tangential stress, resultant stress. | | |
| | 2.2 Defination of principal planes and principal stresses. Maximum shear stress, position of planes subjected to max. shear stress. | 10 | 12 |
| | 2.3 Planes carrying resultant stress having maximum angle of obliquity. Mohr's circle method. | | |

| | | | |
|---|---|---|---|
| | | | |
| **3** | **Torsion :** | | |
| **Proposed for deletion** | 3.1 Theory of pure torsion. Torsion equation. | | |
| | 3.2 Strenght of solid & hollow circular shaft, polar modulus of section, power transmitted by shafts. | 4 | 4 |
| | 3.3 Simple problems on calculations of angle of Twist, shear test, torsional moment of resistance. ( No problems on design of shafts to be asked in the examinations.) | | |
| **4** | **Slope and Deflection :** | | |
| | 4.1 Concept of slope and deflection, stiffiness of beams, flexural rigidity of beams. Relation between slope, deflection and radius of curvature, differential equation.( No derivation to be asked in examination.) | | |
| | 4.2 Slope & deflection by standard formulae. Calculation of slope & deflection of simply supported, cantilever, overhanging beams subjected to concentrated and uniformly loads by Macaulay's method. ( Calculations involving solutions of cubical expressions for maximum deflection are not expected). | 12 | 14 |



| | | | |
|---|---|---|---|
| | 4.3 Propped cantilevers, reactions of prop by superposition theorm, bending moment and shear force diagram for rigid prop. ( No numerical problems involving solution by intregration is expected. Use of standard formula only.) | | |
| | **Section II** | | |
| **5** | **Fixed Beams** | 8 | 10 |

| | | | |
|---|---|---|---|
| | 5.1 Concept of fixity, effect of fixity, advantages and<br>disadvantages, fixed end moments, principle of superposition. | | |
| | 5.2 Formula for fixed beams subjected to concentrated<br>loads and uniformly distributed load over entire span.<br>FEMS using standard formula. | | |
| | 5.3 Drawing shear force and bending moment diagrams.<br>No problems on fixed beams carrying partial udl. | | |
| **6** | **Continuous Beams :** | 10 | 12 |
| | 6.1 Defination, effect of continuity, nature of moments<br>induced due to contuity, deflected shape.<br>6.2 Clapeyron's theorm up to two span including overhang supports at same level, equal or unequal, flexural rigidity EI, subjected to concentrated and uniformly distributed<br>loads over entire span. | | |
| | 6.3 Drawing shear force and bending moment diagram.<br>The beams with fixed end overhand are also to be<br>taken. | | |
| **7** | **Moment Distribution Method** | 8 | 10 |
| | 7.1 Introduction, sign convention. Carry over factors,<br>stiffiness factors, distributed factor. | | |
| | 7.2 Application of moment distribution method to various<br>types of two spans continuous beams includingoverhang and propped<br>cantilevers having rigid supports at same levels<br>subjected to concentrated and uniformly distributed<br>loads over entire span. | | |
| **8** | | 6 | 8 |
| | 8.1 Defination, types and classification of columns-long &<br>short. | | |
| | 8.2 Concept of buckling, different end conditions, effective<br>length, radius of gyration, slenderness ratio. | | |

| | | | |
|---|---|---|---|
| | 8.3 Euler's theory, assumptions, buckling load, factor of safety. Safe load, application of Euler's theory to various sections & built up sections ( Analysisi problems only.) | | |
| | 8.4 Empirical formula - Rankine's formula, for calculating load for various sections & built-up section. ( No derivation in theory examination). | | |
| | **Total** | **64** | **80** |



**List of Practicals / Experiments / Assisgnments : (On each topic mentined in syllabus)**

| Sr.No | Name of Experiment / Assignment | Hrs. |
|---|---|---|
| | | |
| 1 | Assignment No .1 | 2 |
| 2 | Assignment No.2 | 2 |
| 3 | Assignment No. 3 | 2 |
| 4 | Assignment No. 4 | 2 |
| 5 | Assignment No. 5 | 2 |
| 6 | Assignment No. 6 | 2 |
| 7 | Assignment No. 7 | 2 |
| 7 | Assignment No. 8 | 2 |
| | **Total** | **16** |

**Instructional Strategy :**

| Sr.No | Topic | Instructional Strategy |
|---|---|---|
| | **Section I** | |
| 1 | Direct & bending stresses | Lect. Method, discussion |
| 2 | Principle planes and principle stresses. | Lect. Method, discussion |
| 3 | Torsion | Lect. Method, discussion |
| 4 | Slope and deflection | Lect. Method, discussion & demo. |
| | **Section II** | |
| 5 | Fixed beams | Lect. Method, discussion & demo. |
| 6 | Continuous beams | Lect. Method, discussion & demo. |
| 7 | Moment and Distribution | Lect. Method, discussion & demo. |
| 8 | Columns | Lect. Method, discussion & demo. |

**Text Books :**

| Sr.No | Author | Title | Publication |
|---|---|---|---|
| | | | |
| 1 | M.V. Panchanadikar | Theory of Structures | PVG Publication |
| 2 | S.Ramamrutham | Theory of Structures | Dhanpat Rai & Sons |
| 3 | B.Junnarkar & Adavi | Mechanics of Structure | Charotkar Publ.House |
| 4 | R.S.Biyani | Vol. I &II Theory of Structure | Vrinda Prakashan |

**Refrence Books :**

| Sr.No | Author | Title | Publication |
|---|---|---|---|
| 1 | Bilber & Morris | Elements of Analysis of Structures | McGraw Hill |
| 2 | Vazirani & Ratwani | Theory of Structures | Khanna Publishers, Delhi. |
| 3 | Singer & Pytel | Strenght of Materials | Harper & Row Publishers. New York. |

**Learning Resources : Books, Models,Transparencies, IS Codes.**



**Specification Table :**

| Sr.No | Topic | Cognitive Levels | | | |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | Total |
| **Section I** | | | | | |
| 1 | Direct and Bending stresses | 2 | 4 | 6 | 12 |
| 2 | Principle planes and principle stresses. | 2 | 2 | 8 | 12 |

| | | | | | |
|---|---|---|---|---|---|
| 3 | Torsion | … | 4 | … | 4 |
| 4 | Slope and deflection | 2 | 2 | 8 | 12 |
| | **Total** | **6** | **12** | **22** | **40** |
| **Section II** | | | | | |
| 5 | Fixed beams | 4 | … | 6 | 10 |
| 6 | Continuous beams | 2 | 4 | 6 | 12 |
| 7 | Moment Distribution Method | 2 | 2 | 6 | 10 |
| 8 | Columns | 2 | 2 | 4 | 8 |
| | **Total** | **10** | **8** | **22** | **40** |

**Prof.M.M.Ganorkar**
Prepared By

**GOVERNMENT POLYTECHNIC, PUNE**
**( An Autonomous Institute of Govt. of Maharshtra )**

**Programme : Diploma in CE**
**Programme Code : 01**
**Name of Course : Analysis and design of R.C Structure**
**Course Code : AM - 482**

## Teaching Scheme :

| | Hours/Week | Total Hours |
|---|---|---|
| **Theory** | **4** | **64** |
| **Practical** | **2** | **32** |

## Evaluation Scheme :

| | Progressive Assesment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Tutorial | Oral | Term Work |
| **Duration** | Two class tests, Each of 60 minutes | 3 | … | 25 | - |
| **Marks** | 20 | 80 | … | - | 25 |

## Course Rationale :

Reinforced Cement concrete is very widely used for almost all types of structures. As concrete can be cast in any shape, the architects prefer reinforced concrete as the main construction material; for residential, public and all other important decorative buildings. Hence, it becomes essential for every civil engineer to study properties & behaviour of RCC.
While working as a supervisor, the diploma student should be aware of the basic concepts of RCC design & should be able to prepare, read, interpret structural drawings. The student should be familiar with relevant IS codes & be aware of the standard requirements, while executing the construction work. He should be also capable of designing simple structures.

## Course Objectives :

After studying this course, student will be able to -

| | |
|---|---|
| I | Understand concepts of RCC. |
| ii | Know various methods for designing RCC structures. |
| iii | Analyze given sections & will apply the knowledge of designing standard structural elements viz, slabs, beams, columns, staircase & footing; using Limit State Method. |
| iv | Know the provisions given in IS - 456-2000 |
| v | Prepare, read and interpret a structural drawing. |

## Course Content :

| Chapter No | Name of Topics / Sub Topic | Hrs | Weightage |
|---|---|---|---|
| | | | |
| | **Section - I** | | |
| **1** | **Introduction** | 2 | 4 |
| | 1.1 Introduction to Reinforced concrete. | | |
| | 1.2 Advantages and limitations of RCC | | |
| | 1.3 Various grades of Concrete and steel. | | |
| | 1.4 Introduction to various loads with reference to IS 875-1984 | | |
| **2** | **Introduction to LSM :** | 6 | 8 |
| | 2.1 Methods of analysis & design of RCC members WSM, LSM, Ultimate Load Theory.Analysis and design of singly reinforced section by WSM | | |
| | 2.2 Definition and objectives of limit state method, various limit states, assumptions of LSM, advantages of LSM over WSM | | |
| | 2.3 Partial safety factors for materials and loads. | | |
| | 2.4 Stress diagram, neutral axis, balanced, over - reinforced and under reinforced sections. | | |
| | 2.5 Moment of resistance. Its relation with bending moment: design constants for different combinations of concrete and steel grades. | | |
| **3** | **Analysis of Beams :** | 12 | 16 |
| | 3.1 Analysis of Singly reinforced sections ( capacity of the section only.) | | |
| | 3.2 Tee and sections, advantages over rectangular sections. | | |

| | | | |
|---|---|---|---|
| | 3.3 Conditions under which section act as a flanged section calculation of effective flange width & MR of the section. ( Problems on MR of T beams with NA lying in the web with 0.43 Xu < Df are not to be asked in Exam. | | |
| | 3.4 Concept of Doubly reinforce sections, conditions, under which they are provided. Calculation of capacity of the section only. | | |
| **4** | **Design of Beams** | 10 | 12 |
| | 4.1 Design of singly reinforced beams for given loading size given or size not given. | | |
| | 4.2 Design of doubly reinforced beams by LSM. | | |
| | 4.3 Design of T beams by LSM. | | |



| | **Section II** | | |
|---|---|---|---|
| **5** | **Limit State of Collapse for Shear & Bond :** | 10 | 10 |
| | 5.1 Concept of shear force and shear stress, diagonal tension. | | |
| | 5.2 Necessity of shear reinforcement, shear taken by concrete alone, design of vertical stirrups for shear reinforcement, minimum or nominal shear reinforcement. | | |
| | 5.3 Concept of Bond, bond stress, flexural bond, anchorage bond, development bond, anchorage length, develpoment length. | | |
| | 5.4 Simple numericals on calculation of development length. No problems to be asked on check for flexural bond. | | |
| **6** | **Design of Slabs :** | 12 | 18 |
| | 6.1 Types of slabs, concept of one way and two way | | |

| | | | |
|---|---|---|---|
| | action.<br><br>6.2 Design of one - way simply supported slabs for flexure. | | |
| | 6.3 Design of two way simply supported slabs with<br>corners free to lift,calculation of reinforcement at support of two way restrained slab. | | |
| | 6.4 Design of Cantilever slabs. | | |
| | 6.5 Design of a flight of a dog-legged staircase. | | |
| **7** | **Columns & Footings :** | | |
| | 7.1 Assumptions of a limit state of collapse - compression. | | |
| | 7.2 Classification of columns, min.eccentricity. | | |
| | 7.3 Analysis and design of axially loaded, short, square,<br>rectangular and circular columns with lateral ties .<br>( No helical steel.) | | |
| | 7.4 Design of square sloped footing for square columns<br>loaded axially. Calculations of depth & reinforcement<br>for B.M criteria only.<br>( No checks for one way and two way shear.) | 12 | 12 |
| | 7.5 IS Codes Requirements governing reinforcement<br>detailing - Cover, max. & min. spacing, reinforcement<br>percentage - max & min. for various structural components like slab, beam, column & footing. | | |
| | **Total** | **64** | **80** |



**List of Practicals / Experiments / Assisgnments :**

| Sr.No | Name of Experiment / Assignment | Hrs. |
|---|---|---|
| | **Section I** | |
| 1 | Assignment No - 1 | 6 |
| 2 | Assignment No - 2 | 6 |

| | | |
|---|---|---|
| 3 | Assignment No. 3 | 4 |
| | **Section II** | |
| 4 | Assignment No. 4 | 8 |
| 5 | Assignment No. 5 | 8 |
| | **Total** | **32** |

* Term work shall consist of assignments and drawings showing details of reinforcement of typical R.C.structures and schedule of reinforcement.(Drawings of details of reinforcement of slabs, columns,beams,beamcolumn junction, staircase, footings.Drawings will be drawn by Autocad) .

Collection and reading of drawings of retaining wall, girders, different sections of pier,concrete roads.

**Instructional Strategy :**

| Sr.No | Topic | Instructional Strategy |
|---|---|---|
| | **Section I** | |
| 1 | Introduction | Lect. Method. |
| 2 | Introduction to LSM : | Lect. Method, discussion |
| 3 | Analysis of Beams : | Lect. Method. |
| 4 | Design of Beams | Lect. Method. |
| | **Section II** | |
| 5 | Limit State of Collapse for Shear & Bond : | Lect. Method. |
| 6 | Design of Slabs : | Lect. Method, discussion |
| 7 | Columns & Footings : | Lect. Method. |

**Text Books :**

| Sr.No | Author | Title | Publication |
|---|---|---|---|
| | | | |
| 1 | V L Shaha & S R Karve | Illustrated RCC Design | Structures publishers. |
| 2 | B.C. Punmia | R.C.Structures | Standard Pub.Dist. |
| 3 | H.J.Shah | Reinforced concrete | Charotkar Publ.House |
| 4 | P.C.Vargheses | Limit State Design of Reinforced concrete | P.H.I. Pvt. Ltd. |

**Refrence Books :**

| Sr.No | Author | Title | Publication |
|---|---|---|---|
| 1 | Purushothaman P. | R.C Struct. Elements, Behaviour, ana. & Design | TMH Pub. Co. Ltd. |
| 2 | V.L.Shah & S.R. Karve | Limit state theory & design of R.C | Structures publ. |
| 3 | N.Krishna Raju & R.N. Prakash | Reinforced Concrete Design | New Age International |
| 4 | M.L.Gambhir | Reinforced Concrete Design | P.H.I. Pvt.Ltd. |
| 5 | S.Ramamrutham | Design of R.C. Structures | Dhanpat Rai & |

publishing

**Learning Resources : Books, relevant IS Codes.**



## Specification Table :

| Sr.No | Topic | Cognitive Levels | | | |
|---|---|---|---|---|---|
| | | **Knowledge** | **Comprehension** | **Application** | **Total** |
| **Section I** | | | | | |
| 1 | Introduction | 4 | … | … | 4 |
| 2 | Introduction to LSM | 4 | 4 | … | 8 |
| 3 | Analysis of Beams | … | 4 | 12 | 16 |
| 4 | Design of Beams | 4 | … | 8 | 12 |
| | **Total** | **12** | **8** | **20** | **40** |
| **Section II** | | | | | |
| 5 | Limit State of Collapse for Shear & Bond | 2 | 2 | 6 | 10 |
| 6 | Design of Slabs | 2 | 4 | 8 | 14 |
| 7 | Columns & Footings | … | 4 | 4 | 8 |
| 8 | Columns | 4 | … | 4 | 8 |
| | **Total** | **8** | **10** | **22** | **40** |

**Prof.M.M. Ganorkar**
Prepared By

**Name of programme** : **CE**/ EE/ET/ME/MT/CM/IT/DDGM
**Programme Code** : **01**/02/03/04/05/08/**21**/22/23/24/**15**/16/17/18/19
**Name of course** : Environmental Science
**Course code** : AU481

**Teaching Scheme:**

| | Hours/Week | Total Hours |
|---|---|---|
| Theory | -- | -- |
| Term work / Practical | 2 | 32 |

**Evaluation Scheme:**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term Work |
| Duration | -- | -- | -- | -- | -- |
| Marks | -- | -- | -- | -- | 50 |

| Sr. No | Topic/Subtopic | Hours | Weightage | Practical |
|---|---|---|---|---|
| 1. | **Introduction**<br>1.1 Need of the study of environmental science, definition scope and importance of environmental studies.<br>1.2 Environment & its component need of public awareness, effect of human activities on technological environment.<br>1.3 Depleting Nature of environmental sources such as soil, water, minerals & forests. Need of conserving natural resources preserving the environment. | 04 | | |
| 2. | **Sustainable Development:**<br>2.1 Concept of sustainable development.<br>2.2 Social, Economical & Environmental aspect of sustainable development.<br>2.3 Control measure: 3 R (Reuse, Recovery, and Recycle). Appropriate Technology, Environmental education. | 04 | | |

| | | | | |
|---|---|---|---|---|
| 3 | **Environmental Pollution:**<br>3.1 Introduction.<br>3.2 Water Pollution: Sources of water pollution-Sewage, Industrial waste, Agriculture chemicals, Thermal & radioactive waste, Heavy metals. Effects of water pollution. Control of water pollution.<br>3. 3 Air pollution: Introduction, sources of air pollution, types of air pollution, effects of air pollution, control measures of air pollution.<br>3.4 Concept of Global Warming, Ozone Layer Depletion, Acid rain, Greenhouse effects.<br>3.5 Noise Pollution: Definition, Classification of noise pollution, effects of noise pollution, control of noise pollution.<br>3.6 Land Pollution: Causes, effects and remedies.<br>3.7 E-Pollution: Definition, Causes and effects and remedies measures.<br>3.8 Introduction to solid waste management.<br>3.9 Water Conversation: Rainwater harvesting, Watershed Management | 16 | | |
| 4 | **Renewable sources of Energy:**<br>Biomass, Biogas, Solar Energy, Nuclear Power, Hydropower, Wind Energy, Ocean (Tidal Energy), Geothermal Energy. | 04 | | |
| 5 | **Environmental Legislation:**<br>5.1 Introduction<br>5.2 Ministry of Environment and Forest. (MOEF) Organizational Structure of MOEF.<br>5.3. Functions & Powers of Control Pollution Control Board.<br>5.4 Functions & Powers of State Pollution Control Board.<br>5.5 Environment Protection Act. | 04 | | |

**Assignments:**

1. Study of air quality of Pune city.
2. Study of noise pollution in Pune city.
3. Study of solid waste management of Pune city.
4. Study of E-waste management of Pune city.
5. Study of Environmental Status Report of Pune city prepared by Pune Municipal Corporation.

**Text Books:**

| Sr. No | Author | Title | Publication |
|---|---|---|---|
| 1 | S.P. Nisture, D. A. Joshi, G.S.Chhawsaria | Basic Civil and Environmental Engineering | Pearson |
| 2 | Anindita Basak, D.L. Manjunath | Basics of Environmental Studies | Pearson |
| 3 | L.D. Danny Harvey | Global Warming The Hard Science | Pearson |
| 4 | Benny Joseph | Environmental Studies | TataMcGraw Hill |
| 5 | Godfrey Boyle | Renewable Energy | Oxford Publications |
| 6 | R. Rajagopalan | Environmental studies | Oxford University Press |

**Websites:**

1. **http://www.mpcb.gov.in/**
2. **http://www.cpcb.nic.in/**
3. **http://www.envfor.nic.in/**
4. **http://www.neeri.res.in/**

Prepared by

| | | |
|---|---|---|
| R.M.Aghav<br>V.M. Kolhe<br>D.K. Fad<br>LCE | (S.V.Chaudhari)<br>Member Secretary, PBOS | (M.S.Satarkar)<br>Chairman, PBOS |

**Programme** : **Diploma in CE**/EE/ ET/ ME/MT/ CM/ IT
**Programme Code** : **01**/02/03/04/05/06/07/**21**/24/26/**15**/16/17/18/19
**Name of Course** : **Community Development**
**Course Code** : **AU482**

**Teaching Scheme:**

| | **Hours /Week** | **Total Hours** |
|---|---|---|
| **Theory** | **02** | **32** |
| **Practical** | | |

**Evaluation Scheme:**

| | **Progressive Assessment** | **Semester End Examination** | | | |
|---|---|---|---|---|---|
| | | **Theory** | **Practical** | **Oral** | **Term work** |
| Duration | **Two class tests of 60 min Duration** | **3 Hrs** | --- | --- | --- |
| Marks | **20** | **80** | --- | --- | --- |

**Course Rationale:**

The course has been introduced to make young Engineers especially aware of the present status of Villages &to motivate them to make improvement in villages when they start their Engineering carrier.

**Course Objectives:**

After studying this course, the student will be able to

- Able to understand present situation in villages and realize the gravity of the village development.
- Able to make survey of villages, collect the data, analyze it and identify the area of development.
- Able to identify the available natural resources and how they can be utilized for betterment of villages.
- Able to collect the useful information for starting probable new industries in villages.
- Able to guide villagers in building low cost durable houses taking in to considerations weather conditions of that area.
- Able to guide villagers for development good habits regarding health and hygiene.
- Motivated to bring about all round development of villages.

**Course Content:**

| **Chapter No.** | **Name of Topic/Sub topic** | | **Hrs** | **Weightage** |
|---|---|---|---|---|
| **1.** | **Introduction** | | | |
| | 1.1 | Present status of rural and urban community. | **02** | **04** |
| | 1.2 | Necessity of community development. | | |
| | 1.3 | Identifying needs of community, Ways to develop community. | | |
| **2.** | **Human Power Development** | | | |
| | 2.1 | Present scenario of Human power in India, | **04** | **08** |
| | 2.2 | Socioeconomic survey to ascertain requirement of human requirements. | | |

| | | | | |
|---|---|---|---|---|
| | 2.3 | Methodology for training the human power | | |
| | 2.4 | Wage employment and self employment, | | |
| | 2.5 | Support from financial institutions for self employment. | | |
| **3.** | **Appropriate Technology and Technology Transfer** | | | |
| | 3.1 | Technological development of India, Additional needs of community due to technology development, | **04** | **12** |
| | 3.2 | Classification of rural industries, | | |
| | 3.3 | Areas of appropriate technology, | | |
| | 3.4 | Use of locally available materials, | | |
| | 3.5 | Methods of transfer of technology, Project reports preparation. | | |
| **4.** | **Industrialization** | | | |
| | 4.1 | Present status of rural traditional industries, | **04** | **12** |
| | 4.2 | Renewal of old industries in villages-<br>Manufacturing new commodities such as plastic utensils, nylon ropes, ceramics<br>Repairing – agricultural implements, tractors, automobiles, electrical or diesel pump sets, domestic appliances<br>Food processing – Papad, jam, jelly, pickles, preservation, spices, syrups, ketchups<br>Utilization of waste product – Gobar gas, fuel cake,<br>Construction – Brick clamp, stone quarry, sand supply, and crusher.<br>Miscellaneous – Handlooms, power looms, Ginning mills, Jaggery making<br>Service Industry –House keeping Public facility centre (suvidha Kendra-setu) Net café, Bachat Gat concept and working.<br>Housing support to industrialization. | | |
| **5.** | **Non Conventional Energy Sources** | | | |
| | 5.1 | Availability of energy sources in India, | **06** | **20** |
| | 5.2 | Needs of use of non conventional energy sources. | | |
| | 5.3 | Availability of such sources in India. | | |
| | 5.4 | Various types of non conventional energy sources. Solar energy – Solar water heater and solar cooker, wind energy, wind mill and wind turbines, bio-gas-generation. | | |
| **6.** | **Community Services** | | | |
| | 6.1 | Health and Hygiene awareness, | **04** | **08** |
| | 6.2 | Health services, | | |
| | 6.3 | Educating the community for good habits of health and hygiene, Potable drinking water, purifying well water, low cost latrines, drainage system and soak pits Tree plantation programmes, roads and communications. | | |
| **7.** | **Waste Management** | | | |
| | 7.1 | Generation of waste, causes | **04** | **08** |
| | 7.2 | Types of waste – domestic, commercial, industrial, E-waste, hazardous waste. | | |
| | 7.3 | Waste separation of domestic waste e.g. wet, dry, reusable, recyclable, | | |
| | 7.4 | Waste disposal – methods, treatments, etc. | | |
| | 7.5 | Reduce, Reuse, and Recycle, 3Rs in Waste Management. | | |

| | | | | |
|---|---|---|---|---|
| **8.** | **Developments** | | | |
| | 8.1 | Programmes for all round development of | **04** | **08** |
| | 8.2 | Community, Various government schemes, IRDP – Integrated Rural Development Programme. | | |
| | 8.3 | Active participation of community in development programmes | | |
| | 8.4 | Motivation for participation. | | |
| | | **Total** | **32** | **80** |

**Instructional Strategy:**

| Sr. No. | Topic | Instructional Strategy |
|---|---|---|
| **1.** | Introduction | Class rooms teaching |
| **2.** | Man power developments | Class rooms teaching, data collection |
| **3.** | Appropriate technology & technology transfer | Class rooms teaching |
| **4.** | Industrialization | Class rooms teaching |
| **5.** | Non-conventional energy sources | Class rooms teaching |
| **6.** | Community services | Class rooms teaching |
| **7.** | Waste Management | Class rooms teaching |
| **8.** | Developments | Class rooms teaching |

**Text Books:**

| Sr. No | Author | Title | Publication |
|---|---|---|---|
| **1.** | Katav Sing | Rural Development Principles, Policies and management. | --- |
| **2.** | S.P. Sukhatme | Solar Energy | --- |
| **3.** | G.P. Rai | Non-Conventional Sources of Energy | --- |
| **4.** | Debendra K. Das | Dynamics of rural development, perspectives | Deep & Deep Publications Delhi |

**Reference Books:**

| Sr. No | Author | Title | Publication |
|---|---|---|---|
| 1. | T.T.T.I. Madras | Environmental Engg. | Tata McGraw Hill Publishing Co. Ltd. New Delhi. |

**Learning Resources:** Internet, Daily News papers

**Specification Table:**

| Sr. No. | Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| **1.** | Introduction | 04 | -- | -- | 04 |
| **2.** | Man-power development | 04 | 04 | -- | 08 |
| **3.** | Appropriate technology & its transfer | 04 | 04 | 04 | 12 |
| **4.** | Industrialization | 04 | 04 | 04 | 12 |
| **5.** | Non-conventional Energy Sources | 08 | 06 | 06 | 20 |
| **6.** | Community Services | 04 | 04 | -- | 08 |
| **7.** | Waste Management | -- | 04 | 04 | 08 |
| **8.** | Developments | 04 | 04 | -- | 08 |
| | **Total** | **32** | **30** | **18** | **80** |

**(J. N Thorat-Shingte)**
**Prepared By**

**(Prof. S. V. Chaudhari)**
**Member Secretary, PBOS**

**(Prof.M.S.Satarkar)**
**Chairman, PBOS**

**Programme** : **Diploma in CE**/EE/ET/ME/MT/CM/IT
**Programme Code** : **01**/02/03/04/05/06/07/08/**21**/22/23/24/26/**15**/16/17/18/19/24
**Name of Course** : **Renewable & Sustainable Energy Management**
**Course Code** : **AU483**

**Teaching Scheme:**

| Theory/Practical | Hours/ Week | Total Hours |
|---|---|---|
| **Theory** | 02 | 32 |
| **Practical** | -- | -- |

**Evaluation Scheme:**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term Work |
| Duration | Two class tests each of 60 minutes | 3 Hrs | -- | -- | -- |
| Marks | **20** | **80** | -- | -- | -- |

**Course Rationale:**

Energy is an important aspect in all sectors of country's economy. The energy crisis is mainly caused due to increased population and enhanced standard of living and life style of people. The conventional sources of energy are insufficient to meet these demands. Hence alternative energy sources are utilized for power production. The use of alternative energy source is increasing day by day. Diploma Engineers are to develop, operate and maintain these systems therefore essential to know basics of energy conversion, conservation, energy audit and waste heat recovery techniques.

**Course Objectives:**

| After studying this course, the student will be able to | |
|---|---|
| 1 | Know the National scene of energy production, utilization, consumption and reserves. |
| 2 | Appreciate the need for non-conventional energy sources. |
| 3 | Understand relative advantages and disadvantages of various non-conventional energy sources. |
| 4 | Develop awareness for effective utilization of alternative energy sources. |
| 5 | Identify different components of solar energy and wind energy sources. |
| 6 | Identify and analyze biomass plant. |
| 7 | Identify and apply energy conservation techniques for commonly used Power absorbing and generating devices. |
| 8 | Apply principles of energy conservation and energy management techniques. |

**Course Content:**

| Chapter No. | Name of Topic/Sub topic | | Hrs | Marks |
|---|---|---|---|---|
| **1.** | **Review of conventional sources of energy** | | **03** | **06** |
| | 1.1 | Types of conventional energy sources, availability and important power plants in India | | |
| | 1.2 | India's production and reserves for fossil fuels, waterpower, nuclear power. | | |
| | 1.3 | Need for non-conventional energy sources. | | |
| | 1.4 | Environmental impact of various energy sources. Green building, sustainable development. Carbon credits and its signifcance | | |
| **2.** | **Solar Energy** | | **04** | **10** |
| | 2.1 | Principle of conversion of solar energy into heat and electricity. Solar radiation. Solar radiations at earth's surface | | |
| | 2.2 | Solar radiation geometry- declination, hour Angle, altitude angle, incident angle, zenith angle, solar azimuth angle | | |
| | 2.3 | Solar collectors and their types, application, advantages and limitations | | |
| **3.** | **Applications of Solar Energy** | | **04** | **10** |
| | 3.1 | Solar electric power generation: Solar photovoltaic cell, solar cell principle and working, its application, advantages and disadvantages. | | |
| | 3.2 | Solar water heating, solar distillation, solar cooking and furnace, | | |
| | 3.3 | Solar pumping and Green house, Agriculture and industrial process heat. | | |
| | 3.4 | Space heating, space colling, | | |
| **4.** | **Wind Energy** | | **05** | **16** |
| | 4.1 | Basic principles of wind energy conversion, power in wing, available wind power formulation, power coefficient, and maximum power | | |
| | 4.2 | Main considerations in selecting a site for wind mills, advantages and limitations of wind energy conversion | | |
| | 4.3 | Classification of windmills, construction and working of horizontal And vertical axis wind mills, their comparison. | | |
| | 4.4 | Main applications of wind energy for power generation and pumping. | | |
| **Energy From Biomass** | | | | |
| **5.** | 5.1 | Common species recommended for biomass, methods for obtaining energy from biomass. | **05** | **12** |
| | 5.2 | Classification of biomass- gasified, fixed bed and fluidized | | |
| | 5.3 | Application of gasifier | | |
| | 5.4 | Biodiesel production and application | | |
| | 5.5 | Agricultural waste as biomass, biomass digester, comparison of biomass with conventional fuels. | | |
| **6.** | **Geothermal Energy and Tidal Energy** | | **06** | **16** |
| | 6.1 | Availability, forms of geothermal energy- Dry steam, wet steam, hot dry rock, magnetic chamber system | | |
| | 6.2 | Different power plants available. | | |

| | | | | |
|---|---|---|---|---|
| | 6.3 | Tidal power, factors for selection of tidal power plant | | |
| | 6.4 | Classification- Single basin, double basin type | | |
| | 6.5 | Tidal power plants in world, ocean thermal plants. | | |
| **7.** | **Energy Conservation and management** | | | |
| | 7.1 | Energy conservation and management, need and importance of energy conservation and management | **05** | **10** |
| | 7.2 | Concept of payback period, return on investment, life cycle cost, Sankey diagrams, specific energy consumption. Distribution of energy consumption. | | |
| | 7.3 | Energy audit, types of audit, methods of energy conservation | | |
| | 7.4 | Cogeneration and its application. | | |
| **Total** | | | **32** | **80** |

**List of Assignments:**

| Sr. No. | Name of Assignment |
|---|---|
| **1.** | To collect information about global and Indian energy market |
| **2.** | One field visit to be conducted to demonstrate application of Solar Energy |
| **3.** | One field visit to be conducted to Wind Mill |
| **4.** | To visit a biomass/ biogas plant of municipal waste or elsewhere. |
| **5.** | Perform energy audit for workshop/Office/Home/SSI unit. |

**Instructional Strategy:**

| Sr. No. | Topic | Instructional Strategy |
|---|---|---|
| 1 | Review of conventional sources of energy | Classroom teaching and Internet browsing |
| 2 | Solar Energy | Classroom teaching and field visits, use of charts |
| 3 | Wind Energy | Classroom teaching, field visit & use of charts |
| 4 | Energy From Biomass | Classroom teaching, field visit & use of charts |
| 5 | Geothermal Energy | Classroom teaching and Internet browsing |
| 6 | Tidal Energy | Classroom teaching and Internet browsing |
| 7 | Energy Conservation | Classroom teaching |
| 8 | Energy Conservation Techniques | Classroom teaching and case study |

**Text Books:**

| Sr. No | Author | Title | Publication |
|---|---|---|---|
| 1 | Non conventional energy resources | Dr B.H.Khan | Tata McGraw Hill |
| 2 | Non conventional energy Resources | G. D. Rai | Khanna publication |

**Reference Books:**

| Sr. No | Author | Title | Publication |
|---|---|---|---|
| 1. | Solar energy | S. P. Sukhatme | Tata McGraw Hill |
| 2. | Solar energy | H. P. Garg | Tata McGraw Hill |
| 3. | Power plant engineering | Arrora Domkundwar | Dhanpat Rai & co. |
| 4. | India- The energy sector | P.H. Henderson | Oxford University Press |
| 5. | Industrial energy conservation | D. A. Ray | Pergaman Press |
| 6. | Non-conventional energy source | K. M. Mittal | --- |
| 7. | Energy resource management | Krupal Singh Jogi | --- |
| 8. | Website for Akshay Urja News Bulletin. (www.mnes.nic.in) | --- | --- |

**Learning Resources:** Charts of solar water heater and cooker, Models of solar water heater and cooker, Photovoltaic cells etc., video cassette no.131, 365 of G.P.P. library

**Specification Table:**

| Sr. No. | Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| **1.** | Review of conventional sources of energy | 06 | -- | -- | 06 |
| **2.** | Solar Energy | 04 | 06 | -- | 10 |
| **3.** | Application of Solar Energy | -- | 04 | 06 | 10 |
| **4.** | Wind Energy | 04 | 04 | 08 | 16 |
| **5.** | Energy From Biomass | 04 | 02 | 06 | 12 |
| **6.** | Geothermal & Tidal Energy | 06 | 04 | 06 | 16 |
| **7.** | Energy Conservation Management | 04 | 06 | -- | 10 |
| | **Total** | **28** | **26** | **26** | **80** |

Prepared By

(E.C.Dhembare)
L.M.E.

(S.V.Chaudhari)
I/C CDC & Member Secretary, PBOS

(A.S.Zanpure)
H.M.E.D. & Chairman,PBOS

**Programme** : **Diploma in CE**/EE/ET/ME/MT/CM/IT
**Programme Code** : **01**/02/03/04/05/06/07/08/**21**/22/23/24/26/**15**/16/17/18/19/24
**Name of Course** : **Renewable & Sustainable Energy Management**
**Course Code** : **AU483**

**Teaching Scheme:**

| Theory/Practical | Hours/ Week | Total Hours |
|---|---|---|
| **Theory** | 02 | 32 |
| **Practical** | -- | -- |

**Evaluation Scheme:**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term Work |
| Duration | Two class tests each of 60 minutes | 3 Hrs | -- | -- | -- |
| Marks | **20** | **80** | -- | -- | -- |

**Course Rationale:**

Energy is an important aspect in all sectors of country's economy. The energy crisis is mainly caused due to increased population and enhanced standard of living and life style of people. The conventional sources of energy are insufficient to meet these demands. Hence alternative energy sources are utilized for power production. The use of alternative energy source is increasing day by day. Diploma Engineers are to develop, operate and maintain these systems therefore essential to know basics of energy conversion, conservation, energy audit and waste heat recovery techniques.

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| After studying this course, the student will be able to | |
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| 2 | Appreciate the need for non-conventional energy sources. |
| 3 | Understand relative advantages and disadvantages of various non-conventional energy sources. |
| 4 | Develop awareness for effective utilization of alternative energy sources. |
| 5 | Identify different components of solar energy and wind energy sources. |
| 6 | Identify and analyze biomass plant. |
| 7 | Identify and apply energy conservation techniques for commonly used Power absorbing and generating devices. |
| 8 | Apply principles of energy conservation and energy management techniques. |

**Course Content:**

| Chapter No. | Name of Topic/Sub topic | | Hrs | Marks |
|---|---|---|---|---|
| **1.** | **Review of conventional sources of energy** | | **03** | **06** |
| | 1.1 | Types of conventional energy sources, availability and important power plants in India | | |
| | 1.2 | India's production and reserves for fossil fuels, waterpower, nuclear power. | | |
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| | 1.4 | Environmental impact of various energy sources. Green building, sustainable development. Carbon credits and its signifcance | | |
| **2.** | **Solar Energy** | | **04** | **10** |
| | 2.1 | Principle of conversion of solar energy into heat and electricity. Solar radiation. Solar radiations at earth's surface | | |
| | 2.2 | Solar radiation geometry- declination, hour Angle, altitude angle, incident angle, zenith angle, solar azimuth angle | | |
| | 2.3 | Solar collectors and their types, application, advantages and limitations | | |
| **3.** | **Applications of Solar Energy** | | **04** | **10** |
| | 3.1 | Solar electric power generation: Solar photovoltaic cell, solar cell principle and working, its application, advantages and disadvantages. | | |
| | 3.2 | Solar water heating, solar distillation, solar cooking and furnace, | | |
| | 3.3 | Solar pumping and Green house, Agriculture and industrial process heat. | | |
| | 3.4 | Space heating, space colling, | | |
| **4.** | **Wind Energy** | | **05** | **16** |
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| | 4.3 | Classification of windmills, construction and working of horizontal And vertical axis wind mills, their comparison. | | |
| | 4.4 | Main applications of wind energy for power generation and pumping. | | |
| **Energy From Biomass** | | | | |
| **5.** | 5.1 | Common species recommended for biomass, methods for obtaining energy from biomass. | **05** | **12** |
| | 5.2 | Classification of biomass- gasified, fixed bed and fluidized | | |
| | 5.3 | Application of gasifier | | |
| | 5.4 | Biodiesel production and application | | |
| | 5.5 | Agricultural waste as biomass, biomass digester, comparison of biomass with conventional fuels. | | |
| **6.** | **Geothermal Energy and Tidal Energy** | | **06** | **16** |
| | 6.1 | Availability, forms of geothermal energy- Dry steam, wet steam, hot dry rock, magnetic chamber system | | |
| | 6.2 | Different power plants available. | | |

| | | | | |
|---|---|---|---|---|
| | 6.3 | Tidal power, factors for selection of tidal power plant | | |
| | 6.4 | Classification- Single basin, double basin type | | |
| | 6.5 | Tidal power plants in world, ocean thermal plants. | | |
| **7.** | **Energy Conservation and management** | | | |
| | 7.1 | Energy conservation and management, need and importance of energy conservation and management | **05** | **10** |
| | 7.2 | Concept of payback period, return on investment, life cycle cost, Sankey diagrams, specific energy consumption. Distribution of energy consumption. | | |
| | 7.3 | Energy audit, types of audit, methods of energy conservation | | |
| | 7.4 | Cogeneration and its application. | | |
| **Total** | | | **32** | **80** |

**List of Assignments:**

| Sr. No. | Name of Assignment |
|---|---|
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| **3.** | One field visit to be conducted to Wind Mill |
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| **5.** | Perform energy audit for workshop/Office/Home/SSI unit. |

**Instructional Strategy:**

| Sr. No. | Topic | Instructional Strategy |
|---|---|---|
| 1 | Review of conventional sources of energy | Classroom teaching and Internet browsing |
| 2 | Solar Energy | Classroom teaching and field visits, use of charts |
| 3 | Wind Energy | Classroom teaching, field visit & use of charts |
| 4 | Energy From Biomass | Classroom teaching, field visit & use of charts |
| 5 | Geothermal Energy | Classroom teaching and Internet browsing |
| 6 | Tidal Energy | Classroom teaching and Internet browsing |
| 7 | Energy Conservation | Classroom teaching |
| 8 | Energy Conservation Techniques | Classroom teaching and case study |

**Text Books:**

| Sr. No | Author | Title | Publication |
|---|---|---|---|
| 1 | Non conventional energy resources | Dr B.H.Khan | Tata McGraw Hill |
| 2 | Non conventional energy Resources | G. D. Rai | Khanna publication |

**Reference Books:**

| Sr. No | Author | Title | Publication |
|---|---|---|---|
| 1. | Solar energy | S. P. Sukhatme | Tata McGraw Hill |
| 2. | Solar energy | H. P. Garg | Tata McGraw Hill |
| 3. | Power plant engineering | Arrora Domkundwar | Dhanpat Rai & co. |
| 4. | India- The energy sector | P.H. Henderson | Oxford University Press |
| 5. | Industrial energy conservation | D. A. Ray | Pergaman Press |
| 6. | Non-conventional energy source | K. M. Mittal | --- |
| 7. | Energy resource management | Krupal Singh Jogi | --- |
| 8. | Website for Akshay Urja News Bulletin. (www.mnes.nic.in) | --- | --- |

**Learning Resources:** Charts of solar water heater and cooker, Models of solar water heater and cooker, Photovoltaic cells etc., video cassette no.131, 365 of G.P.P. library

**Specification Table:**

| Sr. No. | Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| **1.** | Review of conventional sources of energy | 06 | -- | -- | 06 |
| **2.** | Solar Energy | 04 | 06 | -- | 10 |
| **3.** | Application of Solar Energy | -- | 04 | 06 | 10 |
| **4.** | Wind Energy | 04 | 04 | 08 | 16 |
| **5.** | Energy From Biomass | 04 | 02 | 06 | 12 |
| **6.** | Geothermal & Tidal Energy | 06 | 04 | 06 | 16 |
| **7.** | Energy Conservation Management | 04 | 06 | -- | 10 |
| | **Total** | **28** | **26** | **26** | **80** |

Prepared By

(E.C.Dhembare)
L.M.E.

(S.V.Chaudhari)
I/C CDC & Member Secretary, PBOS

(A.S.Zanpure)
H.M.E.D. & Chairman,PBOS

**Programme** : Diploma in **CE**/EE/ET/ME/MT/CM/IT
**Programme Code** : **01**/02/03/04/05/06/07/08/**21**/22/23/23/26/**15**/16/17/18/19
**Name of Course** : Engineering Economics
**Course Code** : AU484

**Teaching Scheme:**

| | **Hours /Week** | **Total Hours** |
|---|---|---|
| **Theory** | **02** | **32** |
| **Practical** | -- | -- |

**Evaluation Scheme:**

| | **Progressive Assessment** | **Semester End Examination** | | | |
|---|---|---|---|---|---|
| | | **Theory** | **Practical** | **Oral** | **Term work** |
| **Duration** | Three class tests of 60 min Duration | 3 Hrs | -- | -- | -- |
| **Marks** | 20 | 80 | -- | -- | -- |

**Course Rationale:**

Diploma Engineers working in middle level management are no longer confined to the role of professional technicians. They often have to take business decisions, for which they are required to apply economic concepts, logic, tools of analysis and economic theories as they advance in their carrier. It is for this reason that diploma students are required to posses some working knowledge of economic concepts, economic policy of our country, also the effects of globalization, GATT, WTO etc.

**Course Objectives:**

After studying this course, the student will be able to

- Various concepts, applications, contribution of Micro Economics and macro economics to engineering business decisions.
- Consumer demand, market demand, supply and production.
- Prices and cost - Break even analysis, price decisions.
- Concept of National income.
- Inflation, Deflation and unemployment.
- Money and Banking, New economic environment.

**Course Content:**

| Chapter No. | Name of Topic/Sub topic | | Hrs | Weigh tage |
|---|---|---|---|---|
| **1** | **Introduction to Economics** | | | |
| | 1.1 | Definitions of economics, Objectives, Importance, concept of engineering economics. | **04** | **10** |
| | 1.2 | General concepts on micro & macro economics- Market economy, Command economy, Mixed economy. | | |
| **2** | **Demand Analysis** | | | |
| | 2.1 | Utility related demand- total and marginal utility, law of diminishing marginal utility, cardinal and ordinal utility. | **07** | **20** |
| | 2.2 | Law of demand, Determinants of demand, Elasticity of demand, Factors governing the elasticity of demand. | | |
| | 2.3 | Techniques and methods for forecasting of demand. | | |
| **3** | **Supply, Production and Cost analysis** | | | |
| | 3.1 | Law of supply, Determinants of supply, Elasticity of supply and factors governing elasticity. | **06** | **14** |
| | 3.2 | Theory of production, Laws of production. | | |
| | 3.3 | Cost concepts, Elements of costs, Preparation of cost sheet, Segregation of costs into fixed and variable costs. Break-even analysis-Linear approach. (Simple numerical problems to be solved) | | |
| **4** | **Time value of money** | | | |
| | 4.1 | Simple and compound interest. | **08** | **16** |
| | 4.2 | Principle of economic equivalence. Evaluation of engineering projects, Cost-benefit analysis in public projects. | | |
| | 4.3 | Depreciation- Causes of depreciation, Methods of calculating depreciation- Straight line method and declining balance method. | | |
| **5** | **National Income and Inflation** | | | |
| | 5.1 | Concepts and measurement of national income, Gross domestic and national production (GNP, GDP). | **03** | **08** |
| | 5.2 | Inflation and deflation, measures, kinds and effects. | | |
| | 5.3 | Unemployment causes, kinds, effects and remedies. | | |
| **6** | **Finance, Money and Banking and New Economic Environment** | | | |
| | 6.1 | Financial statements i.e. Profit & Loss (Income) Statement, Balance sheet, Book – Keeping, Financial reporting. | **04** | **12** |
| | 6.2 | Money- Kinds and functions, significance. | | |
| | 6.3 | Banking- Meaning and functions of commercial banks and Reserve Bank of India. | | |
| | 6.4 | Liberalization- merits and demerits, GATT and W.T.O. | | |
| | | **Total** | **32** | **80** |

**Instructional Strategy:**

| Sr. No. | Topic | Instructional Strategy |
|---|---|---|
| 1 | Introduction to Economics | Lecture method, discussion |
| 2 | Demand Analysis | Lecture method, Assignment, surveys, case study, discussion |
| 3 | Supply Production and cost analysis | Lecture method, Assignment, surveys, case study, discussion |
| 4 | Time value of money | Lecture method, Assignment, surveys, case study, discussion |
| 5 | National income and inflation | Lecture method, Literature survey, discussion. |
| 6 | Finance, money and banking and New economic environment | Lecture method, visits journals review, discussion. |

**Text Books:**

| Sr. No | Author | Title | Publication |
|---|---|---|---|
| 1 | D.N. Dwivedi and Abhishek Dwivedi | Engineering Economics | Vikas publishing House Pvt. Ltd., New Delhi, |
| 2 | Maheshwari | Managerial Economics (2nd ed) | Prentice Hall of India Pvt. Ltd. New Delhi |

**Reference Books:**

| Sr. No | Author | Title | Publication |
|---|---|---|---|
| 1 | Pannerselvam | Engineering Economics | Prentice Hall of India Pvt. Ltd. New Delhi |
| 2 | Sasmita Mishra | Engineering economics & Costing | Prentice Hall of India Pvt. Ltd. New Delhi |
| 3 | Newnan, Eschenbach, and Lavelle, | Engineering Economic Analysis, 9th Edition, | Oxford University Press, 2004. |
| 4 | Eschenbach, Ted G. | Engineering Economy - Applying Theory to Practice | Irwin, 1995 |
| 5 | Newnan and Wheeler, | Study Guide for Engineering Economic Analysis, 9th Edition, | Oxford University Press, 2004. |
| 6 | Anthony J. Tarquin | Engineering Economy | McGraw-Hill, 1989 |

**Learning Resources:** Books, Journals, and Reports etc.

**Specification Table:**

| Sr. No. | Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| 1 | Introduction to Economics | 04 | 06 | -- | 10 |
| 2 | Demand Analysis | 06 | 08 | 06 | 20 |
| 3 | Supply Production and cost analysis | 06 | 04 | 04 | 14 |
| 4 | Time value of money | 06 | 06 | 04 | 16 |
| 5 | National Income and Inflation | 04 | 04 | -- | 08 |
| 6 | Finance, Money and Banking and New economic environment | 06 | 04 | 02 | 12 |
| | Total | 32 | 32 | 16 | 80 |

Prepared By

( ) (S.V.Chaudhari) (M.S.Satarkar)
Secretary, PBOS Chairman, PBOS

**Programme** : **CE**/EE/ET/ME/MT/CM/IT/DDGM
**Programme Code** : **01**/02/03/04/05/06/07/08/**21**/22/23/24/26/**15**/16/17/18/19
**Name of Course** : **E-Commerce**
**Course Code** : **AU486**

**Teaching Scheme:**

| | Hours /Week | Total Hours |
|---|---|---|
| Theory | 02 | 32 |
| Practical | -- | -- |

**Evaluation Scheme:**

| | **Progressive Assessment** | **Semester End Examination** | | | |
|---|---|---|---|---|---|
| | | **Theory** | **Practical** | **Oral** | **Term work** |
| Duration | Two class tests of 60 Min. duration | 3 hrs. | -- | -- | -- |
| Marks | **20** | **80** | -- | -- | -- |

**Course Rational:**

This course is aimed at providing the students with modules on the use of the Internet and e-commerce. It also includes all aspects of deploying e-business and e-commerce within an organization. It also provides theories and concepts and questions the validity of these models in the light of the differences between the Internet and other media.

**Course Objectives:**

| After studying this course, the student will be able to |
|---|
| Outline the ongoing business challenges of managing e-business and e-commerce in an organization. |
| Evaluate the effectiveness of business and revenue models for online businesses. |
| Outline the hardware and software requirements necessary to enable employee access to the Internet and hosting of e-commerce services. |
| Assess the role of macro-economic factors such as economics, governmental e-business policies, and taxation and legal constraints. |
| Distinguish between marketing communication characteristics of traditional and new media. |
| Assess different options for integration of organizations' information systems with e-procurement suppliers. |
| Describe techniques for retaining customers and cross- and upselling using new media. |

**Course Content:**

| Chapter No. | Name of Topic/Sub topic | | Hrs | Weightage |
|---|---|---|---|---|
| **1** | **Introduction to E-Business and E-Commerce** | | | |
| | 1.1 | Introduction ,The impact of the electronic communications on traditional businesses , Real-world E-Business: HP.com | **04** | **12** |
| | 1.2 | Difference between e-commerce and e-business, E-Commerce defined, E-business defined. | | |
| | 1.3 | Business or consumer models of e-commerce transactions, E-business opportunities, Business adoption of digital technologies for e-commerce and e-business, Drivers of business Internet adoption. | | |
| | 1.4 | E-business risks and barriers to business adoption ,<br>Evaluating an organization's e-business capabilities, Drivers of consumer Internet adoption, Barriers to consumer Internet adoption. | | |
| | 1.5 | Case Study: A history of Flipcart/Paytm. | | |
| **2** | **E-Commerce Fundamentals** | | | |
| | 2.1 | Web presentation and data exchange standards, Audio and video standards, Focus on Internet governance. | **06** | **14** |
| | 2.2 | Managing e-business infrastructure, Managing hardware and systems software, infrastructure, Managing Internet service and hosting providers, Managing employee access to the Internet and e-mail, Managing e-business applications infrastructure. | | |
| | 2.3 | Focus on web services, SaaS and service-oriented architecture (SOA), Benefits of web services or SaaS, Challenges of deploying SaaS. | | |
| | 2.4 | EDI, Focus on mobile commerce, Wireless Internet access standards, Wireless access devices, Popularity of mobile applications. | | |
| | 2.5 | Case Study: New architecture or just new hype? | | |
| **3** | **E-Environment** | | | |
| | 3.1 | Introduction , Real-world E-Business: GD Worldwide<br>Social and legal factors, Factors governing e-commerce service adoption , Privacy and trust in e-commerce , Other e-commerce legislation. | **06** | **14** |
| | 3.2 | Environmental and green issues related to Internet, usage Taxation, Freedom-restrictive legislation, Economic and competitive factors, Focus on e-commerce and globalization. | | |
| | 3.3 | The implications of e-commerce for international B2B trading, Political factors, Internet governance, E-government, Technological innovation and technology assessment, Approaches to identifying emerging technology. | | |
| | 3.4 | Case Study: The implications of globalization for consumer attitudes. | | |

| | | | | |
|---|---|---|---|---|
| **4** | **E-Procurement** | | | |
| | 4.1 | Introduction to e-procurement, Understanding the procurement process, Types of procurement. | **04** | **12** |
| | 4.2 | Participants in online procurement , Drivers of e-procurement , Focus on estimating e-procurement cost,<br>The impact of cost savings on profitability, Risks and impacts of e-procurement. | | |
| | 4.3 | Case Study: Cambridge Consultants reduce costs through e-procurement. | | |
| **5** | **E-Marketing** | | | |
| | 5.1 | Introduction to e-marketing, Marketing defined, E-marketing defined, Distinguishing between e-marketing, e-business and e-commerce. | **04** | **12** |
| | 5.2 | E-marketing planning, Situation analysis, Demand analysis, Competitor analysis, Intermediary analysis, Internal marketing audit, Objective setting. Strategy, Market and product positioning. Target market strategies, Focus on characteristics of new-media marketing communications, Tactics, Product, Price, Place, Promotion, People, Process and Physical evidence. | | |
| | 5.3 | Focus on online branding, The importance of brand online Actions, Control. | | |
| **6** | **Customer Relationship Management** | | | |
| | 6.1 | Introduction, Marketing applications of CRM, What is e-CRM? Benefits of e-CRM, Permission marketing, Customer profiling, Conversion marketing. | **08** | **16** |
| | 6.2 | The online buying process, Differences in buyer behaviour in target markets, Differences between B2C and B2B buyer, Behaviour. The net promoter score, Customer acquisition management, Focus on marketing communications for customer Acquisition. | | |
| | 6.3 | The characteristics of interactive marketing, communications, Assessing marketing communications effectiveness, Online marketing communications, Customer retention management, Personalization and mass customization, Online communities Techniques for managing customer activity and value, Lifetime value modelling. | | |
| | 6.4 | Focus on excelling in e-commerce service quality, Improving online service quality, Customer extension, Advanced online segmentation and targeting, techniques, Technology solutions for CRM, Types of CRM applications. | | |
| | 6.5 | Integration with back-office systems, The choice of single-vendor solutions or a more, fragmented choice, Data quality. | | |
| | | **Total** | **32** | **80** |

**Instructional Strategy :**

| Sr. No | Topic | Instructional Strategy |
|---|---|---|
| 1. | Introduction To E-Business and E-Commerce | Explanation of basic concepts |
| 2. | E-Commerce Fundamentals | Explanation and Practical Demo on Internet using LCD |
| 3. | E-Environment | Explanation and Demonstration of issues related to Internet |
| 4. | E-Procurement | Explanation and Group discussion |
| 5. | E-Marketing | Explanation and Marketing Demo by Students and Experts |
| 6. | Customer Relationship Management | Explanation and Group Discussion in Class room |

**Text / Reference Books:**

| Sr. No | Author | Title | Publisher |
|---|---|---|---|
| 1 | Dave Chaffey | E-Business and E-Commerce Management Strategy, Implementation and Practice. | Prentice Hall |
| 2 | Kalakota et al | Electronic Commerce: A Manager's Guide. | Addison-Wesley |

**Specification Table:**

| Sr. No | Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| 1 | Introduction to E Business & E-Commerce | 06 | 04 | 02 | 12 |
| 2 | E-Commerce Fundamentals | 04 | 04 | 06 | 14 |
| 3 | E-Environment | 04 | 04 | 06 | 14 |
| 4 | E-Procurement | 04 | 04 | 04 | 12 |
| 5 | E-Marketing | 02 | 04 | 06 | 12 |
| 6 | Customer Relationship Management | 04 | 06 | 06 | 16 |
| | Total | **24** | **26** | **30** | **80** |

Prepared By

( Smt. H.F.Khan & Smt.B.K.Vyas)
Lect. in Computer Engg.
PBOS

(S.V.Chaudhari)
Member Secretary, PBOS

( M.S.Satarkar )
H.C.E.D.& Chairman,

**Programme** : **CE**/EE/ET/ME//MT/CM/IT/DDGM
**Programme Code** : **01**/02/03/04/05/06/07/08/**21**//22/23/24/26
**Name of Course** : Development of Soft Skills - I
**Course Code** : NC 481

**Teaching Scheme:**

| | **Hours /Week** | **Total Hours** |
|---|---|---|
| Theory | -- | -- |
| Practical | 02 | 32 |

* NON EXAM.NON CREDIT COURSES (COMPULSORY) # Credits over & above 180 credits

**Evaluation Scheme:**

| | **Progressive Assessment** | **Semester End Examination** | | | |
|---|---|---|---|---|---|
| | | **Theory** | **Practical** | **Oral** | **Term work** |
| Duration | -- | -- | -- | -- | -- |
| Marks | -- | -- | -- | -- | **25** |

**Course Rationale:**
This course aims to make students aware of good interpersonal relations, Professionalism in etiquettes, importance of time management and importance of good health. The techniques such as role play, group discussions can be used effectively to demonstrate understanding emotions of persons in daily contact.

**Course Objectives:**
After studying this course, the student will be able to

- Develop better interpersonal relations among their peer group, subordinates and superiors and work effectively.
- Display corporate etiquettes and professionalism while attending /answering phone calls.
- Plan time optimally/effectively in office –work as well for their personal growth.
- Understand strengths and weaknesses of self.
- Understand /feel emotions of persons (from office and family) in daily contact and take appropriate actions.
- Demonstrate habits for keeping good health by following good food habits and daily exercise.
- Develop overall personality and be successful in his/her career.

**Course Content:**

| **Chapter No.** | **Name of Topic/Sub topic** | | **Hrs** | **Weigh tage** |
|---|---|---|---|---|
| **1.** | **Interpersonal Skills through Personal Development** | | | |
| | 1.1 | Reducing conflict by preventing problems in the classroom. | -- | -- |
| | 1.2 | Interpersonal Skills through Self Development and change. | | |
| **2.** | **Corporate Etiquettes & Professionalism** | | | |
| | 2.1 | Understanding Self | -- | -- |
| | 2.2 | Polished personal habits | | |
| | 2.3 | Ethics & Etiquettes: a way of life | | |
| | 2.4 | Personal Attire & Grooming | | |
| | 2.5 | Cell phone manners | | |

| | | | | |
|---|---|---|---|---|
| **3.** | **Time Management** | | | |
| | 3.1 | Time management skills in groups for completion of project | -- | -- |
| | 3.2 | Factors that lead to time loss and how they can be avoided | | |
| | 3.3 | Time matrix & urgent versus , Important jobs | | |
| **4.** | **Managing Emotions** | | | |
| | 4.1 | To understand and identify emotions, | -- | -- |
| | 4.2 | To know our preferences | | |
| | 4.3 | Strength, weaknesses ,opportunities and threats , Techniques of self control | | |
| | 4.4 | To get desirable response from others | | |
| **5.** | **Health Management** | | | |
| | 5.1 | Importance of health management, | -- | -- |
| | 5.2 | Relevance of it , | | |
| | 5.3 | Tips to maintain good health | | |
| | | **Total** | -- | -- |

**List of Practicals/Experiments/Assignments:**

| Sr. No. | Name of Practical/Experiment/Assignment | Hrs |
|---|---|---|
| **1.** | Case studies to be discussed in a group and presentation of the same by group /group leader. | 04 |
| **2.** | Field exercises for the group of students. | 02 |
| **3.** | Role play by individual/group leader. | 04 |
| **4.** | Arranging Quizzes, puzzle- solving and educational games. | 02 |
| **5.** | Group discussions. | 04 |
| **6.** | Sharing of self -experiences in a group. | 04 |
| **7.** | Brain storming sessions | 02 |
| **8.** | Questionnaire -filling & discussing results of the same in a group. | 04 |
| **9.** | Live demonstrations on Yoga and other stress relieving techniques by professional persons. | 06 |
| | **Total** | **32** |

**Reference Books:**

| Sr. No | Author | Title | Publication |
|---|---|---|---|
| 1. | Mr. Shiv Khera | You can win | |
| 2. | Mr Abdul Kalam | Wings of Fire | |
| 3. | Mr Nirfarake | Prabhavi Vyaktimatwa.(Marathi) | |
| 4. | Mr Iyyengar | YogaDipika | |
| 5. | Mr. Anand Nadkarni | Tan tanavache niyojan (Marathi) | |
| 6. | Mr. Rajiv Sharangpani | Khusit raha ,Mast Jaga.(Marathi) | |

**Learning Resources :** Video cassettes on 1. Effective Communication 2. Group discussions, 3.Corporate Etiquettes and professionalism.

Prepared By

| | | |
|---|---|---|
| (D.K.Bhandare) | (S. V.Chaudhari) | (M.S.Satarkar) |
| Lect. in Civil Engineering | Member Secretary, PBOS | Chairman, PBOS |

**Programme** : Diploma in **CE**/EE/ET/ME/ MT/CM/IT/DDGM
**Programme Code** : **01**/02/03/04/05/06/07/8/**21**/22/23/24/26
**Name of Course** : Development of Soft Skills – II
**Course Code** : NC 482

**Teaching Scheme:**

| | **Hours /Week** | **Total Hours** |
|---|---|---|
| **Theory** | **--** | **--** |
| **Practical** | **02** | **32** |

* NON EXAM.NON CREDIT COURSES (COMPULSORY) - B # Credits over & above 180 credits

**Evaluation Scheme:**

| | **Progressive Assessment** | **Semester End Examination** | | | |
|---|---|---|---|---|---|
| | | **Theory** | **Practical** | **Oral** | **Term work** |
| Duration | -- | -- | -- | -- | -- |
| Marks | -- | -- | -- | -- | **25** |

**Course Rationale:**

This course aims to make students aware of importance of goal setting , develop self study techniques , importance of ethics and value system , This also aims one to inculcate creative mind along with interest in using problem solving techniques while dealing with any work. It also emphasizes about importance of stress relieving techniques to be practiced for good health.

**Course Objectives:**

After studying this course, the student will be able to

- Understand importance of goal setting and strategies for setting one's goal.
- Develop and practice self- study techniques.
- Use and practice stress management techniques for good health
- Use and practice problem solving skills.
- Understand importance of ethics and value system for positive interpersonal relations.
- Develop overall personality and be successful in his/her career.

**Course Content:**

| **Sr. No.** | **Name of Topic/Sub topic** | | **Hrs** | **Weightage** |
|---|---|---|---|---|
| **1.** | **Motivation & Goal Setting** | | | |
| | **1.1** | Importance of goal setting, | -- | -- |
| | **1.2** | How to set SMART goals. | | |
| **2.** | **Study Habits** | | | |
| | **2.1** | Note taking, Methods of Learning, | -- | -- |
| | **2.2** | Memory Enhancement, self - Study Techniques, | | |
| | **2.3** | Techniques for effective Reading and Writing. | | |
| **3.** | **Stress Management** | | | |
| | **3.1** | Stresses in groups, how to control emotions, | -- | -- |
| | **3.2** | Strategies to overcome stress, understanding importance of good health to avoid stress. | | |

| | | | | |
|---|---|---|---|---|
| **4.** | **Ethics & Motivation** | | | |
| | **4.1** | What are ethics, how ethics help to ensure positive interpersonal relations, | -- | -- |
| | **4.2** | Personal value system, and personal quality primer | | |
| **5.** | **Creativity** | | | |
| | **5.1** | Definition of Creativity, Tips and ways to increase creativity, importance of creativity. | -- | -- |
| **6.** | **Problem Solving Techniques** | | | |
| | **6.1** | Puzzles and technical quizzes to be organized to develop these skills. | -- | -- |
| | **Total** | | -- | -- |

**List of Practicals/Experiments/Assignments:**

| **Sr. No.** | **Name of Practical/Experiment/Assignment** | **Hrs** |
|---|---|---|
| **1.** | Case studies to be discussed in a group and presentation of the same by group /group leader. | 04 |
| **2.** | Field exercises for the group of students. | 02 |
| **3.** | Role play by individual/group leader. | 04 |
| **4.** | Arranging Quizzes, puzzle- solving and educational games. | 02 |
| **5.** | Group discussions. | 04 |
| **6.** | Sharing of self -experiences in a group. | 04 |
| **7.** | Brain storming sessions | 02 |
| **8.** | Questionnaire -filling & discussing results of the same in a group. | 04 |
| **9.** | Live demonstrations on Yoga and other stress relieving techniques. | 06 |
| | **Total** | **32** |

**Reference Books:**

| **Sr. No** | **Author** | **Title** | **Publication** |
|---|---|---|---|
| 1. | Mr. Shiv Khera | You can win | |
| 2. | Mr Abdul Kalam | Wings of Fire | |
| 3. | Mr Nirfarake | Prabhavi Vyaktimatwa.(Marathi) | |
| 4. | Mr Iyyengar | YogaDipika | |
| 5. | Mr. Anand Nadkarni | Tan tanavache niyojan (Marathi) | |
| 6. | Mr. Rajiv Sharangpani | Khusit raha ,Mast Jaga.(Marathi) | |

**Learning Resources:** Video cassettes on 1. Motivation & Goal Setting
2. Stress Management,3. Ethics & Motivation

Prepared By

| | | |
|---|---|---|
| ( D.K.Bhandare) | ( S. V.Chaudhari) | (M.S.Satarkar) |
| Lect. in Civil Engineering | Member Secretary, PBOS | Chairman, PBOS |

**Name of Programme : Diploma in Civil Engineering**
**Programme Code : 01/21/15**
**Name of the Course : Disposal and Management of Waste**
**Course Code : CE581**

**Teaching Scheme:**

| | Hours / Week | Total Hours |
|---|---|---|
| Theory | 04 | 64 |
| Term work / Practical | 02 | 32 |

**Evaluation:**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term work |
| Duration | Two class tests of 60 min. duration | 3 Hrs | -- | -- | -- |
| Marks | 20 | 80 | -- | 25 | 25 |

**Course Aim:**

Industrialization and Urbanization is increasing day by day. As a result of this the generation of solid waste is a major problem all over the country within the urban as well as rural area. In view of this the management of solid waste produced is of prime need to keep the environment safe and clean.

Information on classification and characteristics of solid waste will enable to decide appropriate decision about the collection and transportation of waste produced. Various disposal methods of solid waste will enable to recommend suitable method of disposal of solid waste with economy and acceptable environmental constraints including reuse and recycle wherever applicable.

Content on other types of solid waste such as biomedical waste, Construction waste ,E-waste and plastic waste will useful in deciding appropriate method for collection, transportation and disposal of these wastes.

Thus, the knowledge of solid waste management with the concept like recycling, recovering and reuse will lead to proper disposal with acceptability. This will further lead to keeping the natural resources contamination free.

**Course Objective:**

Students will able to

1. Understand various types of solid waste produced with their characteristics
2. Understand different methods of collection, transportation and disposal of solid waste.
3. Apply different method of disposal of solid waste for safe disposal.
4. Understand concept of Bio medical waste, E-waste and Industrial waste.
5. Understand recycling and reuse of solid waste.
6. Understand different transportation equipments with their limitations.

**Course Content:**

| Sr. No | Topic / Sub-Topic | Hrs | Weightage | Practical |
|---|---|---|---|---|
| | **Section I** | | | |
| 1 | **Introduction**<br>1.1 Definition of solid waste<br>1.2 Meaning of different solid waste – Domestic waste, commercial waste, industrial waste, market waste, agricultural waste, biomedical waste, E-waste, hazardous waste, institutional waste, etc.<br>1.3 Sources of solid waste<br>1.4 Classification of solid waste – hazardous and non-hazardous waste.<br>1.5 Physical and Chemical characteristics.<br>1.6 Impact of solid waste on environment.<br>1.7 Solid waste management techniques – solid waste management Hierarchy, waste prevention and waste reduction.<br>1.8 Factors affecting on solid waste generation. | 10 | 16 | Tutorial on theory |
| 2 | **Storage, collection and Transportation Of Municipal solid waste**.<br>2.1 Storage of municipal waste.<br>2.2 Collection methods of municipal waste.<br>2.3 Tools and Equipments-Litter Bin, Broom, Shovels, Handcarts, Mechanical road sweepers, Community Bin like movable and stationary Bin.<br>2.4 Transportation of municipal waste.<br>2.5 Transportation vehicles with their capacity and working-Animal carts, Auto vehicles, Tractors or Trailers, Trucks, Dumper, Compactor vehicles. Transfer station- meaning, necessity, location<br>2.6 Role of rag picker.<br>2.7 Organization pattern of solid waste Management. | 10 | 12 | Tutorial on theory |

| | | | | |
|---|---|---|---|---|
| | **Disposal of Solid Waste**<br>3.1 Composting of waste, Principles of composting process, Factors affecting on composting process<br>3.2 Methods of composting -<br>a) Manual Composting - Bangalore method, Indore Method<br>b) Mechanical Composting - Dano Process<br>c) Vermicomposting- Concept<br>3.3 Land filling technique, Factors for site Selection<br>Land filling methods-Area method, Trench method and Ramp method.<br>Leachate and its control, Biogas from landfill, Advantages and Disadvantages of landfill method<br>3.4 Incineration of waste<br>Introduction of incineration process.<br>Types of incinerators-Flash, Multiple chamber incinerators. Products of incineration, process with their use.<br>Pyrolysis of waste -<br>Definition, methods<br>3.5 Advantages and Disadvantages of incineration Process | 12 | 12 | Tutorial on theory |
| | **Section II** | | | |
| 4 | **Biomedical waste Management**<br>4.1 Definition of Biomedical Waste.<br>4.2 Sources and generation of Biomedical Waste<br>4.3 Classification of Biomedical Waste.<br>4.4 Management technologies. | 06 | 08 | Tutorial on theory |
| 5 | **E-waste Management**<br>5.1 Definition of E- waste, Varieties of E- waste, Dangers of E- waste,<br>5.2 Disposal of E- waste,<br>5.3 Recycling of E- waste | 06 | 06 | Tutorial on theory |
| 6 | **Industrial waste Management**<br>6.1 Variety of industrial waste<br>6.2 Collection and disposal of industrial waste,<br>6.3Control measures of industrial waste,<br>6.4Recycling of industrial waste. | 06 | 06 | Tutorial on theory |
| 7 | **Health aspect and public Involvement in solid waste management**<br>**Content :**<br>7.1 Health aspect during handling and processing<br>7.2 Health problem during time of segregation, reuse, recovery, recycling of solid waste.<br>7.3 Public Involvement and participation in Solid waste management | 06 | 10 | Tutorial on theory |

| | | | | |
|---|---|---|---|---|
| 8 | **Recycling of solid waste**<br>**Content :**<br>8.1 Introduction, purpose of recycling<br>8.2 Benefits of recycling.<br>8.3 Methods of collecting recyclables.<br>8.4 Solid waste recycling in India. | 06 | 06 | Tutorial on theory |
| 9 | **Municipal SWM Legal Aspects**<br>**9.1** MSW Rules 2000<br>9.2 Municipal solid wastes (Management and Handling) Rules, 1999.<br>9.3 Bio-Medical Waste (Management and Handling) Rules, 1998. | 02 | 04 | Tutorial on theory |
| | **Total** | **64** | **80** | |

**Instructional Strategy:**

| Sr.No | Topic | Instructional Strategy |
|---|---|---|
| 1 | Introduction | Class-room teaching |
| 2 | Storage, collection and Transportation Of Municipal solid waste | Class-room teaching |
| 3 | Disposal of Solid Waste | Class-room teaching |
| 4 | Biomedical waste Management | Class-room teaching & Visit |
| 5 | E-waste Management | Class-room teaching & Visit |
| 6 | Industrial waste Management | Visits, Class-room teaching |
| 7 | Health aspect and public Involvement in solid waste management | Visits, Class-room teaching |
| 8 | Recycling of solid waste | Visits, Class-room teaching |
| 9 | Municipal SWM Legal Aspects | Visits, Class-room teaching |

**Test Books:**

| Sr. No | Author | Title | Publisher |
|---|---|---|---|
| 1 | Dr. A.D.Bhide | Solid Waste Management | -- |
| 2 | Gorge Techobanoglous | Solid Waste | McGraw Hill |
| 3 | D.L. Manjunath | Environmental Studies | PEARSON Publication |
| 4 | Gottas | Composting | -- |
| 5 | K.Sasikumar | Solid Waste Management | PHI learning |
| 6 | Khopkar S.M. | Environmental Pollution | New Age International limited |
| 7 | Edwards and Lofty | Earthworm Biology | |
| 8 | Anindita Basak | Environmental Studies | PEARSON Publication |
| 9 | Rao C.S. | Environmental Pollution Control Engineering | Wiley Eastern Limited |
| 10 | B.B. Hosetti | Prospect and Perspectives of Solid Waste Management | NEW AGE International limited |

**Learning Resources:**

**Websites:**

1.www.hsagolden.com
2.www.almitrapatel.com
3. www.yousee.in
4. www.skgsangha.org
5. www.epa.gov/epaoswer/non-hw/muncipal/index.htm
6. En.wikipedia.org/waste-management

Prepared by

| | | |
|---|---|---|
| (D.K.Fad)<br>L.C.E. | (S.V.Chaudhari)<br>Member Secretary | (M.S.Satarkar)<br>H.C.E.D. &<br>Chairman P.B.O.S. |

**Name of Programme** **: Civil Engineering**
**Program Code** **: 01/21 /15**
**Name of Course** **: Advanced Construction Techniques**
**Course Code** **: CE582**
**Teaching Scheme:**

| | Hours / Week | Total Hours |
|---|---|---|
| Theory | 04 | 64 |
| Term work / Practical | 02 | 32 |

**Evaluation:**

| | Progressive Assessments | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term Work |
| Duration | Two class tests of 60 min Duration | 3 hours | -- | -- | -- |
| Marks | 20 | 80 | -- | 25 | 25 |

**Course Aim:**

Civil Engineering Diploma holder technician has to work not only in house building industry but also in other construction fields such as Irrigation Structures, Bridges, and Industrial Constructions. By studying this course the student will be aware of advanced construction procedures & techniques required for above construction structures with special reference to various operations related with concrete.

**Course Objectives:**

After studying this course the student will be able to

- Understand advanced Construction Techniques
- Supervise concreting operations used for advanced construction processes
- Acquaint with special types of concrete
- Know special types of formworks
- Supervise activities carried out by using various construction equipment & machinery
- Know aspects of Quality of concrete
- Know different causes of deterioration of concrete & necessary remedies to set right the same.

**Course Contents:**

| Sr No. | Topic / Subtopic | Hours | Weigh tage | Practical |
|---|---|---|---|---|
| **Section – I** | | | | |
| **1** | **Concreting in Extreme Environmental Conditions:**<br>Placing of concrete in hot weather- Special problems encountered precautions to be taken placing of concrete in cold weather on concrete, general points to be observed, Recommended minimum time limits for stripping of form work , Placing of concrete under water- Tremie method, Bucket placing in bags, prepacked concrete. | **09** | **10** | Assignment on Concreting in Extreme Environmental conditions. |
| **2** | **Grouting and Shotcreting**<br>Definition, Necessity of grouting, applications, Materials used for grouting.<br>Grouting procedures-Drilling pattern, preparation for grouting, methods of working,<br>Types of grouting-<br>-Cement grouting<br>-Chemical grouting<br>-Clay grouting<br>Shotcreting-Definition, procedures, applications. | **08** | **10** | An assignment on Grouting and Shotcreting |
| **3** | **Special Formworks**<br>Slip forms-definitions, applications, construction and working, climbing shutters-definition applications, methods of raising forms.<br>Formwork for silos & chimneys<br>Formwork for retaining wall<br>Form work for circular tanks. | **08** | **10** | An assignment on special formworks. |
| **4** | **Concreting Equipment**<br>Weigh batcher- portable, Types of concrete mixers,<br>Titling, Non-titling type, Drum-type, Double drum type, split drum type, Ready mix concrete plant, transit mixer.<br>Machinery for compaction of concrete-Internal vibrators External Vibrators, Surface vibrators, Shutter Vibrators, Vibrating tables – Working and suitability of each vibrator. | **7** | **10** | A visit to Ready mix concrete plant and preparing report of the visit. |

| Section – II | | | | |
|---|---|---|---|---|
| **5** | **Machinery for execution of concrete work**<br>Concrete work<br>Plant for handling cement and aggregates – Belt conveyors, Elevators, Tower cranes, Wagons, Lorries, Barrows, Dumpers, Chutes, Cable ways, Concrete pumps, Constructions working and applications of each equipment. | **08** | **10** | Assignment on machinery for execution of concrete work. |
| **6** | **Quality Control of Concrete**<br>Necessity of quality control, Field control, Minimum concrete strength. Non-destructive testing of concrete – Surface hardness method and Ultrasonic pulse velocity method. | **08** | **10** | |
| **7** | **Deterioration & Repairs of concrete**<br>Direction of concrete - Internal and External causes of deterioration. Corrosion of concrete and steel, cracking-corrosion interaction, Prevention of concrete deterioration. Repairs of concrete structures-Defects occurring during construction - causes, prevention, remedy, Selection of repair procedure, preparation of surface, repair by concrete replacement, prepacked concrete, repair of a retaining wall, Polymer-based repairs, Polymer concrete, Polymer impregnation, Drilling and plugging. | **08** | **10** | An assignment on Deterioration and repairs of concrete |
| **8** | **Design of Building for comfort in hot climates**<br>Introduction:<br>Comfort – Tropical summer index - climatic zones of India, Ventilation requirements, wind rose diagram, Factors to be considered for comfort conditioning of buildings in hot regions.<br>Design of building in hot regions. Natural ventilation of buildings, comfort conditioning by mechanical methods. Heat insulation of roofs, Concept of Green buildings and High-Rise Buildings. | **08** | **10** | |

**Instructional Strategy :**

| Sr.No. | Topic | Instructional Strategy |
|---|---|---|
| 1 | Concreting in Extreme Environmental Conditions | Class room teaching |
| 2 | Grouting and Shotcreting | Class room teaching |
| 3 | Special Formworks | Class room teaching |
| 4 | Concreting Equipment | Class room teaching, site visit |
| 5 | Machinery for execution of concrete work | Class room teaching |
| 6 | Quality control of concrete | Class room teaching |
| 7 | Deterioration and repairs of concrete | Class room teaching |
| 8 | Design of Building for comfort in hot climates | Class room teaching |

**Reference Books :**

| Sr.No | Author | Title | Publisher |
|---|---|---|---|
| 1 | Shri. M.S. Shetty | Concrete Technology | S. Chand & Co. |
| 2 | Dr. Neville | Concrete Technology | E.L.B.S. London |
| 3 | Dr. Orchanrd | Concrete Technology | |
| 4 | M.L. Gambhir | Concrete Technology | Tata McGraw Hill Publishing Co. New Delhi |
| 5 | P.D. Kulkarni | Manual of Concrete Technology | |
| 6 | R.L. Peuritoy | Construction Planning & Equipment | McGraw Hill Publisher Co. |

**Specification Table :**

| Sr. No | Topic/Subtopic | Cognitive Level | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| | | | Section I | | |
| 1 | Concreting in Extreme Environmental Conditions. | 04 | 06 | --- | 10 |
| 2 | Grouting and Shotcreting | 06 | 04 | --- | 10 |
| 3 | Joints in Concrete | 04 | --- | 06 | 10 |
| 4 | Special Formworks | 04 | 06 | --- | 10 |
| | Total | 18 | 16 | 06 | 40 |
| | | | Section II | | |
| 5 | Concreting Equipment | 02 | 02 | 04 | 08 |
| 6 | Machinery for execution of concrete work | 02 | 02 | 04 | 08 |
| 7 | Quality control of concrete | 04 | 02 | 02 | 08 |
| 8 | Deterioration and repairs of concrete | 02 | 02 | 04 | 08 |
| 9 | Design of Building for comfort in hot climates | 04 | 02 | 02 | 08 |
| | Total | 14 | 10 | 16 | 40 |

Prepared by

(R.H.Dhorje)
L.C.E.

(S.V.Chaudhari)
Member Secretary

(M.S.Satarkar)
H.C.E.D.
Chairman P.B.O.S.

**Name of Programme** : **CE**
**Programme Code** : **01/21/21**
**Name of Course** : **Railway and Tunnel Engineering**
**Course Code** : **CE583**

**Teaching Scheme:**

| | Hours / Week | Total Hours |
|---|---|---|
| Theory | 04 | 64 |
| Term work / Practical | 02 | 32 |

**Evaluation:**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term work |
| Duration | Two class tests of 60 min duration | --- | --- | --- | --- |
| Marks | 20 | 80 | --- | 25 | 25 |

**Course Aim:**

Civil Engineering diploma technicians have job opportunities in works pertaining to various construction and maintenance works of railway tracks, yards, railway stations, tunnels and tunnelling operations. This course has been framed with a view to familiarize the students with the terminology, components, construction techniques and maintenance operations used in Railway and Tunnel Engineering.

**Course Objectives:**

After studying this course the student will be able to –

- Understand component parts of Permanent Way and their requirements.
- Acquaint themselves with Geometric Design and branching of tracks.
- Understand various features about stations and yards and track maintenance.
- Understand fundamental principles of tunnel surveying
- Understand different methods of tunnelling.
- Acquaint with different tunnelling equipments and works related with tunnelling

**Course Contents:**

| Sr. No. | Topic / Subtopic | Hours | Weigh -tage | Practical |
|---|---|---|---|---|
| | **Section – I** | | | |
| **1** | **Permanent Way**<br>1.1 Definition, requirements of an ideal permanent way.<br>1.2 Different components of permanent way and its construction.<br>1.3 Cross-section of Broad Gauge and Meter Gauge single and double line in cutting and embankment.<br>1.4 Rails- Types, functions, dimensions and weight per meter length.<br>1.5 Types of rail joints, ideal joint.<br>1.6 Welding of rails – purpose & advantages of welding of rails.<br>1.7 Sleeper- Functions and requirement. Types of sleepers – wooden, Metal, cast iron, steel trough and prestressed concrete sleepers.<br>1.8 Gauges – Types of Gauges – Broad Gauge, Meter Gauge, Narrow Gauge their gauge width, circumstances under which they are used Necessity and importance of uniform gauge<br>1.9 Rail fixtures and fastenings - Fixtures and fastenings between rail to rail as well as rail and sleepers. Bearing plates, keys, bolts, elastic fastenings<br>1.10 Ballast- Functions and requirements. Different types of ballast and their properties. | **12** | **16** | Assignment No 1 |
| **2** | **Geometric Design**<br>2.1 Coning of wheels & tilting of rails.<br>2.2 Super - elevation on curves.<br>2.3 Cant deficiency and grade compensation.<br>2.4 Creep of rails- Definition, causes, effects & prevention of creep | **06** | **08** | Assignment No 2 |
| **3** | **Branching of tracks**<br>3.1 Turn-outs - components of Turn-out and their functions<br>3.2 Simple split switch turnout consisting of points and crossings.<br>3.3 Line sketches showing different components and their functions.<br>3.4 Line sketches of diamond crossing, crossovers and their salient features. | **04** | **06** | Assignment No 3 |
| **4** | **Station and Yards**<br>4.1 Functions, factors affecting selection of station, Types of stations.<br>4.2 Study of layout and functions of different types of yards- Passenger, Goods. Marshalling and Locomotive yards | **05** | **06** | Assignment No 4 |

| | | | | |
|---|---|---|---|---|
| **5** | **Maintenance of Railway track**<br>5.1 Introduction, Importance of Maintenance of track.<br>5.2 Types of maintenance-<br>Daily maintenance, periodical maintenance.<br>5.3 Inspection of track, working and responsibility of different personnel in track maintenance. | **05** | **04** | Assignment No 5 |
| | **Section – II** | | | |
| **6** | **Primary Aspects in Tunnelling :**<br>6.1 Introduction to tunnelling<br>6.2Necessity of tunnelling<br>6.3Types of tunnels<br>6.4 Shapes of tunnels<br>6.5 Advantages of tunnelling<br>6.6 Economics of tunnelling | **04** | **08** | Assignment No 6 |
| **7.** | **Tunnel Surveying**<br>7.1 Initial surveys, geology, topography, climatic conditions, gradient, drainage pattern.<br>7.2 Setting out of the tunnel centre line on the surface, setting out tunnel centre line inside tunnel.<br>7.3 Transferring of alignment through shafts.<br>7.4 Adjustment at meeting point of tunnels. | **06** | **06** | Assignment No 7 |
| **8.** | **Method of tunnelling in soft strata :**<br>8.1 Tunnelling in firm ground-<br>Types of ground-firm, soft, self supporting, running.<br>8.2 Characteristics of soft ground<br>8.3 Operations involved in tunnelling in soft ground.<br>8.4 Tunnelling in soft ground-<br>Needle beam method, Multiple drift method, Shield method of tunnelling. Method of supporting roof and sides in multiple drift method. | **08** | **08** | Assignment No. 8 |
| **9.** | **Method of tunnelling in hard strata (Rock)**<br>9.1 Sequence of operation for construction of tunnel in rocky strata.<br>Drilling, Blasting, Inspection and handling misfire, mucking, Time distribution for various operations.<br>9.2 Tunnelling in rock –<br>Full face method, Heading and bench method, drift method<br>9.3 Tunnel shafts & caissons: Introduction, Timber shaft, Rock shaft, steel lining for shaft, Drop caissons. | **08** | **10** | Assignment No 9 |

| | | | | |
|---|---|---|---|---|
| **10.** | **Ventilation, lighting & drainage of tunnels**:<br>10.1 Definition of ventilation, objects of tunnel ventilation.<br>10.2 Methods of ventilation in tunnels, Mechanical ventilation, Dust control.<br>10.3 Lighting of tunnels.<br>10.4 Drainage of tunnel. | **06** | **08** | Assignment No 10 |

**List Of Practicals :**

| Sr No | Name of practical | Hrs |
|---|---|---|
| 1 | Assignment based on topic no 1 | 08 |
| 2 | Assignment based on topic no 2 | 02 |
| 3 | Assignment based on topic no 3 | 02 |
| 4 | Assignment based on topic no 4 | 02 |
| 5 | Assignment based on topic no 5 | 02 |
| 6 | Assignment based on topic no 6 | 02 |
| 7 | Assignment based on topic no 7 | 04 |
| 8 | Assignment based on topic no 8 | 04 |
| 9 | Assignment based on topic no 9 | 04 |
| 10 | Assignment based on topic no 10 | 02 |

**Instructional Strategy:**

| Sr.No | Topic | Instruction Strategy |
|---|---|---|
| Section – I | | |
| 1 | Permanent Way | Class room teaching, site visit, AV aids |
| 2 | Geometric Design | Class room teaching, site visit, AV aids |
| 3 | Branching of tracks | Class room teaching, site visit, AV aids |
| 4 | Station and yards | Class room teaching, site visit, AV aids |
| 5 | Maintenance of Railway Track. | Class room teaching, AV aids |
| Section - II | | |
| 6. | Primary aspects in tunnelling | Class room teaching, AV aids |
| 7. | Tunnel surveying | Class room teaching, AV aids |
| 8. | Method of tunnelling in soft strata | Class room teaching, AV aids |
| 9. | Method of tunnelling in hard strata | Class room teaching, AV aids |
| 10. | Ventilation, lighting & drainage of tunnels | Class room teaching, Site visit, AV aids |

**Text Books :**

| Author | Title | Publisher |
|---|---|---|
| N.L. Arora | Transportation Engineering | New India Publishing House |

**Reference Book:**

| Author | Title | Publisher |
|---|---|---|
| V.N. Vazirani & S.P. Chandola | Transportation Engineering | Khanna Publisher, Delhi |
| N.L. Arora | Transportation Engineering | New India Publishing House |
| A. Kamala | Transportation Engineering | Tata McGraw Hill Co. New Delhi |
| S.C. Saxena | Railway Engineering | |
| S.C. Rangawala | Railway Engineering | |

**Specification Table:**

| | Chapter No | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| | Section – I | | | | |
| 1 | Permanent Way | 08 | 04 | 04 | 16 |
| 2 | Geometric Design | 04 | 04 | --- | 08 |
| 3 | Branching of tracks | 02 | 04 | --- | 06 |
| 4 | Station and yards | 02 | 02 | 02 | 06 |
| 5 | Maintenance of Railway track. | --- | 02 | 02 | 04 |
| Total | | 16 | 16 | 08 | 40 |
| | Section – II | | | | |
| 6 | Primary aspects in Tunnelling. | 04 | 04 | --- | 08 |
| 7 | Tunnel surveying | --- | 04 | 02 | 06 |
| 8 | Method of tunnelling in soft strata | --- | 04 | 04 | 08 |
| 9 | Method of tunnelling in hard strata | 02 | 04 | 04 | 10 |
| 10 | Ventilation, lighting & drainage of tunnels | 04 | 04 | --- | 08 |
| Total | | 10 | 20 | 10 | 40 |

Prepared by

| | | |
|---|---|---|
| (M.S.Satarkar) | (S.V.Chaudhari) | (M.S.Satarkar) |
| H.C.E.D | Member Secretary | H.C.E.D & Chairman P.B.O.S. |

**Name of Programme : CE**
**Program Code No : 01/21/15**
**Name of Course : Construction Equipment and Machinery**
**Course Code No : CE 584**

**Teaching Scheme:**

| | Hours / Week | Total Hours |
|---|---|---|
| Theory | 04 | 64 |
| Term work / Practical | 02 | 32 |

**Evaluation:**

| | Progressive Assessments | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term Work |
| Duration | Two class tests of 60 min duration | 3 hours | -- | -- | -- |
| Marks | 20 | 80 | -- | 25 | 25 |

**Course Aims:-**

With ever – growing construction activity, the world over, new and sophisticated equipments are being developed. Suitability of every equipment to perform specific jobs for specific needs is required to be studied by Civil Engineering Students.
The course is intended to expose the students to different construction equipments, their suitability and outputs.

**Course Objectives**:

The students will be able to –
* Select the appropriate type of equipment for a job.
* Decide output of excavating and other equipments
* Understand the construction and working of equipment
* Understand the methods of soil stabilization
* Understand the working of crushers

**Course Content:**

| Sr. No | Topic / Subtopic | Hrs | Weigh tage | Practicals / Tutorials |
|---|---|---|---|---|
| | Section – I | | | |
| **1** | **Factors Affecting Selection Of Equipment**<br>General<br>Standard types of equipment<br>Special equipments<br>Replacement of parts<br>Cost of owning and operating equipments<br>Investment costs, Depreciation<br>Operating costs, Economic life of equipment | **06** | **08** | Tutorials based on theory |
| **2** | **Excavating Equipment**<br>Introduction<br>Power shovels<br>Basic parts and operation of shovel<br>Selecting the type and size of power shovel<br>Optimum depth of cut, Output of power shovels,<br>Factors affecting output<br>Hoes<br>General Basic parts and working<br>Working ranges of hoes<br>Draglines<br>Types of draglines, Basic parts and operation of dragline, Optimum depth of cut, Factors affecting output<br>Clamshells<br>General information, Clamshell buckets<br>Trenching machines<br>Types, Selection of suitable equipment for trenching | **10** | **12** | Tutorials based on theory |
| **3** | **Earth – Moving Equipments**<br>General<br>Scrapers<br>Types of scrapers and working of scraper,<br>Cycle time for a scraper<br>Tractor and tractor units<br>Types and factors affecting selection<br>Crawler versus wheeled tractors<br>Bull – dozers, Crawler mounted versus wheel mounted bulldozers, Output of bulldozers<br>Front end loaders<br>Trucks and wagons, Dumpers, Their capacity | **10** | **12** | Tutorials based on theory |
| **4** | **Rock-Drilling Equipments**<br>Drill bits, Drifters, Rotary percussion drill, Jumbo drill, Blast hole drill, diamond drill, Fusion, piercing, Factors affecting selection of drilling methods.<br>Tunnel Boring Machine:<br>Applications, Limitations. | **06** | **08** | Tutorials based on theory |

| Section II | | | | |
|---|---|---|---|---|
| **5** | **Hoisting Equipment**<br>Introduction<br>Hoisting equipment – Pulleys, Jacks<br>Chain hoist – types, Hoist winches<br>Fork trucks<br>Cranes – types, Derrick crane, mobile crane, whirled crane, tower crane, hydraulic crane, gantry crane. Safety in crane operation | **06** | **08** | Tutorials based on theory |
| **6** | **Conveying Equipment**<br>Introduction<br>Package conveyors, Screw conveyors, Flight or scrap conveyors<br>Bucket conveyors, Bucket elevators<br>Band or belt conveyor, Idlers, Belt drive<br>Pneumatic conveyor, Aerial transport -<br>cable way, ropeway. | **10** | **12** | Tutorials based on theory |
| **7** | **Soil Compacting Equipment**<br>Introduction<br>Specification for compacting soil<br>Types of compacting equipment<br>Tamping roller, Smooth wheel roller, Pneumatic tyre roller, Vibrating rollers including tamping, smooth wheel and Pneumatic vibrators. Self propelled vibrating plates, Manually propelled vibrating plates, Vibratory compactors for deep sand | **10** | **12** | Tutorials based on theory |
| **8** | **Crushing Equipments**<br>Introduction ,needs of crushing,<br>Stages in crushing. Primary, secondary, Tertiary.<br>Types of crusher - Jaw crusher, Gyratory crushers, Hammer mill crusher, cone crusher, roll crusher, Rod and ball mill crusher | **06** | **08** | Tutorial based on theory |

**Instructional Strategy:**

| Sr.No | Topic | Instructional Strategy |
|---|---|---|
| **Section – I** | | |
| 1 | Factors affecting selection of equipment | Class room teaching |
| 2 | Excavating equipment | Class room teaching, Models, Toys |
| 3 | Earth moving equipment | Class room teaching, Internet Printouts |
| 4 | Tunnelling Equipment | Class room teaching, Internet Printouts |
| **Section – II** | | |
| 5 | Hoisting equipment | Class room teaching, Models, Toys |
| 6 | Conveying equipment | Class room teaching, Internet Printouts<br>Video cassettes. |
| 7 | Soil stabilisation and compaction | Class room teaching, Internet Printouts |
| 8 | Crushed stone aggregate | Class room teaching, Internet Printouts |

**Reference books:**

| Sr.No | Author | Title | Publisher |
|---|---|---|---|
| 1 | R.L. Peurifoy | Construction planning & equipment | McGraw Hill Publication |
| 2 | Dr. Mahaesh Varma | Construction equpment its planning and application | Metropolitant book Company |
| 3 | V.N. Vazirani & S.P. Chandola | Transportation Engg. Volume - I | Khanna Publisher |

**Specification table:**

| Sr. No | Topic | Cognitive Level | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| **Section I** | | | | | |
| 1 | Factors affecting selection of equipment | 04 | 02 | 02 | 08 |
| 2 | Excavating equipment | 04 | 04 | 04 | 12 |
| 3 | Earth Moving equipment | 04 | 04 | 04 | 12 |
| 4 | Tunnelling Equipment | 04 | -- | 04 | 08 |
| | Total | 16 | 10 | 14 | 40 |
| **Section-II** | | | | | |
| 5 | Hoisting equipment | 04 | 02 | 02 | 08 |
| 6 | Conveying equipment | 04 | 04 | 04 | 12 |
| 7 | Soil stabilisation & compaction | 04 | 04 | 04 | 12 |
| 8 | Crushed stone aggregate | 04 | 04 | -- | 08 |
| | Total | 16 | 14 | 10 | 40 |

Prepared by

(R.H.Dhorje)
L.C.E.

(S.V.Chaudhari)
Member Secretary

(M.S.Satarkar)
Chairman P.B.O.S.

**Name of Programme** : **Civil Engineering**
**Programme Code** : **01/21/15**
**Name of Course** : **Town Planning**
**Course Code** : **CE585**

**Teaching Scheme:**

| | Hours / Week | Total Hours |
|---|---|---|
| Theory | 04 | 64 |
| Term work/ Practical | 02 | 32 |

**Evaluation :**

| | Progressive Assessments | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term Work |
| Duration | Two class tests of 60 min. Duration | 3 hours | -- | -- | -- |
| Marks | 20 | 80 | -- | 25 | 25 |

**Course Aim:** The curriculum prepared for the programme is designed to impart such basic skills that would help students later in their careers to serve in various Professional capacities in planning, development and management agencies in the public sector as well as private consultancy organizations. During the programme, the students are also equipped with the knowledge of basic theories, techniques, and design concepts so that they can assume their assigned professional roles as members of multi-Disciplinary teams. The students can carry out survey, analyze, plan and work in the areas of urban planning, development and management regional planning etc.

Also diploma students must have preliminary knowledge and are required to study a published regional plan or district plan and critically examine its contents

Hence, the knowledge of principles, techniques methods is an obligatory part to be known by every practicing engineer.

**Course Objectives:**

After completion of this course student will be able to:

1. Understand principles and techniques of Town Planning.
2. Identity and explain the objectives of the plan as contained in the regional plan and district plan.
3. Enumerate surveys required for the preparation of the plan and identify major conclusions of each survey.
4. Identify the direction of growth (physical) and growth potentials. (socioeconomic) pointed out in the plan.
5. Discuss the proposed land utilization plan in detail with a focus on integration of various land uses such as forestry, agriculture, tourisms, etc.

**Course Content:**

| Sr. No. | Topic / Subtopic | Hours | Weightage | Practical |
|---|---|---|---|---|
| | **SECTION -I** | | | |
| **1** | **History of Town Planning**: Principles of town planning, Town planning in ancient India, Indus Valley civilisation, objects and necessity of town planning, growth of towns, forms of cities, site for an ideal town, planning of modern town, Medieval town, industrialisation and its effects on town planning. | **06** | **06** | Assignment No.1 |
| **2** | **Definitions and Rationales of Planning**<br>Fundamentals of Urban and Regional Planning. Basic Architectural Design<br>Various definitions of town and country planning, Goals and objectives of planning; Components of planning; Benefits of planning.<br>Definition of development plan; Types of development plans - master plan, city development plan, town planning scheme, regional plan, | **06** | **16** | Assignment No.2 |
| **3** | **Techniques of Planning** – Planning techniques and its implementation: Basic methods of various types of surveys, Collection of data, Methods adopted to collect data, standards for development and redevelopment of residential commercial industrial and re-creational areas, land use planning, socio-Economic data for urban planning. | **16** | **12** | Assignment No.3 |
| **4** | **Case Studies in Planning**<br>Case Studies of Lay-out Plans, Case Study of a Regional Plan. Limitations. | **4** | **6** | Assignment No.4 |
| | **Section – II** | | | |
| **5** | **Traffic and Transportation Planning**.<br>Traffic Management measures; Arterial Management; Traffic Signs - principles, types and design. Considerations, road markings; Traffic Signals - types, optimal cycle length and signal settings,<br>Warrants; Regulation of Traffic - speed regulation, regulation of vehicle, parking regulations. | **10** | **12** | Assignment No. 5 |

| | | | | |
|---|---|---|---|---|
| **6** | **Housing and Community Planning**.<br>Factors determining residential densities, Densities, costs and development control regulations for Township planning.<br>Housing designs parameters Housing design and climate,<br>Housing for disaster prone areas.<br>Communities; its characteristics and housing; socio-economic implication of slums, clearance/ improvement of slum; sites and services schemes. | **10** | **12** | Assignment No.6 |
| **7** | **Landscape Planning and Design**<br>Landscape as an outcome of natural processes; principles and techniques of design with landform, water and vegetation; the role of surface materials, outdoor fittings and structures; man-made landscapes in history; a comparative study of the major traditions of landscape design in the east and the west in relation to concepts of space and variations in the use of landscape | **06** | **08** | Assignment No.7 |
| **8** | **GIS for Planning.**<br>Need for GIS- Maps and Spatial Information, Introduction of GIS Packages<br>Comparative advantages and disadvantages; Planning applications | **06** | **08** | Assignment No. 6 |

**Instructional Strategy:**

| Sr.No. | Topic | Instructional Strategy |
|---|---|---|
| 1 | History of Town Planning | Lecture method, P.P. Presentation |
| 2 | Definitions and Rationales of Planning | Lecture method, Visits, Assignment |
| 3 | Techniques of Planning | Lecture method, Visits, Assignment |
| 4 | Case Studies in Planning | Lecture method, Visits, Assignment |
| 5 | Traffic and Transportation Planning | Lecture method, discussion, Visit, Case study. |
| 6 | Housing and Community Planning | Lecture method, P.P. presentation, A/V cassettes assignment case study. |
| 7 | Landscape Planning and Design | Lecture method, P.P. presentation, A/V cassettes assignment case study. |
| 8 | GIS for Planning | Lecture method, P.P. presentation, A/V cassettes assignment case study. |

**Reference Books:**

| Sr.No. | Author | Title | Publisher |
|---|---|---|---|
| 1 | S.C.Rangwala | Town Planning | Charotar |
| 2 | Dr. S.Kumar | Basics of Remote Sensing & GIS | Laxmi Publication |
| 3 | -- | Pune Municipal Byelaws | Pune Municipal Corporation |
| 4 | A.Bandopadhyay | A text book of Town Planning | Books & Allied, Calcutta |
| 5 | Basudeb Bhatta | Remote sensing & GIS | Oxford |
| 6 | -- | National Building code of India | Govt. Publication |
| 7 | -- | Maharashtra Regional Town Planning Act | Govt. Publication |

**Specification Table:**

| Sr. No. | Topic | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| | | | **Section I** | | |
| 1 | History of Town Planning | 04 | 02 | -- | 06 |
| 2 | Definitions and Rationales of Planning | 04 | 02 | 02 | 08 |
| 3 | Techniques of Planning | 04 | 06 | 10 | 20 |
| 4 | Case Studies in Planning | 02 | 02 | 02 | 06 |
| | Total | 20 | 12 | 08 | 40 |
| | | | **Section II** | | |
| 5 | Traffic and Transportation Planning | 04 | 04 | 04 | 12 |
| 6 | Housing and Community Planning | 04 | 04 | 02 | 12 |
| 7 | Landscape Planning and Design | 04 | 02 | 02 | 08 |
| 8 | GIS for Planning | 02 | 02 | 04 | 08 |
| Total | | 14 | 12 | 12 | 40 |

Prepared by

| | | |
|---|---|---|
| ( N.G.Waykole) | (S. V.Chaudhari) | (M.S.Satarkar) |
| Lecturer in Civil Engg. | CDC Incharge | Head of Civil Engg. Dept |
| | Member Secretary | Chairman P.B.O.S. |

**Name of Programme** : **CE**

**Programme Code** : **01/21/15**

**Name of Course** : **Infrastructure Development**

**Course Code** : **CE586**

**Teaching Scheme:**

| | Hours / Week | Total Hours |
|---|---|---|
| Theory | 04 | 64 |
| Term work / Practical | 02 | 32 |

**Evaluation:**

| | Progressive Assessment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Practical | Oral | Term work |
| Duration | Two class tests of 60 minutes duration | -- | -- | -- | -- |
| Marks | 20 | 80 | -- | 25 | 25 |

**Course Aim:**

Good infrastructure raises Productivity and lowers production cost. It should not only develop rapidly rather its development should precede the development of other sectors. Infrastructure refers to the facilities, activities and services which support operation and development of other sectors of the economy. They are useful in the daily life of the society. The link between infrastructure and development is not a once for all affair. It is a continuous process; and progress in development has to be preceded, accompanied and followed by progress in infrastructure; if we are to fulfill our declared objectives of a self accelerating process of economic. For most of the developing countries, this is likely to be the infrastructure investment and augmentation decade. India alone is expected to invest Rs.9,00,000 crore (US$200 billion) on infrastructure in the next five years. Despite the ongoing reform process led by the government, the country's infrastructure sector has remained far below public expectations and continues to be plagued by serious deficiencies. These include chronic lack of resources, poor management capabilities and the inability to develop sustainable projects. Globalization is taking very fast at enormous speed. This course has been framed with a view to familiarize the students with the social impact of Globalization on the locals.

**Course Objectives:**

After studying this course the student will be able to –

- Understand the Role of Infrastructure in Development
- Acquaint themselves with Analysis of Infrastructure Development in India
- Understand various Areas of Infrastructure Development .
- Understand Relationship between Infrastructure and Economic Growth.
- Role of Private Participation in Infrastructure Development.
- Areas of Rural Infrastructure Development.

**Course Contents:**

| Sr. No | Topic / Subtopic | Hours | Weigh-tage | Practical |
|---|---|---|---|---|
| | **Section – I** | | | |
| **1** | Role of Infrastructure Development in the Development of country - Lifeline of the economy of a country. | **05** | **06** | Assignment No 1 |
| **2** | Infrastructure Development in India - Development model of 'Small Government and Big Society'. | **05** | **06** | Assignment No 2 |
| **3** | Areas of Infrastructure Development - Infrastructural requirement scenario in India - **Transportation** – Highway &Road, second largest Road network in the world, Important Development projects -The Golden Quadrilateral , North-South & East-West Corridor , Four-laning of 12,109 km under NHDP-III, Program for 6-laning of 6,500 km of National Highways under NHDP- V. DMIC Project, **Railway** - Mission 2020 of Indian Railways, Metro rail, Mono rail. **Port & Harbor**, Need of Development of Ports, **Air Transport**, Need for Infrastructure Development in Airports, Steps taken by Government for developing Ports and Air ports. | **10** | **12** | Assignment No 3 |
| **4** | Areas of Infrastructure Development - Electricity, Structure of power sector, Potential - Large demand-supply gap Water – Industrial Use and Domestic use Telecommunication – Telephone, Television, Radio. | **06** | **08** | Assignment No 4 |

| | | | | |
|---|---|---|---|---|
| **5** | Areas of Infrastructure Development - Industry Special Economic Zone (SEZ) Manufacturing, Energy, Service, Agriculture, Mining, Science & Technology. | **06** | **08** | Assignment No 5 |
| | **Section – II** | | | |
| **6.** | India's Economy and Infrastructure Development – Key Economic Indicators such as – GDP, Agriculture, Manufacturing, Services, Inflation rate, Exchange rate, Exports, Imports, Foreign Economic Aid. | **04** | **06** | Assignment No 6 |
| **7.** | Relationship between Infrastructure and Economic Growth -<br>Output of infrastructure sectors such as power, water, transport, etc which are used as inputs for production in the directly productive sectors, viz. agriculture, manufacturing, etc. Therefore, insufficient availability of the former results in sub-optimal utilization of assets in the latter.<br>Infrastructure development such as transport improving productivity significantly.<br>Infrastructure - the key to modem technology in practically all sectors<br>Association between infrastructure and GDP growth | **06** | **12** | Assignment No 7 |
| **8.** | Private Participation in Infrastructure Development – Government policy on Infrastructure Development :- Public Private Partnership (PPP model) | **08** | **08** | Assignment No. 8 |
| **9.** | Rural Infrastructure Development<br>Rural Roads, Rural Housing, Irrigation, Rural Water Supply, Rural Electrification | **08** | **08** | Assignment No 9 |
| **10.** | Rural Development - A Strategy for poverty alleviation in India, Integrated Rural Development Programme (IRDP). | **06** | **06** | Assignment No 10 |

**Instructional Strategy:**

| Sr.No | Topic | Instruction Strategy |
|---|---|---|
| Section – I | | |
| 1 | Role of Infrastructure Development in the Development of country. | Class room teaching, transparencies |
| 2 | Analysis of Infrastructure Development in India | Class room teaching, transparencies |
| 3 | Areas of Infrastructure Development | Class room teaching, site visit, transparencies |
| 4 | Areas of Infrastructure Development | Class room teaching, site visit, transparencies |
| 5 | Areas of Infrastructure Development - Industry | Class room teaching, transparencies |
| Section - II | | |
| 6. | India's Economy and Infrastructure Development | Class room teaching, transparencies |
| 7. | Relationship between Infrastructure and Economic Growth | Class room teaching, transparencies |
| 8. | Private Participation in Infrastructure Development | Class room teaching, transparencies |
| 9. | Rural Infrastructure Development | Class room teaching, Site Visit, transparencies |
| 10. | Rural Development | Class room teaching, |

**Text Books:**

| Author | Title | Publisher |
|---|---|---|
| | | |
| Debendra K. Das | Dynamics of rural Development, Perspectives | Deep & Deep Publications Delhi |
| S. Ponnuswamy | Bridge Engineering | Tata McGraw-Hill Publishing Co. Ltd., New Delhi. |

**Reference Book:**

| Author | Title | Publisher |
|---|---|---|
| Katav Sing | Rural Development Principles, Policies and management. | -- |
| S.Birdi | Bridge Engineering | -- |
| G.V. Rao | Principle of Transportation & Highway Engineering. | Tata McGraw-Hill Publishing Co.Ltd., New |

**Specification Table:**

| Sr. No. | | Cognitive Levels | | | Total |
|---|---|---|---|---|---|
| | | Knowledge | Comprehension | Application | |
| | Section – I | | | | |
| 1 | Role of Infrastructure Development in the Development of country. | 08 | 04 | 04 | 16 |
| 2 | Infrastructure Development in India | 04 | 04 | --- | 08 |
| 3 | Areas of Infrastructure Development | 02 | 04 | --- | 06 |
| 4 | Areas of Infrastructure Development | 02 | 02 | 02 | 06 |
| 5 | Areas of Infrastructure Development - Industry | --- | 02 | 02 | 04 |
| Total | | 16 | 16 | 08 | 40 |
| | Section – II | | | | |
| 6. | India's Economy and Infrastructure Development | 04 | 04 | --- | 08 |
| 7. | Relationship between Infrastructure and Economic Growth | --- | 04 | 02 | 06 |
| 8. | Private Participation in Infrastructure Development | --- | 04 | 04 | 08 |
| 9. | Rural Infrastructure Development | 02 | 04 | 04 | 10 |
| 10. | Rural Development | 04 | 04 | --- | 08 |
| Total | | 10 | 20 | 10 | 40 |

Prepared by

(M.S Satarkar)
H.C.E.D.

(S V Chaudhari)
C.D.C. Incharge

(M.S Satarkar)
H.C.E.D. &
PBOS Chairman

**GOVERNMENT POLYTECHNIC, PUNE**
**( An Autonomous Institute of Govt. of Maharshtra )**

**Programme : Diploma in CE**
**Programme Code : 01**
**Name of Course : Design of Steel Structure**
**Course Code : AM - 581**

## Teaching Scheme :

| | Hours/Week | Total Hours |
|---|---|---|
| **Theory** | **4** | **64** |
| **Practical** | **2** | **32** |

## Evaluation Scheme :

| | Progressive Assesment | Semester End Examination | | | |
|---|---|---|---|---|---|
| | | Theory | Tutorial | Oral | Term Work |
| **Duration** | Two class tests, Each of 75 minutes | 4 | … | … | - |
| **Marks** | 20 | 80 | … | 25 | 25 |

## Course Rationale :

In the previous course, the student studied analysis and design of RCC structures. In this course, the student will study elements of steel structures. They will be introduced to basic structural steel elements - structural connections, tension members, compression members, column bases, and roof trusses along with the concepts of their designs.

## Course Objectives :

After studying this course, student will be able to -

I Know different rolled steel section, their properties and use.

ii Understand different geometries of roof trusses suitable for different spans.

iii Estimate different loads coming on members and design them along with their connections.

## Course Content :

| Chapter No | Name of Topics / Sub Topic | Hrs | Weightage |
|---|---|---|---|
| | | | |
| | **Section - I** | | |
| **1** | **Introduction** | 2 | 2 |
| | 1.1 Different rolled steel sections, their use and designation | | |
| | 1.2 Sectional properties of rolled steel sections, use if steel table. | | |
| | 1.3 Types of loads on the structures. Relevant IS codes. | | |
| **2** | **Welded and bolted joints** | 6 | 8 |
| | 2.1 Introduction to bolted joints, welded joints. | | |
| | 2.2 Types of welded joints and their symbols. | | |
| | 2.3 Strenght of fillet weld, standard specifications. | | |
| | 2.4 Design of fillet welded joint for connecting tie plates, single and double angle sections to the gusset plate.Design of bolted connection for axially loaded member ( No question on riverted joints and welded connection subjected to moments to be asked in the examination.) | | |
| **3** | **Tension Members** | 12 | 14 |
| | 3.1 Tie member, permissible stress in axial tension, net effective area, capacity calculations. | | |
| | 3.2 Design of tension memberusing single, double equal and unequal angles, T - sections connected by riverting and welding. | | |
| | 3.3 Tack rivets and welds for tie and their pitch. | | |
| **4** | **Compression Members** | 12 | 16 |
| | 4.1 Forms of compression members | | |
| | 4.2 Buckling, end conditions, effective length, radius of gyration, slenderness ratio,permissible stress in axial compression and load carrying capacities of columns | | |

| | | | |
|---|---|---|---|
| | and struts of roof trusses. | | |
| | 4.3 Design of columns using I, channel sections. Built up columns, introduction to lacing and battening. | | |
| | 4.4 Design of struts in a ruff truss using single & double equal angles. Relevant IS clauses. | | |



| | **Section II** | | |
|---|---|---|---|
| **5** | **Column Bases** | 5 | 6 |
| | 5.1 Types of bases, permissible bearing pressure on concrete. | | |
| | 5.2 SBC of soil, upward soil reaction. | | |
| | 5.3 Design of slab base, design of concrete pedestal. Introduction to gusseted base. ( No problems on design of gusseted base to be asked in the examination.) | | |
| **6** | **Analysis of Roof trust** | 12 | 16 |
| | 6.1 Types of roof trusses, components of trusses & suitability of trusses for different spans. 6.2 Different loads acting on a roof truss. | | |
| | 6.3 Calculation of panel point load on a roof truss under dead load, live load and wind load as per provisions made in IS - 875-1984. | | |
| | 6.4 Analysis of simple roof truss for given panel point loads and load combinations. | | |
| | 6.5 Design of angle iron purlin for a roof truss as per | | |

| | | | |
|---|---|---|---|
| | IS - 800.2007 Details of rafter joint. | | |
| **7** | **Beams** | | |
| | 7.1 Permissible stresses in steel in bending tension & bending compression, concept of laterally restrained beams. | 7 | 8 |
| | 7.2 Design of laterally restrained beams for given loading. | | |
| | 7.3 Checks for bending stresses, shearing stresses & deflection as per IS - 800-2007 | | |
| **8** | **Simple framed connections** | | |
| | 8.1 Design of framed connection using fillet welds for secondary beam to main beam, beam to column for end reaction. Check for shear. | 5 | 6 |
| **9** | **Introduction to plate girder and PEB** | 3 | 4 |
| | 9.1 Components of plate girder,use of stiffeners. | | |
| | 9.2 Sections use for pre engineered building,advantages and limitation of PEB. | | |
| | **Total** | **64** | **80** |



## List of Practicals / Experiments / Assisgnments :

| Sr.No | Name of Experiment / Assignment | Hrs. |
|---|---|---|
| | **Section I** | |
| 1 | Plate No - 1 - Geometrical properties of R.S sections. | 2 |
| 2 | Plate No - 2 Types of welds and welding symbols. | 2 |

| | | |
|---|---|---|
| 3 | Plate No. 3 - Net effective areas. | 2 |
| 4 | Assignment No. 1- Prob. On L.C.C and design of tension members. | 4 |
| 5 | Plate No.4- Eff. Lenghts for diff.end conditions | 2 |
| 6 | Plate No.5- Lacing and battening. | 2 |
| 7 | Assignment No. 2- Prob. On L.C.C and design of compression members. | 4 |
| 8 | Plate No..6 - Slab base details. | 2 |
| 9 | Plate No. 7 - Details of gusseted base. | 2 |
| 10 | Plate No.8 - Types of trusses for diff.spans. | 2 |
| 11 | assignment No. 3 - Prob. On panel point DL,LL & WL. Prob. On design of an angle iron purlins. | 2 |
| 12 | Assignment No. 4 - Prob. On load carrying capacity and design of beams. | 2 |
| 13 | Plate No. 9 - Beam to beam or beam to column connections. | 2 |
| 14 | Plate No. 10 - Components of plate girder. | 2 |
| | **Total** | **32** |

**Instructional Strategy :**

| Sr.No | Topic | Instructional Strategy |
|---|---|---|
| | **Section I** | |
| 1 | Introduction | Lecture, Discussion |
| 2 | Welded Joints | Lecture |
| 3 | Tension Member | Lecture |
| 4 | Compression Member | Lecture |
| | **Section II** | |
| 5 | Column Bases | Lecture, Model |
| 6 | Analysis of Roof Truss | Lecture-Visit |
| 7 | Design of Beams | Lecture, Discussion |
| 8 | Simple Framed Connctions | Lecture-Visit |
| 9 | Introduction to Plate Girders | Lecture |

**Text Books :**

| Sr.No | Author | Title | Publication |
|---|---|---|---|
| | | | |
| 1 | L.S.Negi | Steel Structures | TMH |
| 2 | S.K.Duggal | Design of Steel Structures | TMH |

**Refrence Books :**

| Sr.No | Author | Title | Publication |
|---|---|---|---|
| 1 | S.Ramammrutham | Design of Steel Structures | Khanna |
| 2 | Ram Chandra | Design of Steel Structures | Standard |

**Learning Resources : Books, IS Code.**

## Specification Table :

| Sr.No | Topic | Cognitive Levels | | | |
|---|---|---|---|---|---|
| | | **Knowledge** | **Comprehension** | **Application** | **Total** |
| **Section I** | | | | | |
| 1 | Introduction | 2 | … | … | 2 |
| 2 | Welded Joints | … | 2 | 6 | 8 |
| 3 | Tension Member | 2 | 2 | 10 | 14 |
| 4 | Compression Member | 2 | 4 | 10 | 16 |
| | **Total** | **6** | **8** | **26** | **40** |
| **Section II** | | | | | |
| 5 | Column Bases | … | 2 | 4 | 6 |
| 6 | Analysis of Roof Truss | 2 | 4 | 10 | 16 |
| 7 | Design of Beams | 2 | … | 6 | 8 |
| 8 | Simple Framed Connctions | … | 2 | 4 | 6 |
| 9 | Introduction to Plate Girders | … | 4 | … | 4 |
| | **Total** | **4** | **12** | **24** | **40** |

**Prof. M.M. Ganorkar**
Prepared By