SEMESTER I

Course Title: English and Communication Skills–I
Course Code: CE/EE/ME/ECE-101

L	T	P
4	0	0

Max. Marks: 100
External: 60
Internal Assessment: 40
Duration of Exam: 3 Hrs

Objective

Language is the most commonly used medium of self-expression in all spheres of human life – personal, social and professional. A student must have a fair knowledge of English language and skills to communicate effectively to handle the future jobs in industry. The objective of this subject is to enable the diploma holders to acquire proficiency, both in spoken (oral) and written language. At the end of the subject, the student will be able to develop comprehension skills, improve vocabulary, use proper grammar, acquire writing skills, correspond with others and enhance skills in spoken English. It is expected that each polytechnic will establish a **communication skill laboratory** for conducting practicals mentioned in the curriculum.

UNIT 1

Facets of Literature-I (Short Stories & Poems)

Short Stories:

1. Homecoming – R.N. Tagore
2. The Selfish Giant - Oscar Wilde
3. The Diamond Necklace- Guy- De Maupassant

Poems:

1. Ozymandias – P.B. Shelley
2. Daffodils – William Wordsworth
3. Stopping by Woods on a Snowy Evening – Robert Frost

UNIT 1I

Facets of Literature-II (Prose)

1. I Have A Dream – Martin Luther King
2. On Habits – A. G. Gardiner
3. On Seeing People Off – Max Beerbohm

UNIT III

Grammar and Usage

Parts of speech:

Nouns, Pronouns, Adjectives, Articles, Verbs, Adverbs, Prepositions, Interjection. Identifying parts of speech, Structures: Verb patterns and Question tags, Subject – Verb agreement (concord)

Pair of words (Words commonly confused and misused):

Tenses, Correction of incorrect sentences, One word Substitution

UNIT IV

Translation, Paragraph and Compression

Translation of Glossary of Administrative Terms from English into Urdu/Hindi, Translation from Urdu/Hindi into English.

Paragraph of 100-150 words from outlines
Comprehension: Unseen passages of literacy, scientific, data/graph based for comprehension exercises.

UNIT V
Communication
Definition, Introduction and Process of Communication
Objectives of Communication.
Notices

Course Outcome
CO 1.Communicate effectively verbal as well as in writing in English
CO 2 Comprehend given passage and summarize them.
CO 3. Draft official letters.
CO 4. Apply correct voice and prepositions in formal communication.
CO 5. Make sentence using connector for desire meaning.
CO 6 Develop presentation skills.
CO 7. Face oral examination and interviews

REFRENCES

1. English and Communication Skills, Book-I By Kuldip Jaidka, Alwainder Dhillon and Parmod Kumar Singla, Prescribed by NITTTR, Chandigarh Published By Abhishek Publication, 57-59, Sector-17, Chandigarh.
0 Essentials of Business Communication by Pal and Rorualling; Sultan Chand and Sons.
1 The Essence of Effective Communication, Ludlow and Panthon; Prentice Hall of India.
2 New Design English Grammar, Reading and Writing Skills by AL Kohli (Course A and course B), Kohli Publishers, 34 Industrial Area Phase-II, Chandigarh, .
3 New Design English Reading and Advanced Writing Skills for Class XI and XII by MK Kohli and AL Kohli; Kohli Publishers, 34 Industrial Area Phase-II, Chandigarh, .
4 A Practical English Grammar by Thomson and Marlinet.
5 Spoken English by V Sasikumar and PV Dhamija; Tata McGraw Hill.
6 English Conversation Practice by Grount Taylor; Tata McGraw Hill.
7 Developing Communication Skills by Krishna Mohan and Meera Banerji; MacMillan India Ltd., Delhi.
8 Business Correspondence and Report Writing by RC Sharma and Krishna Mohan; Tata McGraw Hill Publishing Company Ltd. New Delhi.
9 Communication Skills by Ms R Datta Roy and KK Dhir; Vishal Publication, Jalandhar

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit.

SEMESTER I

Course Title: Applied Mathematics-I
Course Code: CE/EE/ME/ECE-102
L T P
4 0 0

Max. Marks: 100
External: 60
Internal Assessment: 40
Duration of Exam: 3 Hrs

Objective

Applied Mathematics forms the backbone of engineering students. Basic elements of algebra, trigonometry, coordinate geometry have been included in the curriculum as foundation course. This course will develop analytical abilities to make exact calculations and will provide continuing educational base to the students.

UNIT 1

Algebra

Arithmetic progression, its nth term, sum of n terms with their applications to engineering problems. Geometrical progression, its nth term and sum of n terms and to infinity with application to engineering problems; Partial fractions (linear factors, repeated linear factors, non-reducible quadratic factors excluding repeated factors)

UNIT 1I

Permutations, Combinations & Binomial Theorem

Concept of permutations and Combinations: Value of ${}^{n}p_{r}$ ${}^{n}c_{r}$.

Binomial theorem (without proof) for positive integral index (expansion and general form); binomial theorem for any index (expansion without proof)

UNIT III

Trigonometry

Concept of angles, measurement of angles in degrees, grades and radians and their conversions.

Review of ratios of some standard angles (0, 30, 45, 60, 90 degrees), T-Ratios of Allied angles (without proof), Sum, difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa). T-Ratios of multiple angles, sub-multiple angles (2A, 3A, A/2).

UNIT IV

Co-Ordinate Geometry-I

Cartesian and Polar coordinates (two dimensional), conversion from Cartesian to polar coordinates and vice-versa, distance between two points (Cartesian co-ordinates), section formulae.

Area of triangle when its vertices are given, co-ordinates of centroid, in center of a triangle when the vertices are given, simple problems on locus.

UNIT V

Co-Ordinate Geometry-II

Equation of straight line in various standard forms (without proof), inter section of two straight lines, angle between two lines, perpendicular distance formula (without proof)
General equation of a circle and its characteristics.
To find the equation of a circle, given:

* Centre and radius
* Three points lying on it
* Coordinates of end points of a diameter

Course: Outcome

CO 1.To understand basics and applications of Algebra
Permutations, Combinations & Binomial Theorem
, determinants, matrices
CO 2. To understand trigonometry, coordinate geometry
CO 4. Comprehensive knowledge of basic mathematics

REFRENCES

1. Elementary Engineering Mathematics by BS Grewal, Khanna Publishers, New Delhi
2. Engineering Mathematics by Vol. I & II by S Kohli, IPH, Jalandhar
3. Applied Mathematics by Dr. RD Sharma
4. Applied Mathematics, Vol. I & II by SS Sabharwal & Sunita Jain, Eagle Parkashan, Jalandhar.
5. Comprehensive Mathematics, Vol. I & II by Laxmi Publications
6. Engineering Mathematics by Dass Gupta
7. Engineering Mathematics by C Dass Chawla, Asian Publishers, New Delhi
8. Comprehensive Mathematics, Vol. I & II by Laxmi Publications
9. Engineering Mathematics, Vol I, II & III by V Sundaram et.al, Vikas Publishing House (P) Ltd., New Delhi
10. Engineering Mathematics by N.Ch.S.N Iyengar et.al, Vikas Publishing House (P) Ltd., New Delhi
11. Engineering Mathematics, Vol I & II by SS Sastry, Prentice Hall of India Pvt. Ltd.,
12. Engineering Mathematics, Vol I & II by AK Gupta, MacMillan India Ltd., New Delhi.

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit.

SEMESTER I

Course Title: Applied Physics-I
Course Code: CE/EE/ME/ECE-103
L T P
4 0 0

Max. Marks: 100
External: 60
Internal Assessment: 40
Duration of Exam: 3 Hrs

Objective

Applied physics includes the study of a large number of diverse topics all related to things that go on in the world around us. It aims to give an understanding of this world both by observation and by prediction of the way in which objects will behave. Concrete use of physical principles and analysis in various fields of engineering and technology are given prominence in the course content.

Note: Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to appreciate learning of these concepts and principles

UNIT 1

Units and Dimensions

Physical quantities, Fundamental and derived units, Systems of units (CGS, MKS and SI units), Dimensions and dimensional formulae of physical quantities (area, volume, velocity, acceleration, momentum, force, impulse, work, power, energy, surface tension, gravitational constant, density). Coefficient of viscosity, stress, strain and elasticity)

Principle of homogeneity

Uses of Units and Dimensions:

(a) Conversion of one system of unit into another

(b) Determination of formula of a physical quantity such as time period of simple pendulum and determination of formula for centripetal force by the method of units and dimensions

(c) Knowing the correctness of a physical equation

Limitations of dimensional analysis

UNIT II

Force and Motion

Scalar and vector quantities–definitions with examples. Simple addition and multiplication of scalar and vector quantities

Force - resolution and composition of forces, Parallelogram Law of forces with the derivation for the resultant force and direction of the resultant force.

Newton's Laws of motion – concept of momentum and their application, determination of force equation from Newton's second law of motion, derivation of Newton's third law of motion from 2nd Law, impulse and impulsive forces, simple numerical problems.

Projectile motion - horizontal and oblique and their equation.

Derivation and definitions of Time of flight, Maximum height, Horizontal range and the condition for the maximum range.

Linear and angular velocity and acceleration with their relations.
Circular motion – centripetal force and centrifugal force in detail.
Banking of roads and rails, bending of a cyclist.

UNIT III

Work, Power and Energy

Work: definitions and its SI units. Work done in moving an object on horizontal and inclined plane (incorporating frictional forces).
Power: definitions and its SI units, calculation of power in simple cases.
Energy: Definitions and its SI units, Kinetic energy and Potential energy with examples and their derivation. Principle of conservation of energy (for freely falling bodies), transformation of energy from one form to another.

UNIT IV

Simple Harmonic Motion and Rotational Motion

Definition of simple harmonic motion relation for the displacement, velocity, acceleration, and time period of a body executing simple harmonic motion, Free, forced and resonant vibrations with examples
Definitions of torque and angular momentum, radius of gyration
Derivation of rotational kinetic energy and hence definition of moment of inertia
Conservation of angular momentum and applications

UNIT V

Temperature and Transfer of Heat

Difference between heat and temperature on the basis of K.E. of molecules, Principles of measurement of temperature and different scales of temperature**,** Bimetallic and Platinum resistance thermometer: their merits and demerits, Pyrometers–Disappearing filament optical pyrometer.
Modes of transfer of heat (conduction, convection and radiation with examples), Coefficient of thermal conductivity. Determination of coefficient of thermal conductivity of good conductor by Searle's method and bad conductor by Lee's disc method, Properties of heat radiation. Black body radiation-Stefan's law, Kirchhoff's law, Wien's law, in case of black body radiations. Prevost's theory of heat exchange

Course: Outcome

CO 1: .Identify general properties of matters.
CO 2:Use and application of different measuring instruments.
CO 3: Apply principles and concept of physics for solving various engineering problems.
CO4: To understand the basic concepts of Units and Dimensions
CO5: To acquaint the students with the practical skills of force and motion.

REFRENCES

1. Applied Physics Vol. I, TTTI Publication Tata McGraw Hill, Delhi
2. Basic Applied Physics by RK Gaur; Dhanpat Rai Publications
3. Comprehensive Practical Physics - Volume I and II by JN Jaiswal; Laxmi Publishers

4. Numerical Problems in Physics - Volume I and II by RS Bharaj; Tata McGraw Hill
5. Simple Course in Electricity and Magnetism by CL Arora; S Chand and Co, New Delhi
6. Fundamental Physics - Volume I and II by Gomber and Gogia; Pardeep Publications, Jalandhar
7. A Text Book of Optics by Subramanian and Brij Lal
8. Physics Laboratory Manual by PK Palanisamy, Scitech Publications
9. Fundamentals of Physics by Resnick and Halliday, Asian Books Pvt. Ltd., New Delhi
10. Concepts in Physics by HC Verma; Bharti Bhawan Ltd., New Delhi

NOTE FOR PAPER SETTER: The question paper shall comprise of 80 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit.

SEMESTER I

Course Title: Applied Chemistry-I
Course Code: CE/EE/ME-104
L T P
4 0 0

Max. Marks: 100
External: 60
Internal Assessment: 40
Duration of Exam: 3 Hrs

Objective

Every branch of engineering is expanding greatly. The contributions of chemicals and chemical products are playing important role in the field of engineering, biotechnology, agriculture and pharmacology etc. The numbers of such chemical products are exponentially increasing each successive year. This results in enhancing the responsibility of engineers while choosing engineering materials for converting them into finished products. Now a days, choosing engineering material is not only based on conventional qualitative and quantitative testing of their chemical composition and behavior under service conditions, but also based on environmental and eco-friendly factors. To achieve such objectives it is essential to know applied aspects of chemistry. Applied chemistry for diploma students in various engineering and technology courses is designed to develop scientific temper and appreciation of physical and chemical properties of engineering materials, which are used in their professional career. Best efforts should be made to teach and train the engineers by imparting essential knowledge required from this subject through demonstrations, and minor projects.

Note:- Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to appreciate learning of these concepts and principles.

UNIT 1

Basics Concepts

Definition of matter, element, compound and mixtures, atom, molecule, ion, symbol, formula, valency and chemical equation. Writing of the chemical formula of a simple chemical compound. Calculation of percentage composition of a chemical compound. Essentials of a chemical equation, balancing of a chemical equation.

Matter, element, compound and mixtures, atoms, molecules, ions, symbols and formulae, Atomic mass (A), atomic number (Z) isotopes, isobars, isotone.

Scope and significance of Environmental Science.

Decomposition of organic compounds and biodegradability.

UNIT 1I

Atomic Structure and Chemical Bonding

Fundamental particles i.e. electron, proton and neutron (their characteristics). Modern periodic law, introduction of periodic table, periods and groups. Electronic concept of valency.

Elementary account of electrovalent, covalent and coordinate bond formation on the basis of the electronic concept of valency with the help of suitable examples of each.

UNIT III

Water

Hard and soft water, types of hardness and its causes, disadvantages of hardness of water (i) in industrial use (ii) in boilers for steam generation. Methods to remove hardness of water (i) Clark's Process (ii) Permutit Process (iii) Soda Lime process (iv) Ion-Exchange process. Simple numerical problems related to soda lime process. Definition of degree of hardness of water and the systems to express the degree of hardness of water. Simple numerical problems related to finding the degree of hardness on different scales. Qualities of water used for drinking purposes, treatment of river water to make it fit for town supply

UNIT IV

Solutions

Concept of homogenous solution, brief introduction of the terms (i) Ionization (ii) Acidity (iii) Basicity (iv) Equivalent weight and gram equivalent weight with suitable examples. Strength of a solution (i) Normality (ii) Molarity (iii) Molality as applied in relation to a solution. Definition of pH, and different industrial applications of pH

UNIT V

Electrolysis

Definition of the terms: Electrolytes, Non-electrolytes conductors and non-conductors with suitable examples. Faraday's Laws of Electrolysis. Different industrial applications of 'Electrolysis'. Elementary study of (i) lead acid battery and (ii) Ni-Cd battery with special reference to their reaction mechanisms.

Course: Outcome

CO 1. Students will be able to know the basic concepts ofAtomic Structure and Chemical Bonding

CO 2 Students will be able to know the types of water used in the subject

CO 3 Students will be able to make different kind of solutions with their respective properties.

CO4.To understand the concept of electrolysis, electrolytesand Different industrial applications Faraday's Laws of Electrolysis conductors and non-conductors

REFRENCES

1. Chemistry in Engineering by J.C. Kuriacose and J. Rajaram; Tata McGraw-Hill Publishing Company Limited, New Delhi
2. Engineering Chemistry by Dr. S. Rabindra and Prof. B.K. Mishra ; Kumar and Kumar Publishers (P) Ltd. Bangalore-40
3. A Text Book of Applied Chemistry-I by SS Kumar; Tata McGraw Hill, Delhi

A Text Book of Applied Chemistry-I by Sharma and Others; Technical Bureau of India, Jalandhar

5. Engineering Chemistry by Jain PC and Jain M
6. Chemistry of Engineering by Aggarwal CV
7. Chemistry for Environmental Engineers by Swayer and McCarty, McGraw Hill, Delhi
8. Progressive Applied Chemistry –I and II by Dr. G.H. Hugar; Eagle Prakashan, Jalandhar

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit.

SEMESTER–I

Course Title: Engineering Drawing-I
Course Code: CE/EE/ME/ECE-105

L	T	P
4	0	0

Max. Marks: 100
External: 60
Internal Assessment: 40
Duration of Exam: 3 Hrs

Objective

Drawing is said to be the language of engineers and technicians. Reading and interpreting engineering drawing is their day-to-day responsibility. The course is aimed at developing basic graphic skills so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation. The emphasis while imparting instructions should be to develop conceptual skills in the students.

Note: 1. First angle projection is to be followed
2. Instruction relevant to various drawings may be given along with appropriate demonstration, before assigning drawing practice to the students

Unit-I

Drawing Office Practice, Lines, Lettering and Dimensioning

Drawing instruments, Sizes and layout of standard drawing sheets, Sizes of drawing boards, Drafting table/board.

Different types of lines in engineering drawing as per BIS specifications, Instrumental single stroke (vertical and inclined gothic) lettering of 35 mm height in the ratios of 7:4, Instrumental double stroke lettering of 35 mm height in the ratio of 7:4, vertical. Free hand lettering (alphabet and numerals) lower case and upper case, single stroke vertical and inclined at 75 degree in different standard series of 2.5, 3, 5, 7, 10, and 15 mm heights in the ratio of 7:4. Necessity of dimensioning - methods and principles. Dimensioning of overall sizes, circles, thread holes, chamfered surfaces, angles, tapered surface holes equally spaced on PCD, counter sunk hole counter bored holes, cylindrical parts, narrow space and gaps, radii, curves and arches – chain and parallel dimensioning

Unit-II

Simple Geometrical Constructions & Scale

Construction of regular polygons (triangle, square, pentagon, hexagon) and circles, Ellipses (concentric circle method and oblong method), Parabola (rectangle and tangent method). Curves (cycloid and helix).

Scales – their need and importance, Definition of representative fraction (RF); Finding RF of a given scale, Types of scales, Construction of plain and diagonal scales.

Unit-III

Principle of Projections

Principle of orthographic projection, Planes of projection, four quadrants, first angle projection and third angle projection, Projection of points situated in different quadrants. Projection of lines, Lines inclined to one plane and parallel to the other and vice versa Projection of Planes: Planes perpendicular and parallel to either of the planes; planes perpendicular to one plane and parallel to the other or vice versa. Projection of solids, such as Prism, Cube, Cylinder and Cones with axis perpendicular to horizontal plane or parallel to horizontal plane/vertical plane or both. Drawing 3 orthographic views of given objects (at least five objects). Identification of surfaces on drawn orthographic views from isometric object drawn. Exercises on missing lines, surfaces and views.

Unit-IV

Sectional Views & Isometric Views

Need for sectional views – conventional sections of various materials. Drawing of different conventions for materials in sections, conventional breaks for shafts, pipes, rectangular, square, angle, channel and rolled sections.

Fundamentals of isometric projections (theoretical instructions) and isometric scales. Isometric views from 2 or 3 given orthographic views

Unit-V

Development of Surfaces (2 sheets):

Development of surfaces – cubes, prisms, (square, pentagonal and hexagonal), cylinders, pyramids (square, pentagonal, hexagonal) and cones

Course: Outcome

CO 1.Identify and use differing drawing tools/instruments.
CO 2 Use the concept of projection for Mechanical Engineering Drawings.
CO 3. Prepare engineering drawing manually with given geometrical dimensions using prevailing drawing standards using proper scale.
CO 4 Visualize and draw the shape of simple object form orthographic view to vise versa

RECOMMENDED BOOKS

1. Elementary Engineering Drawing (in first angle projection) by ND Bhatt, Charotar Publishing House

2. A Text Book of Engineering Drawing by Surjit Singh published by Dhanpat Rai and Co., Delhi

3. Engineering Drawing by PS Gill published by SK Kataria and sons, Delhi

4. Engineering Drawing by RB Gupta published by Satya Prakashan, New Delhi

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit.

SEMESTER I

Course Title: English & Communication Skills-I Lab
Course Code: CE/EE/ME/ECE-111

L	T	P
0	0	2

Max. Marks: 50
External: 25
Internal Assessment: 25
Duration of Exam: 3 Hrs

LIST OF PRACTICALS

1. Locating a Book in Library
2. How to look up words in a Dictionary: meaning and pronunciation of words as given in the standard dictionary using symbols of phonetics.
3. How to Seek Information from an Encyclopedia
4. Listening pre-recorded English language learning programme
5. Paper Reading before an audience (reading unseen passages)
6. Study of spelling Rules
7. Study of essentials of a Good Speech to respond and comprehend visual, oral themes, situations or stimulus and practice before select gathering
8. Exercises on use of different abbreviations
9. Greetings for different occasions
10. Introducing oneself, others and leave taking
11. Exercises on writing sentences on a topic

Course Outcome

CO1 To have practical exposure to the basic language techniques in professional
CO 2 Comprehend given passage and summarize them.
CO 3. Draft official letters.
CO 4. Apply correct voice and prepositions in formal communication.
CO 5. Make sentence using connector for desire meaning.
CO 6 Develop presentation skills.
CO 7. Face oral examination and interviews

SEMESTER I

Course Title: Applied Physics-I Lab
Course Code: CE/EE/ME/ECE-112
L T P
0 2

Max. Marks: 50
External: 25
Internal Assessment: 25 0

LIST OF PRACTICALS

1. To find he radius and diameter of given wire by screw gauge
2. To find the volume of cylinder (hollow and solid) by vernier caliper
3. To find the thickness of glass strip by spherometer
4. To verify parallelogram law of forces
5. To find the time period of a simple pendulum and determine the length of second's pendulum.
6. To find the frequency of a tuning fork by a sonometer
7. To find the velocity of sound by using resonance apparatus at room temperature.
8. To find the Moment of Inertia of a flywheel about its axis of rotation
9. To find the surface tension of a liquid by capillary rise method
10. To determine the atmospheric pressure at a place using Fortin's Barometer

Course outcome

After completing this course the student will be able to
CO1: Have a thorough knowledge and use of Screw guage ,Vernier caliper
CO2: find out the thickness glass strip of spherometer.
CO3: understand the use of Barometer.

SEMESTER I

Course Title: Applied Chemistry-I Lab
Course Code: CE/ERE/ME-113
L T P
0 0 2

Max. Marks: 50
External: 25
Internal Assessment: 25

LIST OF PRACTICALS

1. Volumetric analysis and study of apparatus used therein. Simple problems on volumetric analysis equation
2. Preparation of standard solution of oxalic acid or potassium dichromate
3. Determine the strength of solution of HCl with the help of a solution of NaOH and an intermediate solution of standard oxalic acid
4. Find the amount of chlorides in mg per liter in a sample of H_2O with the help of a solution of $AgNO_3$
5. Determine the degree of temporary hardness of water by Soap Titration method
6. Determine the percentage purity of commercial sample like blue vitriol 12.5 g. of which have been dissolved per litre. Given M/20 $Na_2S_2O_3$.
7. Estimation of amount of iron in hematite ore volumetrically
8. Estimation of total alkalinity of water volumetrically
9. Determine conductance, pH of water sample using conductance bridge and pH meter
10. Determination of solubility of a solid at room temperature

Course Outcome

1; Know about the volumetric analysis
2; prepare standard solutions
3; know about the different impurities of water and to determine them .

SEMESTER I

Course Title: Engineering Drawing-I
Course Code: CE/EE/ME/ECE-114

L	T	P
0	0	2

Max. Marks: 50
External: 25
Internal Assessment: 25

LIST OF PRACTICALS

1. Drawing Office Practice, Lines, Lettering and Dimensioning (4 sheets)
2. Simple Geometrical Constructions & Scale (4 sheets)
3. Principle of Projections (6 sheets)
4. Sectional Views & Isometric Views (3 sheet)
5. Development of Surfaces (2 sheets):

Course Outcome

CO1: Able to draw Orthographic projections of Lines, Planes, and Solid.
CO2: Able to construct Isometric Scale, Isometric Projections and Views.
CO3: Able to draw Sections of various Solids including Cylinders, cones, prisms and pyramids.
CO4: Able to draw projections of lines, planes, solids, isometric projections and sections of solids including Cylinders, cones, prisms and pyramids using AutoCAD

SEMESTER I

Course Title: General Workshop Practice-I Max. Marks: 150
Course Code: CE/EE/ME/ECE-115 External: 75
L T P Internal Assessment: 75
0 0 6

Objective

In order to have a balanced overall development of diploma engineers, it is necessary to integrate theory with practice. General workshop practices are included in the curriculum in order to provide hand on experience about use of different tools and basic manufacturing practices. This course aims at developing general manual and machining skills in the students. Besides above, the development of dignity of labour, precision, safety at work place, team working and development of right attitude are the other objectives

LIST OF PRACTICALS

1. Carpentry & Painting Shop-I:

Introduction to various types of wood by demonstration and their identification. Demonstration, function and use of commonly used hand tools. Care, maintenance of tools and safety measures to be observed.

Job I Marking, Sawing and planning practice
Job II Extensive planning practice
Job III Chiseling practice

Introduction to joints, their relative advantages and uses.

Job IV Preparation of half lap joint
Job V Preparation of Mortise and Tenon Joint

Importance and need of polishing wooden items, Introduction to polishing materials.

Job VI Preparation of surface before polishing.
Job VII Application of primer coat.
Job VIII Polishing on wooden items.

2. Fitting and Plumbing Shop-I

Introduction to fitting shop, Common materials used in fitting shop, Identification of materials. Description and demonstration of various types of work benches. Holding devices and files, Precautions while filing.

Job I Filing practice (Production of flat surfaces) Checking by straight edge.
Job II Marking of jobs, use of marking and measuring tools.
Job III Filing a dimensioned rectangular or Square piece of an accuracy of +0.25mm.

Introduction to chipping, Demonstration on chipping and its applications. Demonstration and function of chipping tools.

Job IV Chipping practice

Description & demonstration of simple operation of hacksawing, demonstration and description of various types of blades, their uses and method of fitting the blade.

Job V Making a cutout from a square piece of iron block using hacksaw.

3. Welding Shop-I

Introduction to welding and its importance in engineering practice; types of welding; common materials that can be welded.

Electric arc welding, (AC and DC) precautions while using electric arc welding, Practice in setting current and voltage for striking proper arc.

Job I Practice of striking arc while using electric arc welding set.

Job II Welding practice job on arc welding for making uniform and straight weld beads.

Common welding defects and inspection. Various types of joints and end preparation.

Job III Preparation of butt joint arc welding.

Job IV Preparation of lap joint by arc welding.

Job V Preparation of single V/double V butt joint by using electric arc welding.

Job VI Preparation of Tee joint by arc welding.

4. Forging shop

Introduction to forging, forging tools, tongs, blowers/pressure blowers, hammers, chisels, punch, anvil, swag-block etc. Forging operations.

Job I Forge a L hook or Ring from MS rod 6 mm ϕ

Job II Forge a chisel and give an idea of hardening and tempering

Job III Lap joint with forge welding

Job IV High Strength Steel (HSS) tools – forging of Lathe shaper tools like side-tools and V-shape tools

5. Electric & Electronic Shop-I

Study and demonstration of common electrical materials such as wires, cables, switches, fuses, ceiling roses, battens, cleats and allied items, tools and accessories such as multi-meter, CRO, types of resisters (colour code) and potentiometers.

Job I Identification of phase, neutral and earth of domestic appliances and their connection to two pin/three pin plugs.

Job II Laying out of complete wiring of a house (i) batten wiring (ii) plastic casing and capping.

Job III Testing and rectification of simulated faults in household appliances such as iron, kettles, water-heaters, fans and mixers.

Job IV Battery connections in series and parallel and battery testing with the help of hydrometers and cell testers.

Job V Cut, strip, join and insulate wires & cables.

Job VI Unsoldering and soldering of resister, capacitor, diodes, transistors on a PCB.

Job VII joining, mounting and dismantling of plugs, sockets, connectors, Bana plugs and terminal strips.

Job VI De-solder and clean all the components and wires from a given equipment, a PCB or a tag strip including sleeving and use of identified tags.

Course Outcome

CO1: Able to study and practice on machine tools and their operations.
CO2: Able to practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.
CO3: Able to identify and apply suitable tools for machining processes including turning, facing, thread cutting and tapping.
CO4: Able to apply basic electrical engineering knowledge for house wiring practice

Reference Books

1. Manual on Workshop Practice by K Venkata Reddy, KL Narayana and P Kaunaioh; MacMillan India Ltd., New Delhi
2. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi

- **Note:** *The students are supposed to come in proper workshop dress prescribed by the institute. Wearing shoes in the workshop(s) is compulsory. Importance of safety and cleanliness, safety measures and upkeep of tools, equipment and environment in each of the following shops should be explained and practiced. The students should prepare sketches of various tools/jobs in their practical Notebook.*

SEMESTER-I

Course Title: Student Centred Activities
Course Code: EE-116
L T P
0 0 4

Max. Marks: 50
Internal Assessment: 50

SCA will comprise of co-curricular activities like extension lectures, library studies, games, hobby clubs e.g. photography, painting, singing, seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities, Civil Defence/ Disaster Management activities etc.

SEMESTER II

Course Title: English and Communication Skills–II
Course Code: CE/EE/ME/ECE - 201
L T P
4 0 0

Max. Marks: 100
External: 60
Internal Assessment: 40
Duration of Exam: 3 Hrs

Objective

Language is the most commonly used medium of self-expression in all spheres of human life – personal, social and professional. A student must have a fair knowledge of English language and skills to communicate effectively to handle the future jobs in industry. The objective of this course is to enable the diploma holders to acquire proficiency, both in spoken (oral) and written language. At the end of the course, the student will be able to develop comprehension skills, improve vocabulary, use proper grammar, acquire writing skills, correspond with others and enhance skills in spoken English. It is expected that each polytechnic will establish a **communication skill laboratory** for conducting practicals mentioned in the curriculum.

UNIT 1
Facets of Literature-I (Short Stories & Poems)
Short Stories:
1. The Portrait of a Lady - Khushwant Singh
2. The Doll's House – Katherine Mansfield
3. The Refugees – Pearl S. Buck
Poems:
1. All The World's A Stage – W. Shakespeare
2. Say Not, The Struggle Nought Availeth – A.H. Clough
3. Pipa's Song – Robert Browning

UNIT 1I
Facets of Literature-II (Prose)
1. Walking Tours – R.L. Stevenson
2. A Dialogue on Civilization – C.E.M. Joad
3. The Sign of Red Cross – Horace Shipp

UNIT III
Grammar and Usage
Narration
Voice
Idioms and Phrases

UNIT IV

Correspondence & Drafting

Correspondence:

Business Letters & Personal letters

Drafting:

Report Writing, Inspection Notes, Memos, Circulars and Notes, Telegrams, Press Release, Agenda and Minutes of Meetings, Applying for a Job

UNIT V

Communication

Media and Modes of Communication, Channels of Communication, Barriers to Communication, Listening Skills, Body language, Humour in Communication,

Course: Outcome

CO To have practical exposure to the basic language techniques in professional

CO 2 Comprehend given passage and summarize them.

CO 3. Draft official letters.

CO 4. Apply correct voice and prepositions in formal communication.

CO 5. Make sentence using connector for desire meaning.

CO 6 Develop presentation skills.

CO 7. Face oral examination and interviews

REFRENCES

1. English and Communication Skills, Book-II By Kuldip Jaidka, Alwainder Dhillon and Parmod Kumar Singla, Prescribed by NITTTR, Chandigarh & Published By Abhishek Publication, 57-59, Sector-17, Chandigarh
2. Essentials of Business Communication by Pal and Rorualling; Sultan Chand and Sons
3. The Essence of Effective Communication, Ludlow and Panthon; Prentice Hall of India
4. New Design English Grammar, Reading and Writing Skills by AL Kohli (Course A and course B), Kohli Publishers, 34 Industrial Area Phase-II, Chandigarh,
5. New Design English Reading and Advanced Writing Skills for Class XI and XII by MK Kohli and AL Kohli; Kohli Publishers, 34 Industrial Area Phase-II, Chandigarh,
6. A Practical English Grammar by Thomson and Marlinet
7. Spoken English by V Sasikumar and PV Dhamija; Tata McGraw Hill
8. English Conversation Practice by Grount Taylor; Tata McGraw Hill
9. Developing Communication Skills by Krishna Mohan and Meera Banerji; MacMillan India Ltd., Delhi
10. Business Correspondence and Report Writing by RC Sharma and Krishna Mohan; Tata McGraw Hill Publishing Company Ltd. New Delhi
11. Communication Skills by Ms R Datta Roy and KK Dhir; Vishal Publication, Jalandhar

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER II

Course Title: Applied Mathematics-II
Course Code: CE/EE/ME/ECE - 202
L T P
4 0 0

Max. Marks: 100
External: 60
Internal Assessment: 40
Duration of Exam: 3 Hrs

Objective

Applied mathematics forms the backbone of engineering students. Basic elements of Differential calculus and integral calculus and statistics have been included in this course. This will develop analytical abilities to apply in engineering field and will provide continuing educational base to the students.

UNIT 1
Differential Calculus-I
Definition of function; Concept of limits.

Four standard limits $\underset{x\to a}{Lim}\frac{x^n-a^n}{x-a}$, $\underset{x\to 0}{Lim}\frac{Sinx}{x}$

$$\underset{x\to 0}{Lim}\frac{a^x-1}{x}, \underset{x\to 0}{Lim}(1+x)^{\frac{1}{x}}$$

Differentiation by definition of x^n, sin x, cos x, tan x, e^x, $\log_a x$ only.
Differentiation of sum, product and quotient of functions. Differentiation of function of a function.

UNIT 1I
Differential Calculus-II
Differentiation of trigonometric inverse functions. Logarithmic differentiation.
Exponential differentiation Successive differentiation (excluding nth order).
Applications:
(a) Maxima and minima
(b) Equation of tangent and normal to a curve (for explicit functions only).

UNIT III
Integral Calculus-I

Integration as inverse operation of differentiation.
Simple integration by substitution, by parts & by partial fractions (for linear factors only)

UNIT IV
Integral Calculus-II
Evaluation of definite integrals (simple problems).

i) $\int_0^{\frac{\pi}{2}} \sin^n x dx$ ii) $\int_0^{\frac{\pi}{2}} \cos^n x dx$ iii) $\int_0^{\frac{\pi}{2}} \sin^m x \cos^n x dx$

using formulae without proof (m and n being positive integers only)
Applications:

(a) Area bounded by simple curves and axes.
(b) Volume of a solid formed by revolution of an area about axes (simple problems).

UNIT V
Statistics
Measures of Central Tendency: Mean, Median, Mode.
Measures of Dispersion: Mean deviation, Standard deviation.

Course: Outcome
CO 1.Use mathematical tool to understand engineering principles and concepts.
CO 2. Concept of Differential Calculus-I
function; Concept of limits and
Differential Calculus-II
CO 3. Evaluate definite and indefinite integrals
CO 4.Apply integration for finding area and volume.
CO 5. Apply basic knowledge of statistics for sampling, data collection, standard deviation
RECOMMENDED BOOKS

1. **Grewal BS,** Elementary Engineering Mathematics by Khanna Publishers, New Delhi.
2. **Kohli S,** Engineering Mathematics by Vol. I & II by IPH, Jalandhar
3. **Dr. Sharma RD** Applied Mathematics
4. **Sabharwal SS & Jain Sunita** Applied Mathematics, Vol. I & II by, Eagle Parkashan, Jalandhar

5. **Gupta Dass** Engineering Mathematics.
6. **Chawla C Dass,** Engineering Mathematics by Asian Publishers, New Delhi

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit.

SEMESTER II

Course Title: Applied Physics-II
Course Code: CE/EE/ME/ECE - 203
L T P
4 0 0

Max. Marks: 100
External: 60
Internal Assessment: 40
Duration of Exam: 3 Hrs

Objective

Applied physics includes the study of a large number of diverse topics related to things that go in the world around us. It aims to give an understanding of this world both by observation and prediction of the way in which objects behave. Concrete use of physical principles and analysis in various fields of engineering and technology

UNIT 1

Waves and vibrations

Generation of waves by vibrating particles, Wave motion with examples, Types of wave motion, transverse and longitudinal wave motion with examples. Velocity, frequency and wave length of a wave (relationship $v = \eta\lambda$). Sound and Light waves.

Acoustics of buildings–reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time

Ultrasonics–production (magnetostriction and piezoelectric detection) & their engineering applications

UNIT 1I

Principle of optics

Introduction: reflection of light, image formation in mirrors (convex and concave), refraction and refractive index, image formation in lenses, lens formulae (thin lens only), power of lens, total internal reflection.

Defects in image formation by lenses and their correction.

Simple and compound microscope, astronomical and Galileo telescope, magnifying power and its calculation (in each case).

Overhead projector and slide projector

UNIT III

Electrostatics

Coulombs law, unit charge and its SI units. Gauss's Law. Electric field intensity and electric potential, equipotential surfaces and their properties. Calculation of electric field of point charge, charged sphere (conducting and non-conducting), straight charged conductor, plane charged sheet.

Capacitance, types of capacitors, capacitance of parallel plate capacitor, series and parallel combination of capacitors. Dielectric and its effect on capacitors, dielectric constant and dielectric break down.

UNIT IV

Electricity

Ohm's law, Resistance of a conductor, specific resistance, series and parallel combination of resistors, effect of temperature on resistance. Kirchoff's law and its applications, Wheatstone bridge principle. Heating effect of current and concept of electric power.

UNIT V

Modern Physics

Lasers: concept of energy levels, ionizations and excitation potentials; spontaneous and stimulated emission; lasers and its characteristics, population inversion, types of lasers, helium – neon and ruby lasers, applications of lasers.

Fibre optics: Introduction, optical fiber materials, types, light propagation & applications.

Superconductivity: Phenomenon of super conductivity.

Energy sources–Conventional and non-conventional (wind, water, solar, bio, nuclear energy) (only elementary idea).

Course: Outcome

CO 1.Identify general properties of Waves and Vibrations
Principle of Optics

CO 2 Use and application of different measuring instruments.

CO 3.Apply principles and concept of Modern Physics for solving various engineering problems.

CO 4 Use the concept of Electrostatics ,Electricity

RECOMMENDED BOOKS

1. Applied Physics Vol. II, TTTI Publication Tata McGraw Hill, Delhi
2. Basic Applied Physics by RK Gaur; Dhanpat Rai Publications
3. Comprehensive Practical Physics-Volume I and II by JN Jaiswal; Laxmi Publishers
4. Numerical Problems in Physics-Volume I and II by RS Bharaj; Tata McGraw Hill
5. Simple Course in Electricity and Magnetism by CL Arora; S Chand and Co, New Delhi
6. Fundamental Physics-Volume I and II by Gomber and Gogia; Pardeep Publications, Jalandhar
7. A Text Book of Optics by Subramanian and Brij Lal
8. Physics Laboratory Manual by PK Palanisamy, Scitech Publications
9. Fundamentals of Physics by Resnick and Halliday, Asian Books Pvt. Ltd., New Delhi
10. Concepts in Physics by HC Verma; Bharti Bhawan Ltd., New Delhi

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit.

SEMESTER II

Course Title: Applied Chemistry-II
Course Code: CE/EE/ME - 204
L T P
4 0 0

Max. Marks: 100
External: 60
Internal Assessment: 40
Duration of Exam: 3 Hrs

Objective

The role of chemistry in every branch of engineering and technology is expanding greatly. Now a days, various chemical products are playing important role in the field of engineering with increasing number of such products each successive years. The strength of materials, the chemical composition of substances, their behaviour when subjected to different treatment and environment, and the laws of heat and dynamic energy have entered in almost every activity of modern life. Chemistry is considered as one of the core subjects for diploma students in engineering and technology for developing in them scientific temper and appreciation of chemical properties of materials, which they have to handle in their professional career. Effort should be made to teach this subject through demonstrations/ minor projects and with the active involvement of students.

Note:- Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to appreciate learning of these concepts and principles.

UNIT I

Manufacture of Materials

A brief introduction of the terms: Metallurgy (types), mineral, ore, gangue or matrix, flux, slag, concentration (methods of concentrating the ores), roasting, calcination and refining as applied in relation to various metallurgical operations.

Metallurgy of (i) Aluminium (ii) Iron with their physical and chemical properties.

Definition of an alloy, purposes of alloying, composition, properties and uses of alloys-brass, bronze, monel metal, magnalium, duralumin, alnico and invar.

Manufacture of Portland cement.

Manufacture of ordinary glass and lead glass and their applications.

Definitions and types of polymers and plastics.

UNIT II

Fuels

Definition of a Fuel, characteristics of a good fuel and classification of fuels with suitable examples. Definition of Calorific value of a fuel and determination of calorific value of a solid fuel with the help of Bomb calorimeter. Simple numerical problems based upon Bomb-calorimeter method of finding the Calorific values.

Brief description of 'Proximate' and 'Ultimate' analysis of a fuel. Importance of conducting the proximate and ultimate analysis of a fuel. Merits of gaseous fuels over those of other varieties of fuels. Manufacture, composition, properties and uses of:
(i) Water gas (ii) Oil gas (iii) Biogas

UNIT III

Corrosion

Meaning of the term 'corrosion' and its definition.
Theories of corrosion i.e. (i) direct chemical action theory and (ii) electro chemical theory
Prevention of corrosion by
1. (a) Alloying
   (b) Providing metallic coatings
2. Cathodic protections:
   (a) Sacrificial
   (b) Impressed voltage method
3. Heat treatment (Quenching, annealing, tempering and normalizing)

UNIT IV

Lubricants

Definition of (i) lubricant (ii) lubrication. Classification of lubricants.

Principles of lubrication:- (i) fluid film lubrication (ii) boundary lubrication (iii) extreme pressure lubrication.

Characteristics of a lubricant such as viscosity, viscosity index, volatility, oiliness, acidity, emulsification, flash point and fire point and pour point.

UNIT V

Classification and Nomenclature of Organic Compounds
Classification of Organic Compounds, functional group, Homologous Series, Nomenclature, Physical and Chemical properties, and industrial use of Organic Compounds, IUPAC system of nomenclature of Carboxylic acid, Alcohols, Phenols, Aldehydes, Ketones and Amines.

Course: Outcome

CO 1. Students will be able to know core concepts in Manufacture of Materials and Fuels .
CO 2.Will be able toknow the fundamental science and engineering principles relevant to materials likeCorrosion
Lubricants, Classification and Nomenclature of Organic Compounds
CO 3. Be able to know about Compounds, IUPAC system of nomenclature of Carboxylic acid, Alcohols, Phenols, Aldehydes, Ketones and Amines.

RECOMMENDED BOOKS

1. Chemistry in Engineering by J.C. Kuriacose and J. Rajaram; Tata McGraw-Hill Publishing Company Limited, New Delhi
2. 3. A Text Book of Applied Chemistry-I by SS Kumar; Tata McGraw Hill, Delhi
3. A Text Book of Applied Chemistry-I by Sharma and Others; Technical Bureau of India, Jalandhar
4. Engineering Chemistry by Jain PC and Jain M
5. Chemistry of Engineering by Aggarwal CV
6. Progressive Applied Chemistry –I and II by Dr. G.H. Hugar; Eagle Prakashan, Jalandhar

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit.

SEMESTER II

Course Title: Engineering Drawing-II
Course Code: CE/ME - 205
L T P
4 0 0

Max. Marks: 100
External: 60
Internal Assessment: 40
Duration of Exam: 3 Hrs

Objective

Drawing is the language of engineers and technicians. Reading and interpreting engineering drawing is their day-to-day responsibility. The subject is aimed at developing basic graphic skills in the students so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation. The emphasis, while imparting instructions, should be to develop conceptual skills in the students following BIS SP 46 – 1988.

UNIT-I
Assembly Drawing & Threads
Principle and utility of detail and assembly drawings. Wooden joints i.e. corner mortice and Tenon joint, Tee halving joint, Mitre faced corner joint, Tee bridle joint, Crossed wooden joint, Cogged joint, Dovetail joint, Through Mortice and Tenon joint.
Nomenclature of threads, types of threads (metric), single and multiple start threads. Forms of various external thread sections such as V, square and acme threads, BA, BSW and Knuckle, Metric, Seller Thread, Buttress Threads. Simplified conventions of left hand and right hand threads, both external and internal threads

UNIT-II
Locking Devices, Nuts & Bolts
Lock nut, castle nut, split pin nut, sawn nut, slotted nut.
Different views of hexagonal and square nuts; Assembly of hexagonal headed, square headed, square headed with square neck bolts with hexagonal and square nuts and washers. Foundations bolts – Rag bolt and Lewis bolt

UNIT-III
Screws, Studs, Keys and Cotters
Drawing various types of machine screws. Drawing various types of studs and set screws.
Various types of keys and cotters and their practical application and preparation of drawing of various keys and cotters showing keys and cotters in position. Cotter joints: (i) gib and cotter joint (ii) knuckle joint

UNIT-IV
Rivets and Welded Joints
Types of structural and general purposes rivet heads. Caulking and fullering of riveted joints. Types of riveted joints – lap, butt (single riveted, double riveted lap joint, single cover plate and double cover plate), chain and zig – zag riveting.
Various conventions and symbols of welded joints (IS 696). Practical applications of welded joints say joints on steel frames, windows, doors and furniture

UNIT-V

Couplings, Symbols & Conventions (4 sheets)

Muff or Box coupling, half lap muff coupling. Flange coupling (Protected and non-protected). Flexible coupling.

Civil engineering sanitary fitting symbols. Electrical fitting symbols for domestic interior installations. Building plan drawing with electrical and civil engineering symbols.

Course: Outcome

CO1.Students will be able to know assembly Drawing & Nomenclature of threads

CO 2 Use the concept of projection for Mechanical Engineering Drawings.

CO 3. Be able to prepare Drawing of Screws, Studs, Keys and Cotters Locking Devices, Nuts & Bolts

.CO 4 Visualize and draw the Rivets and Welded Joints Couplings, Symbols & Conventions etc.

RECOMMENDED BOOKS

1. Elementary Engineering Drawing (in first angle projection) by ND Bhatt, Charotar Publishing House.
2. A Text Book of Engineering Drawing by Surjit Singh Published by Dhanpat Rai and Co. Delhi
3. Engineering Drawing by PS Gill; published by SK kataria and Sons, New Delhi
4. Machine Drawing by RB Gupta published by Satya Prakashan, New Delhi.

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit.

SEMESTER II

Course Title: English & Communication Skills-II Lab
Course Code: CE/EE/ME/ECE - 211
L T P
0 0 2

Max. Marks: 50
External: 25
Internal Assessment: 25
Duration of Exam: 3 Hrs

LIST OF PRACTICALS

1. Practice on browsing information from Internet.
2. Group Discussions
3. Mock Interviews
4. Telephone Etiquette – demonstration and practice
5. Situational Conversation with feedback through video recording
6. Presentation on a given theme (using PowerPoint)
7. Exercises leading to personality development like mannerism, etiquettes, body language etc.
8. Reading unseen passages
9. Writing (developing) a paragraph
10. Exercises on writing notices and telephonic messages

Course outcome

CO1: will have good vocablaory.
CO2: will be able to sit and speak well in group discussions
CO3: will have fine demonstrative skills.
CO4: will have good writing skills

SEMESTER II

Course Title: Applied Physics-II Lab
Course Code: CE/EE/ME/ECE - 212
L T P
0 0 2

Max. Marks: 50
External: 25
Internal Assessment: 25

LIST OF PRACTICALS

1. To verify Ohm's law
2. To verify law of resistances in series and in parallel
3. To find the internal resistance of a cell by potentiometer
4. To convert a galvanometer into an ammeter of given range
5. To convert a galvanometer into voltmeter of given range
6. To find the velocity of sound in air by resonance apparatus
7. To find the frequency of a tuning fork by a sonometer
8. To set a model of an astronomical telescope and find its magnifying power
9. To set up a model of a compound microscope

Course Outcome

CO1: Understand the basics concepts of Ohm's law.
CO2: Understand the connections of resisters in parallel and series.
CO3: Have a thorough knowledge of device like ammeter,galvanometer,voltmeters etc.
CO4: Perform the conversion of galvanometer in ammeter and voltmeter.
CO5: Understand the working of telescope and microscope.

SEMESTER II

Course Title: Applied Chemistry-II Lab
Course Code: CE/EE/ME - 213
L T P
0 0 2

Max. Marks: 50
External: 25
Internal Assessment: 25

LIST OF PRACTICALS

1. Gravimetric analysis and study of apparatus used there in
2. To determine the percentage composition of a mixture consisting of a volatile and a non-volatile substances
3. Determine the viscosity of a given oil with the help of "Redwood viscometer"
4. Determine the flash point of the given oil with the help of Abel's Flash Point Apparatus
5. Estimate the amount of moisture in the given sample of coal
6. Estimate the amount of ash in the given sample of coal
7. Electroplate the given strip of Cu with Ni
8. Confirmation test of alcohol, aldehydes, carboxylic acid, amine
9. To determination the amount of copper in the given sample of copper sulphate with the help of M/20 sodium thiosulphate solution.
10. Detection of metal ion in the rust (solution of rust in concentrated HCL may be given

Course Outcome

1.To know about the volatile and a non-volatile substances.
2; To know about the viscosity of different fluids.

SEMESTER II

Course Title: Applied Chemistry-II Lab
Course Code: CE/EE/ME - 214
L T P
0 0 4

Max. Marks: 100
External: 50
Internal Assessment: 50

LIST OF PRACTICALS

1. *Given a PC, name its various components and list their functions*
2. *Identification of various parts of a computer and peripherals*
3. Practice in installing a computer system by giving connection
4. DOS Commands (internal / external) e.g. TYPE, REN, DEL, CD, MD, COPY, TREE, BACKUP
5. Exercises on entering text and data (Typing Practice using any tutor)
6. Features of Windows as an operating system
   - Start
   - Shutdown and restore
   - Creating and operating on the icons
   - Opening closing and sizing the windows
   - Using elementary job commands like – creating, saving, modifying, renaming, finding and deleting a file
   - Creating and operating on a folder
   - Changing setting like, date, time color (back ground and fore ground)
   - Using short cuts
   - Using on line help

7. MS-Word
   - File Management:
     Opening, creating and saving a document, locating files, copying contents in some different file(s), protecting files, Giving password protection for a file
   - Page Set up:
     Setting margins, tab setting, ruler, indenting
   - Editing a document:
     Entering text, Cut, copy, paste using tool- bars
   - Formatting a document:
     Using different fonts, changing font size and colour, changing the appearance through bold/ italic/ underlined, highlighting a text, changing case, using subscript and superscript, using different underline methods
   - Aligning of text in a document, justification of document, Inserting bullets and numbering
   - Formatting paragraph, inserting page breaks and column breaks, line spacing
   - Use of headers, footers: Inserting footnote, end note, use of comments
   - Inserting date, time, special symbols, importing graphic images, drawing tools
   - Tables and Borders:
     Creating a table, formatting cells, use of different border styles, shading in tables, merging of cells, partition of cells, inserting and deleting a row in a table

- Print preview, zoom, page set up, printing options
- Using Find, Replace options
- Using Tools like:
  Spell checker, help, use of macros, mail merge, thesaurus word content and statistics, printing envelops and labels
- Using shapes and drawing toolbar,
- Working with more than one window in MS Word,
- How to change the version of the document from one window OS to another
- Conversion between different text editors, software and MS word

8. MS-Excel

- Starting excel, open worksheet, enter, edit, data, formulae to calculate values, format data, create chart, printing chart, save worksheet, switching between different spread sheets
- Menu commands:
  Create, format charts, organize, manage data, solving problem by analyzing data, and exchange with other applications. Programming with MS-Excel, getting information while working
- Work books:

  Managing workbooks (create, open, close, save), working in work books, selecting the cells, choosing commands, data entry techniques, formula creation and links, controlling calculations, working with arrays
- Editing a worksheet, copying, moving cells, pasting, inserting, deletion cells, rows, columns, find and replace text, numbers of cells, formatting worksheet
- Creating a chart:
  Working with chart types, changing data in chart, formatting a chart, use chart to analyze data
- Using a list to organize data, sorting and filtering data in list

9. MS PowerPoint

a) Introduction to PowerPoint
   - How to start PowerPoint
   - Working environment: concept of toolbars, slide layout, templates etc.
   - Opening a new/existing presentation
   - Different views for viewing slides in a presentation: normal, slide-sorter etc.

b) Addition, deletion and saving of slides

e) How to view the slide show?
   - Viewing the presentation using slide navigator
   - Slide transition
   - Animation effects etc.

10. Internet and its Applications

a) Log-in to internet
b) Navigation for information seeking on internet
c) Browsing and down loading of information from internet
d) Sending and receiving e-mail
   - Creating a message

- Creating an address book
- Attaching a file with e-mail message
- Receiving a message
- Deleting a message

RECOMMENDED BOOKS

1. Fundamentals of Computer by V . Rajaraman; Prentice Hall of India Pvt. Ltd., New Delhi.
2. Computers Today by SK Basandara, Galgotia Publication Pvt ltd. Daryaganj, New Delhi.
3. MS-Office 2000 for Everyone by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., New Delhi
4. Internet for Every One by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
5. A First Course in Computer by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., Jungpura,New Delhi
6. Mastering Windows 95, BPB Publication, New Delhi
7. Computer Fundamentals by PK Sinha; BPB Publication, New Delhi
8. Fundamentals of Information Technology by Leon and Leon;Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
9. On Your Marks - Net…Set…Go… Surviving in an e-world by Anushka Wirasinha, Prentice Hall of India Pvt. Ltd., New Delhi
10. Learning MS Office XP by Ramesh Bangia, Khanna Book Publishing Co. (P)

SEMESTER II

Course Title: Engineering Drawing-II
Course Code: CE/ERE/ME - 215
L T P
0 0 2

Max. Marks: 50
External: 25
Internal Assessment: 25

LIST OF PRACTICALS

1. Assembly Drawing & Threads (4 sheets)
2. Locking Devices, Nuts & Bolts (4 sheet)
3. Screws, Studs, Keys and Cotters (3 sheet)
4. Rivets and Welded Joints (3 sheets)
5. Couplings, Symbols & Conventions (4 sheets)

RECOMMENDED BOOKS

1. Elementary Engineering Drawing (in first angle projection) by ND Bhatt, Charotar Publishing House.
2. A Text Book of Engineering Drawing by Surjit Singh Published by Dhanpat Rai and Co. Delhi
3. Engineering Drawing by PS Gill; published by SK kataria and Sons, New Delhi
4. Machine Drawing by RB Gupta published by Satya Prakashan, New Delhi.

SEMESTER II

Course Title: General Workshop Practice-II
Course Code: CE/EE/ME/ECE - 216
L T P
0 0 2

Max. Marks: 50
External: 25
Internal Assessment: 25

Objective

As we know that, the psychomotor skills are mastered through practice, an opportunity therefore, has been extended to students through this course to refine their skills in different trades. The basic skills developed during first semester will be refined during this course by doing higher order skills jobs. In addition to developing general manual and machining skills in the students, the objective of development of sense of dignity of labour, precision, safety at work places, team working and right attitude among the students will also be met.

LIST OF PRACTICALS

1. Carpentry and Painting Shop-II

Introduction to joints, their relative advantages and uses.

Job I Preparation of Dovetail joint and glued joint.
Job II Preparation of Mitre Joint
Job III Preparation of a lengthening Joint
Job 1V Preparation of at least one utility job with and without lamination.

Demonstration of job showing use of Rip Saw, Bow saw and Tramme, method of sharpening various saws.

Demonstration of job on Band Saw and circular saw, chain and diesel universal wood working machine, saw resharpening machine, Saw Brazing unit.

Demonstration of various methods of painting wooden items.

Job V Preparation of surface before painting.
Job VI Application of primer coat
Job VII Painting wooden items by brush/roller/spray

2. Fitting and Plumbing Shop-II

Description and demonstration of various types of drills, taps and dies

Selection of dies for tapping. Types of taps, tapping, dieing and drilling operations.

Job I Making internal and external threads on a job by tapping and dieing operations (manually)

Precautions while drilling soft metals, specially aluminum and lead.

Job II Drilling practice on soft metals (Aluminum, Brass and lead)

Care and maintenance of measuring tools like calipers, steel rule, try square, vernier,

micrometer, height gauge, combination set, reading gauge. Handling of measuring instruments, checking of zero error, finding of least count.

Job III Preparation of a job by filing on non- ferrous metal.

Job IV Production of a utility job involving all the above operations.

Job V Preparation of job involving thread on GI pipe/ PVC pipe and fixing of different types of elbow T - Union, socket, stopcock, taps, etc

Description and demonstration of various types of drills, taps and dies; Selection of dies for tapping; Types of taps, Tapping and dieing operations.

3. Welding Shop-II

Introduction of the gas welding, gas welding equipment, adjustments of different types of flames, demonstration and precautions about handling welding equipment.

Job I Practice in handling gas welding equipment and welding practice.

Common welding joints generally made by gas welding.

Job II Preparation Butt joint by gas welding.

Job III Preparation of small cot conduit pipe frame by electric arc welding/gas welding.

Job IV Preparation of square pyramid from M.S rods by welding (type of welding to be decided by students themselves).

Job V Exercise job on spot/seam welding machine.

Demonstration of various methods adopted for painting steel items.

Job VI Painting steel items by brush/roller/ spray

4. Sheet metal & Machine shop

Introduction to sheet metal process and tools

Job I Making sheet metal joints

Job II Making sheet metal trey or a funnel or a computer chassis

Job III Preparation of sheet metal jobs involving rolling, shearing, creasing, bending and cornering

Job IV Prepare a lap riveting joint of sheet metal pieces

Introduction to various machines used in machine shop.

Job V Exercise on simple turning

Job VI Exercise on taper turning

Job VII Marking and drilling practice on mild steel piece

Job VIII Marking and drilling practice on aluminium piece

Job IX Demonstration of various functions of CNC Machine

5. Electric Shop-II

Importance of three phase wiring and its effectiveness.

Job I Laying out 3 phase wiring for an electric motor or any other 3 phase machine.

Course outcome

CO1: Able to make the connections of house wiring
CO2: Able to make small transformers.
CO3:Able to repair transformers, fan, motor etc.

Estimating and costing power consumption.

Job II Connecting single phase energy meter and testing it. Reading and working out the power consumption and the cost of energy.

Job III Checking continuity of connection (with tester and bulbs), location of faults with a multimeter and their rectification in simple machines and/or other electric circuits fitted with earthing.

Demonstration of dismantling, servicing and reassembling of a table fan/ceiling fan/air cooler/mixer/electric iron, Electric heater, geaser, electric oven etc.

Job IV Dismantling, serving and reassembling of any of the above electrical appliances.

Job V Demonstration of testing single phase/three phase electrical motor by using voltmeters ammeter clip on meter technometer etc.

Job VI Reversing the rotation of motor.

RECOMMEND BOOKS

1. Manual on Workshop Practice by K Venkata Reddy, KL Narayana and P Kaunaioh; MacMillan India Ltd., New Delhi
2. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi

Note:

The students are supposed to come in proper workshop dress prescribed by the institute. Wearing shoes in the workshop(s) is compulsory. Importance of safety and cleanliness, safety measures and upkeep of tools, equipment and environment in each of the following shops should be explained and practiced. The students should prepare sketches of various tools/jobs in their practical Notebook.

SEMESTER-II

Course Title: Student Centred Activities
Course Code: CE-217
L T P
0 0 4

Max. Marks: 50
Internal Assessment: 50

SCA will comprise of co-curricular activities like extension lectures, library studies, games, hobby clubs e.g. photography, painting, singing, seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities, Civil Defence/ Disaster Management activities etc.

SEMESTER-III

Course Title: Fluid Mechanics-I
Course Code: CE/ME-301
L T P
4 0 0

Max. Marks: 100
External: 60
Internal Assessment: 40
Duration of Exam: 3 Hrs

Objective

Subject of Hydraulics is a basic engineering subject and helps in solving fluid flow problems in the field of Civil Engineering. The subject deals with basic concepts and principles in hydrostatics, hydro kinematics and hydrodynamics and their application in solving fluid - mechanics problems.

UNIT-I
Properties of Fluids
Fluids: Real and ideal fluids ,Fluids Mechanics, Hydrostatics, Hydrodynamics, Hydraulics. Mass density, specific weight, specific gravity, viscosity, surface tension, cohesion, adhesion, capillarity, vapour pressure and compressibility. Units of measurement and their conversion.
Pressure, intensity of pressure, pressure head, Pascal's law and its applications. Total pressure, resultant pressure, and centre of pressure. Total pressure and centre of pressure on horizontal, vertical and inclined plane surfaces of rectangular, triangular, trapezoidal shapes.

UNIT-II
Measurement and fluid flow
Atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure. Piezometer, simple manometer and differential manometer, Bourden gauge.
Types of Flow: Steady and unsteady flow, laminar and turbulent flow,Uniform and non-uniform flow. Discharge and continuity equation (flow equation). Types of hydraulic energy: Potential energy, kinetic energy, pressure energy. Bernoulli's theorem; statement and description (without proof of theorem),Venturimeter.

UNIT-III
Flow Measurements
Venturimeter**,** Pitot tube**,** Orifice meter**,** Current meters and Notches & weirs.

UNIT-IV
Flow Through Pipes
Definition of pipe flow; Reynolds number, laminar and turbulent flow - explained through Reynolds's experiment.
Critical velocity and velocity distributions in a pipe for laminar flow. Head loss in pipe lines due to friction, sudden expansion, sudden contraction, entrance, exit, obstruction and change of direction (No derivation of formula).
Hydraulic gradient line and total energy line. Flow from one reservoir to another through a long pipe of uniform cross section (simple problems). Pipes in series and parallel,Water hammer phenomenon and its effects (only definition and description).

UNIT-V

Flow Through Open Channels

Definition of an open channel, uniform flow and non-uniform flow. Discharge through channels using i) Chezy's formula (no derivation) ii) Manning's formula (no derivation) Most economical channel sections (no derivation) i) Rectangular ii) Trapezoidal. Head loss in open channel due to friction

Course: Outcome

CO 1-Students will be able to understand basic knowledge of the definition and the fundamental concepts of fluid mechanics including continuum, velocity field , surface tension, flow visualization etc.

CO 2-Students will able to apply the basic equation of fluid statics to determine forces on planer and curved surfaces that are submerged in a static fluid.

CO 3-Students will able to use conservation laws in integral form and apply them to determine forces and moments on surfaces of various shapes and simple machines

CO 4-Students will able to use Euler□s and Bernoulli□s equations and the conservation of mass to determine velocities, pressures, and accelerations for incompressible and in viscid fluids

CO 5- Students will able design simple pipe systems to deliver fluids under specified conditions and also the loosed during the flow of the fluid.

CO 6-Understand the mechanics of viscous flow about immersed boundaries, as it relates to flow separation, profile drag, drag coefficients and the determi0tion of drag forces

CO 7-Students will be able to apply these basics in the designing of the Power Plant, Hydraulic Pneumatic Systems and in simulation software□s to solve various critical problems related to fluid flows.

CO 8-Students will be able to get employed in various PSU's such as Central Water Board, Power Sectors as Junior Trainees also in various private companies involving fluid flows related field of work.

RECOMMENDED BOOKS

1. Jagdish Lal, "Fluid Mechanics and Hyraulics" Delhi Metropolitan Book Co. Pvt Ltd.

2. Modi, PN, and Seth, SM; "Hydraulics and Fluid Mechanics", Delhi Standard Publishers Distributors

3. Khurmi RS, "Hydraulics and Hydraulics Machines", Delhi S Chand and Co.

4. Likhi SK., Laboratory Manual in Hydraulics, Delhi Wiley Eastern

NOTE FOR PAPER SETTER: The question paper shall comprise of 80 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER-III

Course Title: Applied Mechanics
Course Code: CE/ME-302
L T P
4 0 0

Max. Marks: 100
External: 60
Internal Assessment: 40
Duration of Exam: 3 Hrs

RATIONALE

The subject Applied Mechanics deals with basic concepts of mechanics like laws of forces, moments, friction, centre of gravity, laws of motion and simple machines which are required by the students for further understanding of other allied subjects. The subject enhances the analytical ability of the students.

UNIT-I
Introduction & Laws of Forces

Introduction: Concept of engineering mechanics definition of mechanics, statics, dynamics, application of engineering mechanics in practical fields. Definition of Applied Mechanics. Definition of basic and derived quantities. Basic units and derived units. Different systems of units (FPS, CGS, MKS & SI) and their conversion from one to another for density, velocity, acceleration, force, pressure, work, power. Concept of rigid body.

Laws of Force: Definition of force, measurement of force in SI units, its representation, types of force: Point force/concentrated force & uniformly distributed force, effects of force, characteristics (elements) of a force. Different force systems (coplanar and non-coplanar), principle of transmissibility of forces, law of super-position. Composition and resolution of *coplanar* concurrent forces, resultant force, method of composition of forces, laws of forces, triangle law of forces, polygon law of forces-graphically, analytically, resolution of forces, resolving a force into two rectangular components. Free body diagram. Equilibrant force and its determination. Lami's theorem (concept only).

[*Simple problems on above topics*]

UNIT-II
Moment

Concept of moment. Moment of a force and units of moment. Varignon's theorem (definition only). Principle of moment and its applications (Levers–simple and compound, steel yard, safety valve, reaction at support). Parallel forces (like and unlike parallel force), calculating their resultant.

Concept of couple, its properties and effects. General conditions of equilibrium of bodies under coplanar forces. Position of resultant force by moment.

[*Simple problems on the above topics*]

UNIT-III
Friction

Definition and concept of friction, types of friction, force of friction. Laws of static friction, coefficient of friction, angle of friction, angle of repose, cone of friction.

Equilibrium of a body lying on a horizontal plane, equilibrium of a body lying on a rough inclined plane, friction in simple screw jack.

Calculation of least force required to maintain equilibrium of a body on a rough inclined plane subjected to a force:

(a) Acting along the inclined plane horizontally.
(b) At some angle with the inclined plane.

UNIT-IV

Centre of Gravity & Moment of Inertia

Centre of Gravity: Concept, definition of centroid of plain figures and centre of gravity of symmetrical solid bodies. Determination of centroid of plain and composite lamina using moment method only, centroid of bodies with removed portion.

Determination of center of gravity of solid bodies-cone, cylinder, hemisphere and sphere; composite bodies and bodies with portion removed.

[*Simple problems on the above topics*]

Moment of Inertia: Concept of moment of inertia and second moment of area and radius of gyration, theorems of parallel and perpendicular axis, second moment of area of common geometrical sections: rectangle, triangle, circle *(without derivations).* Second moment of area for L, T and I sections, section modulus.

UNIT-V

Simple Machines

Definition of effort, velocity ratio, mechanical advantage and efficiency of a machine and their relationship, law of machines. Simple and compound machine (Examples). Definition of ideal machine, reversible and self locking machine. Effort lost in friction, Load lost in friction, determination of maximum mechanical advantage and maximum efficiency. System of pulleys (first, second, third system of pulleys), determination of velocity ratio, mechanical advantage and efficiency. Working principle and application of wheel and axle, different pulley blocks, simple screw jack, worm and worm wheel, single and double winch crab. Expression for their velocity ratio and field of their application

[*Simple problems on the above topics*]

Course: Outcome

CO 1.To provide a comprehensive knowledge of force, work and energy to calculate work done, power required and efficiency for various simple machines.

CO 2. To understand the importance and application of various laws of Mechanics

CO 3. At the end of of the course students will able to understand the importance and application of various laws of mechanics

REFERENCES

1. Applied Mechanics By TL Singla, Harbhajan Singh Parmod Kumar Singla Published By Abhishek Publication, 57-59, Sector-17, Chandigarh
2. A Text Book of Engineering Mechanics (Applied Mechanics) by RK Khurmi; S Chand and Co. Ltd., New Delhi.
3. Text Book in Applied Mechanics by MM Malhotra, R Subramanian, PS Gahlot and BS Rathore; Wiley Eastern Ltd., New Delhi.
4. Engineering Mechanics by SS Bhavikatti, KG Rajashekarappa; Wiley Eastern Ltd., New Delhi.
5. Engineering Mechanics and Strength of Materials by S Ramamurtham; Dhanpat Rai Publishing Co. (P) Ltd., Delhi.
6. Engineering Mechanics by AB Basu; Tata McGraw Hill Publishing Co. Ltd., Delhi.
7. Engineering Mechanics - Volume I and II by VS Mokashi; Tata McGraw Hill Publishing Co. Ltd., Delhi.

8. A Text Book of Applied Mechanics by NL Arora and RK Dhawan; India Publishing House, Delhi.
9. A Text Book of Applied' Mechanics by RK Rajput; Laxmi Publications, New Delhi..

NOTE FOR PAPER SETTER: The question paper shall comprise of 80 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit.

SEMESTER-III

Course Title: Surveying-I	Max. Marks: 100
Course Code: CE-303	External: 60
L T P	Internal Assessment: 40
4 0 0	Duration of Exam: 3 Hrs

RATIONALE

The important functions of a diploma civil engineer includes the jobs of detailed surveying, plotting of survey data, preparation of survey maps and setting out works

While framing the curriculum for the subject of surveying, stress has been given to the development of the skill in each type of survey like chain surveying, compass surveying leveling, that the Civil Engineering diploma holder will normally be called upon to perform and plane table surveying,

Field work should be a selected one so that student can check his work and have an idea of the results the extent of error in the work done by him. As far as possible, the surveys done should be got plotted, as this will also reveal errors in the work and develop skill in plotting.

UNIT-I

Introduction & Chain Surveying

Basic principles of surveying, Concept and purpose of surveying, measurements-linear and angular, units of measurements, Instruments used for taking these measurements, classification based on surveying instruments.

Chain surveying: Purpose of chain surveying, principles of chain surveying, Obstacles in chain surveying, Errors in chain surveying, Correction for measurements by erroneous length of chain, simple problems.

UNIT-II

Compass surveying

Purpose of compass surveying. Construction and working of prismatic compass, use of prismatic compass: Setting and taking observations.

Concept of following with simple numerical problems: a) Meridian - Magnetic and true b) Bearing - Magnetic, True and Arbitrary C) Whole circle bearing and reduced bearing d) Fore and back bearing e) Magnetic dip and declination.

Local attraction - causes, detection, errors and corrections, problems on local attraction, magnetic declination and calculation of included angles in a compass traverse. Concept of a traverse - Open and closed. Traversing with a compass. Checks for an open and closed traverse, plotting a traverse - By included angles and by deflection angles. Concept of closing error, adjustment of error in the traverse graphically by proportionate method.

UNIT-III

Levelling

Purpose of levelling, concept of a level surface, horizontal surface, vertical surface, datum, reduced level and bench marks. Principle and construction of Dumpy level,

Concepts of line of collimation, axis of the bubble tube, axis of the telescope and vertical axis, Levelling staff: single piece, folding, invar precision staff, telescopic. Temporary adjustment: temporary adjustment of dumpy level.

Concept of back sight, foresight, intermediate sight, change point, to determine reduces levels.

UNIT-IV

Computation of Results

Level book and reduction of levels by : Height of collimation method and Rise and fall method.Arithmetic checks, problem on reduction of levels, fly levelling, check leveling and profile levelling (L-section and X-section), errors in levelling, permissible limits, reciprocal levelling, testing and adjustment of IOP level. Numerical Problems.

Computations of Areas of regular figures and irregular figures. Simpson's rule: primordial formula and graphical method, use of planimeter for computation of areas, numerical problems

UNIT-V

Plane Table Surveying

Purpose of plane table surveying, equipment used in plane table survey: (a) Plane table (b) Alidade (Plain and Telescopic) (c) Accessories.

Setting of a plane table: (a) Centering (b) Levelling (c) Orientation.

Methods of plane table surveying (a) Radiation, (b) Intersection (c) Traversing (d) Resection.

Two point problem, three point problem by (a) Mechanical Method (Tracing paper) (b) Bessel's Graphical Method, Errors in plane table survey and precautions to control them. Testing and adjustment of plane table and alidade.

Course outcome

CO1: To develop and plan process for any civil engineering, at first field survey of that area is carried out and various type of survey maps are prepared.

CO2: These maps and drawing are used for taking various decisions regarding the planning, designing, estimation, execution and construction process etc

CO3: To impart the knowledge of basic principles of surveying, different types of surveying and applications

CO4: To carry out various civil engineering survey works.

CO5: To collect and analyse survey data for preparing drawings and maps.

RECOMMENDED BOOKS

1. Narinder Singh; "Surveying"; New Delhi, Tata McGraw Hill Publishing Co Ltd.

2. Hussain, SK and Nagraj, MS; "Text Book of Surveying"; New Delhi, S Chand and Co Ltd.

3. Deshpande, RS; "A Text Book Surveying and Levelling"; Poona, United Book Corporation

4. Kocher, CL; "A Text Book of Surveying"; Ludhiana, Katson Publishing House

5. Kanetkar, TP and Kulkarni, SV., "Surveying and Leveling", Poona, AVG Parkashan

6. Kanetkar, TP; and Kulkarni, SV; "Surveying and Leveling-Vol.2" Poona, AVG Prakashan

7. Punmia, BC; "Surveying and Leveling - Vol. 2", Delhi Standard Publishers Distributors.

8. Shahai, PB; "A Text Book of Surveying Vol. 2", Oxford and IBH Publishing Co.

NOTE FOR PAPER SETTER: The question paper shall comprise of 80 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER-III

Course Title: Construction Material — Max. Marks: 100
Course Code: CE - 304 — External: 60
L T P — Internal Assessment: 40
4 0 0 — Duration of Exam: 3 Hrs

RATIONALE

Civil Engineering diploma holders have to supervise construction of various types of civil works involving use of various materials like stones, bricks and tiles, cement and cement based products, lime, timber and wood based products, paints and varnishes, metals and other miscellaneous materials. The students should have requisite knowledge regarding characteristics, uses and availability of various building materials and skills in conducting tests to determine suitability of materials for various construction purposes. In addition, specifications of various materials should also be known (PWD/BIS) for effective quality control.

UNIT -I

Building Stones, Bricks and Tiles

Classification of Rocks: (General Review), Geological classification: Igneous, sedimentary and metamorphic rocks. Chemical classification; Calcareous, argillaceous and siliceous rocks. Physical classification: Unstratified, stratified and foliated rocks. General characteristics of stones – Marble, Kota stone, Granite, Sand, Trap, Basalt stone, Lime stone and Slate. Requirements of good building stones. Identification of common building stones, various uses of stones in construction. Quarrying of stones by blasting and its effect on environment.

Bricks and Tiles: Introduction to bricks, Raw materials for brick manufacturing and properties of good brick making earth, Manufacturing of bricks. Preparation of clay (manual/mechanically), Moulding: hand moulding and machine moulding brick table; drying of bricks, burning of bricks, types of kilns (Bull's Trench Kiln and Hoffman's Kiln), process of burning, size and weight of standard brick; traditional brick, refractory brick, clay-flyash bricks, sun dried bricks, only line diagram of kilns, Classification and specifications of bricks as per BIS: 1077, Testing of common building bricks as per BIS: 3495, Compressive strength, water absorption – hot and cold water test, efflorescence, Dimensional tolerance, soundness.

Tiles, Building tiles; Types of tiles-wall, ceiling, roofing and flooring tiles, ceramic, terrazzo and PVC tiles, cement tiles: their properties and uses, stacking of bricks and tiles at site

UNIT-II

Cement and Lime

Introduction, raw materials, flow diagram of manufacturing of cement by wet process, Various types of Cements, their uses and testing: Ordinary Portland cement, rapid hardening cement, low heat cement, high alumina cement, blast furnace slag cement, white and coloured cement, Portland pozzolana cement, super sulphated cement, Properties of cement.

Lime: Introduction: Lime as one of the cementing materials, Classification and types of lime as per BIS Code, Calcinations and slaking of lime.

UNIT-III

Timber and Wood Based Products:

Identification and uses of different types of timber: Teak, Deodar, Shisham Sal, Mango, Kail, Chir, Fur, Willow. Market forms of converted timber as per BIS Code.

Seasoning of timber: Purpose, methods of seasoning as per BIS Code. Properties of timber and specifications of structural timber. Defects in timber decay in timber, Preservation of timber and methods of treatment as per BIS.

Other wood based products, their brief description of manufacture and uses: laminated board, block board, fibre board, hard board, sunmica, plywood, and veneers, nu-wood.

UNIT-IV

Paints, Varnishes and Metals:

Introduction, purpose and use of paints, Types, ingredients, properties and uses of oil paints, water paints and cement paints, covering capacity of various paints, Types, properties and uses of varnishes.

Metals: Ferrous metals: Composition, properties and uses of cast iron, mild steel, HYSD steel, high tension steel as per BIS, Commercial forms of ferrous, metals.

UNIT-V

Miscellaneous Materials:

Plastics – Introduction and uses of various plastic products in buildings such as door water tanks and PVC pipes. Asbestos – Introduction, specification and uses of asbestos in roofing sheets, pipes and tanks.

Types and uses of insulating materials for sound and thermal insulation, Construction chemicals like water proofing compound, epoxies, polymers, Water proofing, termite proofing and fire resistance materials – types and uses, Materials used in interior decoration works like POP.

.Course outcome;

CO1: Measure the required physical, chemical and engineering properties of Building Materials.

CO2: Select the appropriate construction materials as per construction activities and specifications.

CO3: Perform the different test for quality assurance of Building Materials.

CO4: Select and justify appropriate advanced and modern building materials for various applications.

CO5: Ascertain the current market price of each and every construction material

RECOMMENDED BOOKS

1. Sharma, SK; and Mathur, GC; "Engineering Materials;" Delhi-Jalandhar, S. Chand and Co.
2. Surendra Singh; "Engineering Materials;" New Delhi, Vikas Publishing House Pvt. Ltd.
3. TTTI, Chandigarh "Civil Engineering Materials:" New Delhi Tata McGraw Hill Publication
4. Kulkarni, GJ; "Engineering Materials;" Ahmadabad, Ahmadabad Book Depot.
5. Shahane; "Engineering Materials"; Poona, Allied Book Stall.

NOTE FOR PAPER SETTER: The question paper shall comprise of 80 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER-III

Course Title: Building Construction	Max. Marks: 100
Course Code: CE – 305	External: 60
L T P	Internal Assessment: 40
4 0 0	Duration of Exam: 3 Hrs

Objective

Diploma holders in Civil Engineering are supposed to effectively supervise construction of buildings. Effective supervision is essential to obtain/provide a fault free service from contractors to users. To perform above task, it is essential that students should have knowledge of various sub components of buildings like foundations, walls, roofs, staircases, floors etc., and their constructional details as well as preventive, remedial and corrective methods of common construction faults. Therefore, the subject of Building Construction is very important for Civil Engineering diploma holders.

UNIT-I

Building, Foundation and Walls

Introduction: Definition of a building. Classification of buildings based on occupancy. Different parts of a building. Foundations: Concept of foundation and its purpose, Types of foundation-shallow and deep Shallow foundation - constructional details of: Spread foundations for walls, thumb rules for depth and width of foundation and thickness of concrete block, stepped foundation, masonary pillars and concrete columns.

Earthwork: Layout/setting out for surface excavation, cutting and filling, Excavation of foundation, trenches, shoring, timbering and de- watering.

Walls: Purpose of walls, Classification of walls - load bearing, non-load bearing, dwarf wall, retaining, breast walls and partition walls, Classification of walls as per materials of construction: brick, stone, reinforced brick, reinforced concrete, precast, hollow and solid concrete block and composite masonry walls, Partition walls: Constructional details, suitability and uses of brick and wooden partition walls, Mortars: types, selection of mortar and its preparation, Scaffolding, construction details and suitability of mason's brick layers and tubular scaffolding, shoring, underpinning.

Building Planning Site selection: Factors to be considered for selection of site for residential, commercial, industrial and public building, Basic principles of building planning, arrangement of doors, windows, cupboards etc for residential building, Orientation of building as per IS: 7662 in relation to sun and wind direction, rains, internal circulation and placement of rooms within the available area, Planning of building services.

UNIT-II

Brick and Stone Masonry

Brick Masonry: Definition of terms, bond, facing, backing, hearting, column pillar, jambs, reveals soffit, plinth masonry, header, stretcher, bed of bricks bat, queen closer, king closer, frog and quoin, course.

Bond – meaning and necessity; English, flemish bond and other types of bonds, Construction of brick walls –methods of laying bricks in walls, precautions observed in the construction of walls, methods of bonding new brick work with old (toothing, raking, back and block bonding), Expansion and contraction joints.

Stone Masonry: Glossary of terms – natural bed, bedding planes, string course, corbel, cornice, block in course grouting, moulding, templates throating, through stone, parapet, coping,

plaster and buttress, Types of stone masonry, rubble masonry, random and coursed ashlars masonry, principles to be observed in construction of stone masonry walls.

UNIT-III

Introduction of Arches, Lintels, Doors and Windows

Meaning and use of arches and lintels: Glossary of terms used in arches and lintels - abutment, pier, arch ring, intrados, soffit, extrados, voussoiers, springer, springing line, crown, key stone, skew back, span, rise, depth of an arch, haunch, spandril, jambs, bearing, thickness of lintel, effective span.

Arches: Types of Arches - Semi circular, segmental, elliptical and parabolic, flat, inverted and relieving, Stone arches and their construction, Brick arches and their construction. Lintels: Purpose of lintel, Materials used for lintels, Cast-in-situ and pre-cast lintels, Lintel along with sun-shade or chhajja.

Doors, Windows and Ventilators: Glossary of terms with neat sketches, Classification based on materials and their suitability for different situations.

Damp Proofing and Water Proofing: Dampness and its ill effects on bricks, plaster, wooden fixtures, metal fixtures and reinforcement, damage to aesthetic appearance, damage to heat insulating materials, damage to stored articles and health, sources and causes of dampness. Types of dampness - moisture penetrating the building from outside e.g. rainwater, surface water, ground moisture, Moisture entrapped during construction i.e. moisture in concrete, masonry construction and plastering work etc.Moisture which originates in the building itself i.e. water in kitchen and bathrooms etc. Damp proofing materials and their specifications: rich concrete and mortar, bitumen, bitumen mastic, polymer coating, use of chemicals. Damp proofing of: basement, ground floors, plinth and walls, special damp proofing arrangements in bathrooms, WC and kitchen, damp proofing for roofs and window sills.

UNIT-IV

Floors, Roofs and Stair cases

Glossary of terms-floor finish, topping, under layer, base course, rubble filling and their purpose. Types of floor finishes - cast-in-situ, concrete flooring (monolithic, bonded) Terrazo tile flooring, Stone (marble and kota) flooring, PCV flooring, Terrazo flooring, Timber flooring, description with sketches. The methods of construction of concrete, terrazzo and timber floors and their BIS specifications.

Roofs: Glossary of terms for pitched roofs - batten, eaves, facia board, gable, hip, lap, purlin, rafter, rag bolt, valley, ridge, Types of roofs, concept of flat, pitched and arched roofs, false ceilings using gypsum, plaster boards, cellotex, fibre boards.

Stairs, Glossary of terms: Staircase, winders, landing, stringer, newel, baluster, riser, tread, width of staircase, hand-rail, nosing, Classification of staircase on the basis of material – RCC, timber, steel, Aluminum, Planning and layout of staircase: Relations between rise and tread, determination of width of stair, landing etc, Various types of layout - straight flight, dog legged, open well, quarter turn, half turn (newel and geometrical stairs), bifurcated stair, spiral stair.

UNIT-V

Surface Finishes and Antitermite Measures

Plastering - classification according to use and finishes like grit finish, rough cast pebble dashed, concrete and stone cladding, plain plaster etc., dubbing, proportion of mortars used for different plasters, techniques of plastering and curing. Pointing - different types of pointing and their methods. Painting - preparation of surface, priming coat and application of paints on wooden, steel and plastered wall surfaces, White washing, colour washing and

distempering, polishing, application of cement and plastic paints, Commonly used water repellent for exterior surfaces, their names and applications.
Anti Termite Measures (As per IS 6313 –I – III),Introduction, site preparation and chemicals used in anti-termite treatment, Treatment of masonry foundation, Treatment of RCC foundation, Treatment of top surface of earth filling, Treatment of junction of walls and floors, Treatment along external perimeter of building, Treatment and selection of timber, Treatment in existing buildings.

Course outcome
CO1:Students are supposed to effectively supervise construction of buildings.
CO2:Students are able to know the building components like foundations, walls, roofs, stair cases, floors etc.
CO3:Their construction details as well as preventive, remedial and corrective methods of common construction faults.
RECOMMENDED BOOKS

1. Gupta, Sushil Kumar, Singla, DR, and Juneja BM; "A Text Book of Building Construction"; Ludhiana, Katson Publishing House.

2. Deshpande, RS and Vartak, GV; "A Text Book of Building Construction"; Poona, United Book Corporation.

3. Rangwala, SC: "Building Construction"; Anand, Charotar Book Stall

4. Kulkarni, GJ; "A Text Book of Building Construction"; Ahmedabad Book Depot

5. Arora, SP and Bindra, SP; "A Text Book of Building Construction"; New Delhi Dhanpt Rai and Sons.

6. Sharma,SK and Kaul, BK; "A Text Book of Building Construction"; Delhi, S Chand and Co.

7. Sushil Kumar; "Building Construction"; Standard Publishers Distributors, Delhi

8. Moorthy, NKR; "A Text Book of Building Construction"; Poona, Engineering Book Publishing Co.

9. SP – 62 Hand Book of BIS

10. B.I.S. – 6313 Part 1, 2, 3

NOTE FOR PAPER SETTER: The question paper shall comprise of 80 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit.

SEMESTER-III

Course Title: Fluid Mechanics Lab Max. Marks: 50
Course Code: CE/ME-311 External: 25
L T P Internal Assessment: 25
0 0 2

LIST OF PRACTICALS

1. To verify Bernoullis Theorem

2. To find out venturimeter coefficient

3. To determine coefficient of velocity (C_v), Coefficient of discharge (C_d) Coefficient of contraction (C_c) of an orifice and verify the relation between them

4. To perform Reynold's experiment

5. To verify loss of head in pipe flow due to
   a) Sudden enlargement
   b) Sudden contraction
   c) Sudden bend

6. Demonstration of use of current meter and pitot tube

7. To determine coefficient of discharge of a rectangular notch/triangular notch.

Course outcome

CO1: To develop fundamental knowledge of Flow in Open Channel.
CO2: To develop fundamental knowledge of Hydro Electric Power.
CO3: To develop fundamental knowledge of Measurement in open channel.

SEMESTER-III

Course Title: Applied Mechanics Lab
Course Code: CE/ /ME-312
L T P
0 0 2

Max. Marks: 50
External: 25
Internal Assessment: 25

LIST OF PRACTICALS

1. Verification of the following laws:
   a) Parallelogram law of forces
   b) Triangle law of forces
   c) Polygon law of forces
2. To verify the forces in different members of jib crane.
3. To verify the reaction at the supports of a simply supported beam.
4. To find the mechanical advantage, velocity ratio and efficiency in case of an inclined plane.
5. To find the mechanical advantage, velocity ratio and efficiency of a screw jack.
6. To find the mechanical advantage, velocity ratio and efficiency of worm and worm wheel.
7. To find mechanical advantage, velocity ratio and efficiency of single purchase crab.
8. To find out center of gravity of regular lamina.
9. To find out center of gravity of irregular lamina.
10. To determine coefficient of friction between three pairs of given surface.

Course outcome

CO1**:**Perform the testing of bricks in the field.
CO2**:**Perform the testing of concrete in the field.
CO**3:**Understand the different types of connections in the circuit.
CO4: Demonstrate the different types of engines

SEMESTER-III

Course Title: Surveying-I
Course Code: CE-313
L T P
0 0 4

Max. Marks: 100
External: 50
Internal Assessment: 50

LIST OF PRACTICALS

1. Chain surveying:
   - i) a) Ranging a line
     b) Chaining a line and recording in the field book
     c) Testing and adjustment of chain
     d) Taking offsets - perpendicular and oblique (with a tape only)
     e) Setting out right angle with a tape
   - ii) a) Chaining of a line involving reciprocal ranging
     b) Taking off sets and setting out right angles, with cross staff and Indian optical square
   - iii) Chain survey of a small area (field work and plotting)
   - iv) Chaining a line involving obstacles to ranging

2. Compass Surveying:
   - i) a) Study of prismatic compass
     b) Setting the compass and taking observations
     c) Measuring angles between the lines meeting at a point
   - ii) Traversing with the prismatic compass and chain (Recording and plotting by included angles)

3. Levelling:
   - i) a) Study of dumpy level and levelling staff
     b) Temporary adjustments of a Dumpy level
     c) Taking staff readings on different stations from the single setting and finding differences of level between them
   - ii) a) Study of IOP level
     b) Its temporary adjustments
     c) Taking staff readings on different stations from the single setting and finding differences of level between them
   - iii) Longitudinal and cross sectioning of a road/railway/canal
   - iv) Setting a gradient by dumpy and IOP level

4. Plane Table Surveying:
   - i) a) Study of the plane table survey equipment
     b) Setting the plane table
     c) Marking the North direction
     d) Plotting a few points by radiation method
   - ii) a) Orientation by
     - Trough compass

- Back sighting

b) Plotting few points by intersection, radiation and resection method

iii) Traversing an area with a plane table (at least five lines)

iv) a) Two point problem

b) Three point problem by

- Tracing paper method
- Bessel's graphical method
- Trial and Error method

5. Layout of Buildings (from given drawing of two room residential building)

Course outcome

CO1: Understand the concepts of chain surveying and measurements of survey line using chain.
CO2: Learn the calculation of angles and bearings using Prismatic Compass in the field.
CO3:Level the different terrains using levelling equipment like dumpy level and auto level.
CO4: Draw different plans using plane table surveying.

SEMESTER-III

Course Title: Construction Materials Max. Marks: 50
Course Code: CE-314 External: 25
L T P Internal Assessment: 25
0 0 2

LIST OF PRACTICALS

1. To identify different types of stones
2. To determine the crushing strength of bricks
3. To determine the water absorption of bricks and stones
4. To identify various types of timbers such as: Teak, Sal, Chir, Sissoo, Deodar, Kail & Hollock
5. To determine fineness (by sieve and Blaine method) of cement
6. To determine normal consistency of cement
7. To determine initial and final setting times of cement
8. To determine soundness of cement
9. To determine compressive strength of cement

Course outcome

CO1:Performing different tests on the properties of materials like specific gravity of aggregates etc.
CO2:Performing different tests on bricks and concrete

SEMESTER-III

Course Title: Civil Engineering Drawing-I Max. Marks: 100
Course Code: CE-315 External: 50
L T P Internal Assessment: 50
0 0 2

RATIONALE

Drawing is the language of engineers. Engineering is incomplete without a thorough knowledge of drawing. A Civil Engineering diploma holder must be capable of sketching detailed constructional drawing of various components of building for the purpose of communication with the craftsman. Planning of small buildings, developing a line plan, dimensioning, key plan, drainage plan should be a part of curriculum. The diploma engineer must be conversant with reading and interpretation of drawing for execution of work.

Drawing No. 1:
Details of spread footing foundations, load bearing and non-load bearing wall for given thickness of walls with the help of given data or rule of the thumb, showing offsets, position of DPC. The details of the concrete and brick plinth protection have to be shown in the drawing.

Drawing No. 2:
Plans of 'T' and Corner junction of walls of 1 Brick, 1-1/2 Brick and 2 brick thick in English bond

Drawing No. 3:
Detailed drawing of basement, single wooden floor, double wooden floor.

Drawing No.4
Elevation, sectional plan and sectional side elevation of flush door, glazed door, panelled door and window, Aluminium door and window with wire gauge shutter. Sketches of various joints of different members.

Drawing No.5
Draw atleast one sheet using CAD software

Drawing No. 6:
Drawing plan, elevation of a small building by measurement and foundation detail and sectional elevation.

Drawing No.7 (a)
Drawing detailed plan, elevation and section of a two room residential building from a given line plan, showing details of foundations, roof and parapet

Drawing No. 7 (b)
Draw detailed plan, elevation and section of:
(i) Single flight R.C.C. stair case
(ii) Dog legged wooden stair case

Drawing No. 8
Drawings of following floors
Cement concrete floors on ground and at first floor

i) Conglomerate (Concrete Flooring)
ii) Bonded cement concrete flooring
iii) Terrazo flooring
iv) Ceramic/vitrified tile flooring

Drawing No. 9:
Drawing of flat roof, showing the heat/thermal insulation provisions.

Drawing No.10
Draw atleast one sheet using CAD software

Drawing No. 11
Drawing details of damp proofing arrangement of roofs and walls as per BIS Code. Show the rain water drainage arrangement also.

NOTE:

a) All drawings should be as per BIS code and specifications in SI Units
b) Intensive practice of reading and interpreting building drawings should be given
c) Some practice should be done to prepare drawings on AutoCAD

Course outcome
Co1 ; How to understand the drawing.
Co2; Draw different types of foundations.
Co3; Draw the drefferent civil engineering structures.
RECOMMENDED BOOKS

1. Civil Engineering Drawing by RS Malik, Asia Publishing House
2. Civil Engineering Drawing by V.B.Sikka. Katson Publishing, Ludhiana
3. Civil Engineering Drawing by NS Kumar; IPH, New Delhi
4. Principles of Building Drawing by MG Shah and CM Kale, MacMillan, Delhi
5. Building Construction by Moorthy NRK
6. Civil Engg Drawing by Layal
7. Zaidi, SKA and Siddiqui, Suhail; Drawing and Design of Residential and Commercial Buildings, Standard Publishers and Distributors, Delhi.
8. SP : 20
9. National Building Code

SEMESTER-III

Course Title: Ecology and Environmental Awareness Camp Max. Marks: 50

Course Code: CE-316 Internal Assessment: 50

L T P

0 0 4

ECOLOGY AND ENVIRONMENTAL AWARENESS CAMP

A diploma holder must have knowledge of different types of pollution caused due to industries and constructional activities so that he may help in balancing the eco system and controlling pollution by pollution control measures. He should also be aware of environmental laws related to the control of pollution.

This is to be organized at a stretch for 3 to 4 days. Lectures will be delivered on following broad topics. There will be no examination for this subject.

1. Basics of ecology, eco system and sustainable development

2. Conservation of land reforms, preservation of species, prevention of advancement of deserts and lowering of water table

3. Sources of pollution - natural and man made, their effects on living and non-living organisms

4. Pollution of water - causes, effects of domestic wastes and industrial effluent on living and non-living organisms

5. Pollution of air-causes and effects of man, animal, vegetation and non-living organisms

6. Sources of noise pollution and its effects

7. Solid waste management; classification of refuse material, types, sources and properties of solid wastes, abatement methods, methods of vermicomposting

8. Mining, blasting, deforestation and their effects

9. Legislation to control pollution and protect environment

10. Environmental Impact Assessment (EIA), Elements for preparing EIA statements

11. Current issues in environmental pollution and its control, Global warming
. Green house gases, non-conventional sources of energy, introduction to clean technology, carbon credits.

12. Introduction to Green buildings, site selection, material efficiency, energy efficiency, water efficiency, building form.

SEMESTER-IV

Course Title: Concrete Technology — Max. Marks: 100
Course Code: CE - 401 — External: 60
L T P — Internal Assessment: 40
4 0 0 — Duration of Exam: 3 Hrs

RATIONALE

Diploma holders in Civil Engineering are supposed to supervise concreting operations involving proportioning, mixing, transporting, placing, compacting, finishing and curing of concrete. To perform above functions, it is essential to impart knowledge and skills regarding ingredients of concrete and their properties; properties of concrete in plastic and hardened stage, water cement ratio and workability; proportioning for ordinary concrete; concreting operations and joints in concrete

UNIT-I

Concrete and its Ingredients

Definition of concrete, brief introduction to properties of concrete, uses of Concrete in comparison to other building materials. Ingredients of Concrete: Cement, physical properties of cement; different types of cement.

Aggregates: Classification of aggregates according to size and shape, Characteristics of aggregate, Particle size and shape, surface texture, Specific gravity of aggregate bulk density, water absorption, surface moisture, Bulking of sand, deleterious materials soundness. Grading of aggregates: Course aggregate, fineness aggregate; All-in-aggregate; fineness modulus; interpretation of grading charts. Water Quality requirements as per IS: 456-2000

UNIT-II

Properties of Concrete

Properties in plastic state, Workability, Segregation, Bleeding and Harshness, Properties in hardened state: Strength, Durability, Impermeability, Dimensional changes;

Principle of water-cement ratio law/Duff Abram's Water-cement ratio law. Limitations of water-cement ratio law and its effects on strength of concrete.

UNIT-III

Workability and Proportioning

Measurement of workability slump test, compacting factor and vee bee consistometer; recommended slumps for placement in various conditions as per IS: 456-2000 SP-23

Objectives of mix design, introduction to various grades as per IS: 456-2000, Proportioning for nominal mix design as prescribed by IS 456-2000.

Adjustment on site for: Bulking of fine aggregate, water absorption of aggregate, workability. Difference between nominal and controlled concrete.

UNIT- IV

Special Concretes and Admixtures

Admixtures (Introduction as per IS: 456-2000): Chemical admixtures, Mineral admixtures such as Fly ash, Silica fumes, Rice husk ash, Meta Kaolin.

Special Concrete: Concreting under special conditions, difficulties and precautions before, during and after concreting in Cold weather concreting, under water concreting and hot weather concreting.

Ready mix concrete, Fiber reinforced concrete, Fly ash concrete, Self compacting concrete.

UNIT-V

Concreting Operations

Storing of Cement: Storing of cement in a warehouse, Storing of cement at site, Effect of storage on strength of cement, Determination of warehouse capacity for storage of Cement, Storing of Aggregate, Storing of aggregate on site.

Batching: Batching of Cement, Batching of aggregate by, Volume, using gauge box (farma) selection of proper gauge box, Weight spring balances and by batching machines. Measurement of water

Mixing: Hand mixing, Machine mixing – (types of mixers, capacities of mixers, choosing appropriate size of mixers, operation of mixers). Maintenance and care of machines.

Transportation of concrete Transportation of concrete using pans, wheel barrows, transit mixers, chutes, belt conveyors, pumps, tower crane and hoists etc.

Placement of concrete: Checking of form work, shuttering and precautions to be taken during placement

Compaction: Hand compaction, Machine compaction – (types of vibrators, internal screed vibrators and form vibrators) Selection of suitable vibrators for different situations

Finishing concrete slabs - screeding, floating and toweling

Curing: Objective of curing, methods of curing like ponding, membrane curing, steam curing, Chemical curing, Duration for curing and removal of form work

Jointing: Location of construction joints, treatment of construction joints, expansion joints in buildings - their importance and location

Defects in concrete, Identification of and methods of repair. Importance and methods of non-destructive tests (introduction only)

Course outcome

CO1: To know the basic properties of ingredients of concrete.

CO2: To know about the different tests of cement and aggregate.

CO3: To know about the workability and strength of concrete.

CO4: To know the different type of concrete and mix design.

CO5: To know about the concreting techniques.

RECOMMENDED BOOKS

1. Kulkarni, PD; Ghosh, RK and Phull, YR; "Text Book of Concrete Technology"; New Delhi Oxford and IBH Publishing Co.
2. Krishnamurthy, KT; Rao, A Kasundra and Khandekar, AA; "Concrete Technology"; Delhi, Dhanpat Rai and Sons.
3. Gupta BL and Gupta Amit; "Text Book of Concrete Technology"; Standard Publishers Distributors, Delhi.
4. Varshney, RS;"Concrete Technology";New Delhi, Oxford and IBH Publishing
5. Neville, AM; "Properties of Concrete" London, Pitman (ELBS Edition available)
6. Orchard; "Concrete Technology"; Vol I, II, and III
7. Handoo, BL; and Puri, LD;"Concrete Technology"; New Delhi, Satya Prakashan
8. Sood, Hemant, Mittal LN and Kulkarni PD; "Laboratory Manual on Concrete Technology", CBS Publishers, New Delhi, 2002

9 Vazirani, VN; and Chandola, SP; "Concrete Technology"; Delhi, Khanna Publishers

10 Gambhir, ML; “Concrete Technology"; New Delhi, MacMillan India Ltd.

11 Siddique, R., “Special Structural Concretes”, New Delhi, Galgotia Publishers Pvt. Ltd. Delhi

12 Birinder Singh, “Concrete Technology”, Ludhiana, Kaption Publications

NOTE FOR PAPER SETTER: The question paper shall comprise of 80 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER-IV

Course Title: Water Supply and Waste Water Engineering Max. Mark: 100
Course Code: CE - 402 Extern: 80
L T P Internal Assessment: 40
4 0 0 Duration of Exam: 3Hrs

RATIONALE

One of the basic necessities of life is water which is not easily available to a lot of people. Providing potable water at the first place then collection and disposal of waste solids and liquids are important activities of civil engineering field. This subject provides basic knowledge and skills in the field of water supply system and waste disposal system. Classroom instructions should be suplimented by field visits to show functional details of water supply and waste disposal systems. It will also be advantageous to invite professionals from field to deliver extension lectures on specialised operations

UNIT-I
Introduction
Necessity and brief description of water supply system. Quantity of Water : Water requirement, Rate of demand and variation in rate of demand, Per capita consumption for domestic, industrial, public and fire fighting uses as per BIS standards (no numerical problems), Population Forecasting.
Sources of Water: Surface water sources, their quality and suitability, Sub surface water sources, quality and suitability
Quality of Water: Meaning of pure water and methods of analysis of water. Physical, Chemical and bacteriological tests and their significance. Standard of potable water as per Indian Standard.
Maintenance of purity of water

UNIT-II
Treatment and Conveyances
Water Treatment (brief introduction): Sedimentation - purpose, types of sedimentation tanks. Coagulation flocculation - usual coagulation and their feeding. Filtration - significance, types of filters, their suitability. Necessity of disinfection of water, forms of chlorination, break point Chlorine, residual chlorine, application of chlorine. Flow diagram of different treatment units, functions of (i) Areation fountain (ii) mixer (iii) floculator, (iv) classifier, (v) slow and rapid sand filters (vi) chlorination chamber
Conveyance of water: Different types of pipes - cast iron, PVC, steel, asbestos cement, concrete & lead pipes. Their suitability & uses, types of joints in different types of pipes.
Appurtenances: Sluice, air, reflux valves, relief valves, scour valves, bib cocks, stop cocks, fire hydrants, and water meters their working and uses. Distribution site: Requirement of distribution, minimum head and rate, methods of layout of distribution pipes. Systems of water supply - Intermittent and continuous service reservoirs - types, necessity and accessories. Wastage of water - preventive measures. Maintenance of distribution system, Leakage detection.

UNIT-III
Water Supply and Drainage in Buildings
Laying out Pipes: Setting out alignment of pipes, Excavation for laying of pipes and precautions to be taken, Handling, lowering beginning and jointing of pipes, testing of pipe lines.

Back filling, Use of boring rods.
Building Water Supply: General principles as per Indian Standards, Connections to water main water supply fixtures and installations and terminology related to plumbing.
Building Drainage: Aims of building drainage and its requirements, General layout at house drainage arrangement as per BIS: 1742. Different sanitary fittings and installations, Traps, seals, causes of breaking seals. Testing of house drainage.

UNIT-IV

Introduction to Waste Water Engineering

Purpose of sanitation, Necessity of systematic collection and disposal of waste. Definition of terms in sanitary engineering, Collection and conveyance of sewage. Conservancy and water carriage systems, their advantages and Disadvantages.
Sewerage System: Types of sewages, Types of sewerage systems, materials for sewers, their sizes and joints. Appurtenance: Location, function and construction features. Manholes, drop manholes, tank hole, catch basin, inverted siphon, flushing tanks grease and oil traps, storm regulators, ventilating shafts.

UNIT-V

Sewers and Sewerage Disposal

Laying and construction of Sewers: Setting out/alignment of sewers. Excavations, checking the gradient with boring rods preparation of bedding, handling and jointing testing and back filling. Construction of surface mains and different sections required.
Natural Methods of Sewage Disposal: General composition of sewage and disposal methods, Disposal by dilution, Self purification of stream, Disposal by land treatment, Nuisance due to disposal. Sewage Treatment: Meaning and principle of primary and secondary treatment and their flow diagrams
Introduction and uses of screens, grit chambers, detritus tanks, skimming tanks, plain sedimentation tanks, primary clarifers, secondary clarifers, filters, control beds, intermittent sand filters, trickling filters, sludge treatment and disposal, oxidation ponds

Course outcome

CO1: Select or construct appropriate treatment schemes to remove certain pollutants present in water or wastewater.

CO2: Balance chemical reactions and use balanced reactions to determine the distribution of species at equilibrium.

CO3: Develop a mass balance expression for contaminants under different case scenarios and design a simple system to meet desired needs.

REFERENCES

1. Duggal, KN; "Elements of Public Health Engineering" New Delhi, S. Chand & Co.
2. Rangwala, SC; "Water Supply and Sanitary Engineering"; Anand Charotar Book Stall
3. Kshirsagar, SR; "Water Supply Engineering"; Roorkee Publishing House
4. Kshirsagar, SR; "Sewage and Sewage Tratement"; Roorkee, Roorkee Publishing House
5. Hussain, SK; "Text Book of Water Supply and Sanitary Engineering"; New Delhi, Oxford and IBH Publishing Co
6. Birdie, GS; "Water Supply and Sanitary Engineering"; Delhi Dhanpat Rai and Sons
7. Steel, EW; "Water Supply and Sewerage"; McGraw Hill.
8. .Duggal, Ajay K and Sharma, Sanjay, "A Laboratory Manual in Public Health Engineering", New Delhi, Galgotra Publications, 2006.

NOTE FOR PAPER SETTER: The question paper shall comprise of 80 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER-IV

Course Title: Irrigation Engineering Max. Marks: 100
Course Code: CE -403 External: 60
L T P Internal Assessment: 40
4 0 0 Duration of Exam: 3 Hrs

RATIONALE

Diploma holders in civil engineering have to supervise the construction, repair and maintenance of canals, head works, river training works, cross drainage works, regulatory and other works . Some of diploma holders are also engaged for preventing water logging and irrigation by tubewells. This subject imparts knowledge regarding hydrology, flow irrigation – storage and distribution system, constructional features of head works, river training works, cross drainage works, causes and prevention of water logging and construction of tube wells.

UNIT-I
Introduction:
Definition of irrigation, Necessity of irrigation, History of development of irrigation in India. Major, medium and minor irrigation projects. Principal crops in India and their water requirements. Crop seasons – Kharif and Rabi. Soil water, soil crop and crop water relationships, Duty, Delta and Base Period, their relationship. Gross commanded area (GCA), culturable commanded area (CCA), Intensity of Irrigation, Irrigable area
Hydrological Cycle Catchment Area and Run-off . Rainfall, definition rain-gauges – automatic and non-automatic, methods of estimating average rainfall (Arithmetic system); catchment area runoff, factors affecting runoff, hydrograph, basic concept of unit hydrograph.

UNIT-II
Methods of Irrigation, Water logging and Drainage
Flow irrigation - its advantages and limitations. Lift Irrigation – Tube well and well irrigation advantages and disadvantages. Sprinkler irrigation conditions favorable and essential requirements for sprinkler irrigation, sprinkler system – classification and component parts. Drip irrigation, suitability of drip irrigation, layout, component parts, and advantages.
Water Logging and Drainage and Ground Water Re-charge . Definition of water logging - its causes and effects, detection, prevention and remedies. Surface and sub-surface drains and their layout. Concept and various techniques used for ground water re-charge.

UNIT-III
Canals, Cross Drainage and Allied Hydraulic Structure
Classification, apurtenancs of a canal and their functions, sketches of different canal cross-sections. Various types of canal lining - their related advantages and disadvantages, sketches of different lined canal x-sections
Functions and necessity of the following types: aqueduct, super passage, level crossing, inlet and outlet. Sketches of the above cross drainage works. Definitions of following Hydraulic Structures with Sketches:
a) Falls b) Cross and head regulators c) Outlets d) Canal Escapes

UNIT-IV

Tube Well Irrigation

Introduction, occurrence of ground water, location and command, advantages and disadvantages, comparison with canal irrigation. Tube wells, explanation of terms: water table, radius of influence, depression head, cone of depression, confined and unconfined aquifers. Yield of a well and methods of determining yield of well.

Types of tube wells and their choice-cavity, strainer and slotted type; Method of boring, installation of well assembly, development of well, pump selection and installation and maintenance. Ground water recharging (concept only)

UNIT-V

Dams and canal Head Works

Classification of dams; earth dams - types, causes of failure; cross-section of zoned earth dam, gravity dams – types, cross-sections of a dam. Concept of small and micro dams. Concept of spillways and energy dissipaters. Definition, object, general layout, functions of different parts of head works. Difference between weir and barrage.

Methods of river training, guide banks, retired (levees) embankments, groynes and spurs, pitched island, cut-off

Course outcome

CO1: To train the students and develop basic understanding of soil water plant relationship and select and design appropriate method of water application in varied situations.

CO2: Students are acquainted with the knowledge of construction, repair and maintenance of canals, headworks, river training works, cross drainage works.

CO3: Students are able to know the causes and prevention of water logging and construction of tubewells.

RECOMMENDED BOOKS

1. Bharat Singh, `Fundamentals of Irrigation Engineering', Roorkee, Nem Chand and Bros
2. Garg, Santosh Kumar, `Irrigation Engineering and Hydraulics Structures', Delhi, Khanna Publishers
3. Punmia, BC; and Pande Brij Bansi Lal, `Irrigation and Water Power Engineering', Delhi, Standard Publishers Distributors
4. Sharma, RK; `Text Book of Irrigation Engineering and Hydraulics Structures', New Delhi, Oxford and IBH Publishing Company
5. Sharma, SK; `Principles and Practice of Irrigation Engineering', New Delhi, Prentice Hall of India Pvt. Ltd.
6. Varshney RS, Gupta SC, Gupta RL etc. “Theory and Design of Irrigation Structures”, Vol. I and II
7. Saharsabudhe SR, “Irrigation Engineering and Hydraulic Structures”

NOTE FOR PAPER SETTER: The question paper shall comprise of 80 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER-IV

Course Title: Surveying – II	Max. Marks: 100
Course Code: CE - 404	External: 60
L T P	Internal Assessment: 40
4 0 0	Duration of Exam: 3Hrs

RATIONALE

The important functions of a civil engineer includes the jobs of detailed surveying, plotting of survey data, preparation of survey maps and setting out works

While framing the curriculum for the subject of surveying, stress has been given to the development of knowledge and skill in theodolite surveying, tachometry surverying, curves and use of minor and modern instruments have been included in this subject.

Field work should be a selected one so that student can check his work and have an idea of the results the extent of error in the work done by him. As far as possible, the surveys done should be got plotted, as this will also reveal errors in the work and develop skill in plotting.

UNIT-I
Contouring.
Concept of contours, purpose of contouring, contour interval and horizontal equivalent, factors effecting contour interval, characteristics of contours, methods of contouring: Direct and indirect, use of stadia measurements in contour survey, interpolation of contours; use of contour map, Drawing cross section from a contour map; marking alignment of a road, railway and a canal on a contour map, computation of earth work and reservoir capacity from a contour map.

UNIT-II
Theodolite Surveying.
Working of a transit vernier theodolite, axes of a theodolite and their relation; temporary adjustments of a transit theodolite; concept of transiting, swinging, face left, face right and changing face; measurement of horizontal and vertical angles. Prolonging a line (forward and backward) measurement of bearing of a line; traversing by included angles and deflection angle method; traversing by stadia measurement, theodolite triangulation, plotting a traverse; concept of coordinate and solution of omitted measurements (one side affected), errors in theodolite survey and precautions taken to minimize them; limits of precision in theodolite traversing. Height of objects – accessible and non-accessible bases

UNIT-III
Tacho-metric surveying.
Tachometry, Instruments to be used in tachometry, methods of tachometry, stadia system of tachometry, general principles of stadia tachometry, examples of stadia tachometry

UNIT-IV
Curves
Simple Circular Curve: Need and definition of a simple circular curve; Elements of simple circular curve - Degree of the curve, radius of the curve, tangent length, point of intersection

(Apex point), tangent point, length of curve, long chord deflection angle, Apex distance and Mid-ordinate. Setting out of simple circular curve
a) By linear measurements only: (Offsets from the tangent, Successive bisection of arcs, Offsets from the chord produced). b) By tangential angles using a theodolite.
Transition Curve: Need (centrifugal force and super elevation) and definition of transition curve; requirements of transition curve; length of transition curve for roads; by cubic parabola; calculation of offsets for a transition curve; setting out of a transition curve by tangential offsets only .Vertical curve, Setting out of a vertical curve.

UNIT-V
Minor Instruments
Introduction to the use of the instruments given below to be explained in addition to providing practice . Abney level , Tangent clinometers, Ceylon Ghat Tracer , Pentagraph and Plainimeter.
Introduction to the use of Modern Surveying equipment and techniques such as: Auto level , Digital Plainimeter , Micro-optic Theodolite , Digital Theodolite, EDM and GPS , Total station and Introduction to remote sensing.

Course outcome
1. calculate angles, distances and levels
2. prepatre field notes.
3 Make use of different surveying methods.

RECOMMENDED BOOKS

1) Narinder Singh; "Surveying"; New Delhi, Tata McGraw Hill Publishing Co Ltd.

2) Hussain, SK and Nagraj, MS; "Text Book of Surveying"; New Delhi, S Chand and Co Ltd.

3) Deshpande, RS; "A Text Book Surveying and Levelling"; Poona, United Book Corporation

4) Kocher, CL; "A Text Book of Surveying"; Ludhiana, Katson Publishing House

5) Kanetkar,TP and Kulkarni, SV., "Surveying and Leveling", Poona, AVG Parkashan

6) Kanetkar, TP; and Kulkarni, SV; "Surveying and Leveling-Vol.2" Poona, AVG Prakashan

7) Punima, BC; "Surveying and Leveling - Vol. 2", Delhi Standard Publishers Distributors, Delhi

8) Shahai, PB; "A Text Book of Surveying Vol. 2", Oxford and IBH Publishing Co.

9) Lilly Sant “Remote Sensing and Image Interpretation”

NOTE FOR PAPER SETTER: The question paper shall comprise of 80 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER-IV

Course Title: Structural Mechanics	Max. Mark: 100
Course Code: CE - 405	Externl: 80
L T P	Internal Assessm20
4 0 0	Duration of Exam: 3Hrs

RATIONALE

This is a basic engineering subject. The purpose of the subject is to impart basic knowledge and skill regarding properties of materials, concept of stresses and strains, bending moment and shear force diagrams, second moment of area, bending and shear stresses, slope and deflection and analysis of trusses. The above knowledge will be useful for designing simple structural components. This subject is very important to develop basic concepts and principles related to strength of materials. This subject will also enable the students to continue their further education

UNIT-I

Simple Stresses and Strains.

Simple Stresses and Strain: Concept of stress, normal and shear stresses, stresses due to torsion. Concept of strain and deformation, longitudinal and transverse strain, poison's ratio, volumetric strain.

Hooke's law, modulii of elasticity and rigidity, Bulk modulus of elasticity, relationship between the elastic constants.

Stresses and strains in bars subjected to tension and compression. Extension of uniform bar under its own weight, stress produced in compound bars (two or three) due to axial load. Stress-strain diagram for mild steel, mechanical properties, factor of safety. Temperature stresses and strains.

UNIT-II

Bending Moment and Shear Force.

Concept of a beam and supports (Hinges, Roller and Fixed), types of beams: simply supported, cantilever, propped, over hang, cantilever, fixed and continuous beams, introduction to determinate and indeterminate structures.

Types of loads (dead load, live load, snow load, wind load seismic load etc) and types of loading (point, uniformly distributed and uniformly varying loads). Concept of bending moment and shear force, sign conventions.

Bending Moment and shear force diagrams for cantilever, simply supported and overhanging beams subjected to concentrated, uniformly distributed

Relationship between load, shear force and bending moment, point of maximum bending moment, and point of contra flexure.

UNIT-III

Bending and Shear Stresses

Concept of pure/simple bending, Assumptions made in the theory of simple bending and application of bending equation (no derivation) to circular cross-section, I section, T&L sections only.

Moment of resistance: Calculations of bending stresses in simply supported beam. Concept of shear stresses in beams, shear stress distribution in rectangular, circular I, T, L sections (Formula to be stated, no derivation)

Slope and Deflection: Necessity for determination of slope and deflection, Moment area theorem (no derivation, no numerical)

UNIT-IV
Columns
Theory of columns, Euler's and Rankine Formula, Combined Direct and Bending Stresses: Concentric and eccentric loads, single axis eccentricity only.
Effect of eccentric load on the section, stresses due to eccentric loads, numerical in the case of short columns. Simple problems on stability of masonry retaining walls (overturning and sliding)

UNIT-V
Analysis of Trusses.
Concept of perfect, redundant and deficient frames. Assumptions and analysis of trusses by: (a) Method of joints (b) Method of sections.

Course outcome

CO1**:**Properties of materials, concept of stresses and strains,
CO2**:**Bending moment and shear force diagrams, second moment of area,
CO3:Bending and shear stresses,
CO4**:**Slope and deflection
CO5**:**Analysis of trusses

RECOMMENDED BOOKS

1. Vazirani, VN and Ratwani, MM., "Analysis of Structures Vol. I", Delhi, Khanna Publishers.
2. Ramamrutham, S., "Strength of Materials", New Delhi Dhanpat Rai and Sons.
3. Punmia, BC., "Strength of Materials", Delhi, Standard Publishers Distributors.
4. Natrajan, V., "Elements of Strength of Materials", New Delhi, Oxford and IBH Publishing Co.
5. Ram Chandra, "Applied Mechanics and Strength of Materials", Delhi: Standard Publishers.
6. VS prasad "Structural mechanics; Galgotia publications Pvt ltd.
7. Chakarborty, 'Strength of Materials; SK Kataria and Sons
8. RK Dhawan, 'A Text Book on Strength of Materials", Jalandhar IPH
9. SS Bhavikatti, "Structural Analysis" Vol. I & II, Vikas Publishing House Pvt. Ltd., New Delhi
10. Sadhu Singh "Strengths of Materials" Standard Publishers, New Delhi

NOTE FOR PAPER SETTER: The question paper shall comprise of 80 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER-IV

Course Title: Concrete Technology Max. Marks: 50
Course Code: CE - 411 External: 25
L T P Internal Assessment: 25
0 0 2

LIST OF PRACTICALS

1. To determine the physical properties of cement as per BIS Codes
2. To determine flakiness and elongation index of coarse aggregates
3. Method to determine silt in fine aggregate
4. Determination of specific gravity and water absorption of aggregates
5. Determination of bulk density and voids of aggregates
6. Determination of particle size distribution of fine, coarse and all in aggregate by sieve analysis (grading of aggregate)
7. To determine necessary adjustment for bulking of fine aggregate
8. To determine workability by slump test:
   a) To verify the effect of water, fine aggregate/coarse aggregate ratio and aggregate/Cement ratio on slump
   b) To test compressive strength of concrete cubes with varying water cement ratio
9. Compaction factor test for workability
10. Non destructive test on concrete by:
    a) Rebound Hammer Test
    b) Ultrasonic Pulse Velocity Test
11. Tests for compressive strength of concrete cubes for M-20

Course outcome

CO1: Outline the importance of testing of cement and its properties
CO2: Assess the different properties of aggregate
CO3: Summarise the concept of workability and testing of concrete
CO4: Describe the preparation of green concrete
CO5: Describe the properties of hardened concrete

SEMESTER-IV

Course Title: Water Supply and Waste Water Engineering Max. Marks: 50
Course Code: CE - 412 External: 25
L T P Internal Assessment: 25
0 0 2

LIST OF PRACTICALS

1) To determine turbidity of water sample

2) To determine dissolved oxygen of given sample

3) To determine pH value of water

4) To perform jar test for coagulation

5) To determine BOD of given sample

6) To determine residual chlorine in water

7) To determine conductivity of water and total dissolved solids

8) To study the installation of following:
   a) Water meter
   b) Connection of water supply of building with main
   c) Pipe valves and bends
   d) Water supply and sanitary fittings

9) To study and demonstrate the joining/threading of GI Pipes, CI Pipes, SW pipes, and plastic pipes

10) To demonstrate the laying of SW pipes for sewers

Course outcome

CO1: Student will come to know about physical and chemical characteristics of water and wastewater.
CO2: To learn the permissible limits of physical and chemical characteristics of water
CO3: To acquire the knowledge of estimation of ambient air quality

SEMESTER-IV

Course Title: Surveying-II Max. Marks: 100
Course Code: CE-413 External: 50
L T P Internal Assessment: 50
0 0 4

LIST OF PRACTICALS

1. Contouring:
   i) Preparing a contour plan by radial line method by the use of a Tangent Clinometer/Tachometer
   ii) Preparing a contour plan by method of squares
   iii) Preparing a contour plan of a Road/Railway track/Canal by taking cross sections.

2. Theodolite:
   i) Taking out the Theodilite, mounting on the tripod and placing it back in the box
   ii) Study of a transit vernier theodolite; temporary adjustments of theodolite
   iii) Reading the vernier and working out the least count, measurement of horizontal angles by repetition and reiteration methods
   iv) Measurement of vertical angles and use of tachometric tables
   v) Measurement of magnetic bearing of a line
   vi) Running a closed traverse with a theodolite (at least five sides) and its plotting
   vii) Height of objects with and without accessible bases

3. Curves
   i) Setting out of a simple circular curve with given data by the following methods
      a) Offsets from the chords produced
      b) One theodolite method

4. Minor instruments:
   i) Demonstration of minor instruments like Ceylon Ghat Tracer, Tangent Clinometer, Pantagraph etc.
   ii) Use of planimeter for computing areas

5. Demonstration of digital instruments like Autolevel, digital planimeter, microoptic theodolite, digital theodolite, digital distance meter, GPS etc.

Course outcome

CO1: Understand the concepts of contouring and preparation of contour maps. Learn working of a Theodolite both in class work and field work.
CO2:Understand different types of curves and their setting out.
CO3:Understand the use of instruments like Abney's Level, Pentagraph and Planimeter

SEMESTER-IV

Course Title: Structural Mechanics Max. Marks: 50
Course Code: CE - 414 External: 25
L T P Internal Assessment: 25
0 0 2

LIST OF PRACTICALS

1. Determination of yield stress, ultimate stress, percentage elongation and plot the stress strain diagram and compute the value of young's modulus on mild steel

2. Determination of Young's modulus of elasticity for steel wire with searl's apparatus

3. Determination of modulus of rupture of a timber beam

4. Determination of maximum deflection and young's modulus of elasticity in simply supported beam with load at middle third
5. Verification of forces in a framed structure

Course outcome

1. Understand elastic behavior of materials.
2.Determine the compressive and tensile strength of materials
3.Measure deflection and young's modulus of elasticity in simply supported beam with load at middle third,.

SEMESTER-IV

Course Title: **Civil Engineering Drawing-II** Max. Marks: 100
Course Code: CE - 415 External: 50
L T P Internal Assessment: 50
0 0 4

RATIONALE

Diploma holders in Civil Engineering are expected to supervise construction of water supply and wastewater treatment works and irrigation structures. This subject aims at imparting skills for preparing water supply and waste water and irrigation engineering drawings to develop competencies for reading the drawings, and their execution in their field

DETAILED CONTENTS

Drawings Exercises

A) WATER SUPPLY AND WASTE WATER ENGINEERING DRAWING

1. Drains and Sewers
   Cross section of standard types of open drains (circular, v-shaped and μ-shaped) with their foundations
   Cross section of earthen ware and RCC sewer pipes
   Cross sections of masonry sewers (circular and egg shaped)

2. Traps, manholes and inspection chamber
   Detailed section of floor trap and gully trap
   Detailed plan and section of an inspection chamber
   Detailed plan and section of a manhole

3. Septic Tank and Soak Pit
   Detailed plan and cross sections of a domestic septic tank with soak pit for 10 and 50 users

4. Bath room and W.C connections:
   4.1 Cross-section through the external wall of lavatories at ground and first floor showing the one and two pipe system and the connections of the lavatory to inspection chamber
   4.2. Plan of a bathroom showing positions of lavatory, bath tub, wash-basin, taps and showers

5. Draw sectional elevation of a two storeyed building showing details of one pipe and two pipes systems with sanitation system.
6. Practice of reading water supply and sanitary engineering working drawings (PWD/urban Development agencies) including hot water and cold water supply system of a two room set.
7. Detailed Layout Plan of Sewage Treatment Plant for a residential area and Effluent Treatment Plant for an industrial unit.

B) IRRIGATION ENGINEERING DRAWING:

1. Typical cross-section of a channel
   - L-section of a channel for given data
   - Typical cross section of an unlined and lined channel in cutting, partly cutting and partly filling and fully in filling with given design data.

2. Layout plan of a canal head works.
3. Draw the typical L-section of a weir
4. Draw the X-section of an Earthen Dam
   i) Homogeneous
   ii) Zoned type
   iii) Diaphragm type

5. Cross section of a tube well
6 Layout and cross section of rain water harvesting system.

Course outcome

CO1: Draw different cross sections of canals
CO2: Draw cross section of canal head works.
CO3: Draw cross section of dams.

INSTRUCTIONAL STRATEGY

Teachers are expected to develop skills in preparation and interpretation of water supply and waste water engineering drawings as per BIS codes of practice. Attention must be paid towards line work, specifications writing, dimensioning, proportioning and accuracy for industrial unit at different intervals of time. Reading and interpreting actual field drawings should also be practiced so as to develop necessary competency in the students.

RECOMMENDED BOOKS

1. Layal JS "Civil Engineering Drawing", Satya Parkashan, New Delhi
2. Chandel RP " Civil Engineering Drawings"
3. Kumar; NS " Civil Engineering Drawing " IPH, New Delhi
4. Malik RS and Meo GA, "Civil Engineering Drawing" Asian Publishing House, New Delhi

SEMESTER-IV

Course Title: Entrepreneurial Awareness Camp
Course Code: CE-416
L T P
0 0 4

Max. Marks: 50
Internal Assessment: 50

ENTREPRENEURIAL AWARENESS CAMP

This is to be organized at a stretch for two to three days during or at the end of 4th semester. Lectures will be delivered on the following broad topics. There will be no examination for this subject.

1. Who is an entrepreneur?
2. Need for entrepreneurship, entrepreneurial career and wage employment
3. Scenario of development of small scale industries in India
4. Entrepreneurial history in India, Indian values and entrepreneurship
5. Assistance from District Industries Centres, Commercial Banks. State Financial Corporations, Small industries Service Institutes, Research and Development Laboratories and other financial and development corporations
6. Considerations for product selection
7. Opportunities for business, service and industrial ventures
8. Learning from Indian experiences in entrepreneurship (Interaction with successful entrepreneurs)
9. Legal aspects of small business
10. Managerial aspects of small business

Course outcome

CO1: Student Generic skills have emerged as an important component of employability skills, which enable an individual to become and remain employable over lifetime and to lead happy and prosperous life
CO2: The camp aims at developing conceptual understanding for setting-up one's own business venture/enterprise
CO3: Students are being made familier with new start-ups.

SEMESTER-V

Course Title: **Reinforced Concrete Design** Max. Marks: 100
Course Code: CE -501 External: 60
L T P Internal Assessment: 40
4 0 0 Duration of Exam: 3 Hrs

RATIONALE

This subject is an applied engineering subject. Diploma holders in Civil Engineering will be required to supervise RC Construction and fabrication. He may also be required to design simple structural elements, make changes in design depending upon availability of materials (bars of different diameters). This subject thus deals with elementary design principles as per IS:456-2000

UNIT-I
Introduction of Concepts
Concept of Reinforced Cement Concrete (RCC), Reinforcement Materials: Suitability of Steel as reinforcing material, Properties of mild steel and HYSD steel.
Working Stress Method: Theory of R.C.C Beams: Assumptions in the theory of simple bending for RCC beam. Flexural Strength of a singly reinforced RCC beam Position of the neutral axis, concept of balanced, under reinforced and over reinforced sections. Moment of Resistance of balanced, under reinforced and over reinforced sections.
Shear and Bond: Shear as per BIS: 456-2000
i) Shear strength of concrete without shear reinforcement
ii) Maximum shear stress
iii) Shear reinforcement
Bond and Development Length:
i) Permissible bond stress for plain and deformed bars
ii) Development Length for bars
iii) Anchorage value of standard bend and hook

UNIT-II
Singly and Doubly Reinforced Beams
Moment of resistance for given simply supported beams. Design of simply supported and cantilever beams including sketching showing reinforcement details and bar bending schedule.
Doubly Reinforced Beam and T-Beam (Limit State Method**),** Design consideration of doubly reinforced beams including sketching showing reinforcement details and bar bending schedule. Design consideration of T and L-beams (No numerical problems).

UNIT-III
Introduction to Limit State Method
Definitions and assumptions made in limit state of collapse (flexure), partial factor of safety for materials strength and design strength, partial factor of safety for load and design load. Loading on structure as per BIS: 875. BIS specifications regarding spacing of reinforcement, cover to reinforcement, minimum reinforcement, lapping & anchoring effective span for beams and slabs.

Limit State of Collapse (Flexure): Basic assumptions and stress strain curve, neutral axis, moment of resistance for singly reinforced sections. Design of singly reinforced simply supported and cantilever beams including sketching showing reinforcement details and bar bending schedule.

UNIT-IV

Design of Slabs

Simply Supported One Way Slab (Limit State Method): Analysis and Design of simply supported one way slab including sketching showing reinforcement details (plan and sections) and bar bending schedule.

Continuous Slab: Design aspects of continuous slab and arrangement of reinforcement in plan and sectional elevation (No problem in theory examination)

Two Way Slab (Limit State Method): Design of two-way simply supported slab with corners free and no provision to resist torsion including sketching showing reinforcement details (plan and sections) and bar bending schedule

UNIT-V

Design of Staircase, columns and Footings

Staircase: Design considerations of simple dog legged stair for residential building (No Numerical problems).

Design of Axially Loaded Column (Limit State Method), Definition and classification of columns, effective length of column, specifications for minimum reinforcement cover, maximum reinforcement, number of bars, main and lateral reinforcement for column. Assumptions made in limit state of collapse (compression). Design of axially loaded square columns only with lateral reinforcement and sketch the reinforcement details

Design of Square Footing (Limit State Method): Types of footing, Design of isolated square footing of uniform thickness and sketch the reinforcement details.

Introduction to Prestressed Concrete **:** Concept of prestressed concrete, externally and internally prestressed member. Pre-tensioning and Post-tensioning. Advantages and disadvantages of prestressed concrete. Prestressing equipment. Losses in Prestress.

Course outcome

CO1: To study about various methods for designing structural components like beam, column, slab, footing etc.

CO2: To study the IS 456: 2007 provisions for design consideration of different R.C.C. structures.

CO3: He may also be required to design simple structural elements, make changes in design depending upon availability of materials

CO4: Understand the different methods of designing the structures like WSM and LSM

CO5: Apply the fundamental behaviour and design of Prestress concrete structures.

RECOMMENDED BOOKS

1. Jai Krishna and Jain, OP; "Plain and Reinforced Concrete", Vol. I, Roorkee, Nem Chand and Bros
2. Handoo, BL; Mahajan, VM and Singla, DR; "Elementary of RCC Design", New Delhi, Satya Prakashan
3. Punmia, BC; "Reinforced Concrete Structure Vol I", Delhi Standard Publishers Distributors

4. Sushil Kumar, "Treasurers of Reinforced Concrete Design", Delhi Standard Publishers Distributors
5. Ramamurtham, S; "Design and Testing of Reinforced Structures", Delhi Dhanpat Rai and Sons
6. Gambhir, M.L., "Reinforced Concrete Design", Macmillan India Limited
7. Structural Analysis and Design, STAAD – PRO; Research Engineers - USA

NOTE FOR PAPER SETTER: The question paper shall comprise of 80 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER-V

Course Title: Highway Engineering	Max. Marks: 100
Course Code: CE -502	External: 60
L T P	Internal Assessment: 40
4 0 0	Duration of Exam: 3 Hrs

RATIONALE

Construction of roads is one of the area in which diploma holders in Civil Engineering may get employment. These diploma holders are responsible for construction and maintenance of highways and airports. Basic concepts of road geo-metrics, surveys and plans, elements of traffic engineering, road materials, construction of rigid and flexible pavements, special features of hill roads, road drainage system and various aspects of maintenance find place in above course.

UNIT-I

Introduction

Importance of Highway engineering, Functions of IRC, CRRI, MORTH, NHAI, IRC. Classification of roads, Organization of a state highway department.

Road Geometrics: Glossary of terms used in road geo-metrics and their importance: Right of way, formation width, road margin, road shoulder, carriage way, side slopes, kerbs, formation levels, camber and gradient. Average running speed, stopping and passing sight distance. Necessity of curves, horizontal and vertical curves including transition curves. Super elevation and methods of providing super elevation. Sketch of typical cross-sections in cutting and filling on straight alignment and at a curve.

UNIT-II

Highway Surveys and Road Materials

Topographic map, reading the data given on a topographic map. Basic considerations governing alignment for a road in plain and hilly area. Highway location; marking of alignment; importance of various stages viz:

a) Reconnaissance survey: Conduct reconnaissance and prepare reconnaissance report.
b) Preliminary survey: Object, organizing, conducting and information to be collected.
c) Location survey.
d) Standards for preparing the highway plans as per Ministry of Surface Transport (MORTH) (reference only).

Road Materials: Different types of road materials in use; soil, aggregate, binders – bitumen, emulsion and modified bitumen. Function of soil as highway subgrade. Introduction to California Bearing Ratio; method of finding CBR value and its significance.

Aggregates: Availability of road aggregates in India, requirements of road aggregates as per IRC specifications. Testing aggregates: Los Angeles Abrasion test, impact test, crushing strength test.

Binders: Common binders; bitumen, properties as per BIS specifications, penetration, softening point, ductility and viscosity test of bitumen, procedures and significance, cut back and emulsion and their uses, Bitumen modifiers.

UNIT-III

Road Pavements

Road pavement: Flexible and rigid pavement, their merits and demerits, typical cross-sections, functions of various components

Sub-grade preparation: Setting out alignment of road, setting out bench marks, control pegs for embankment and cutting, borrow pits, making profiles of embankment, construction of embankment, compaction, stabilization, preparation of subgrade, methods of checking camber, gradient and alignment as per recommendations of IRC, equipment used for subgrade preparation.

Flexible pavements: sub base necessity and purpose, stabilized sub base; purpose of stabilization. Types of stabilization Engineering mechanical stabilization, line stabilization, cement stabilization, fly ash stabilization etc. (introduction only).

Base Course: Preparation of base course: Prime coat, Tack coats (a) Water Bound Macadam (WBM) (b) Wet Mix Macadam (WMM). Binder Courses: (a) Bituminous Macadam (b) Dense Bituminous Macadam (DBM)

Methods of construction as per MORTH

Surfacing: Types of surfacing: a) Surface dressing with seal coat b) Open graded premix carpet c) Mix seal surfacing d) Semi dense bituminous concrete e)Bituminous Penetration Macadam (reference only)

Methods of constructions as per MORTH specifications and quality control; equipments used for above.

Rigid Pavements: Construction of concrete roads as per IRC specifications: Form laying, mixing and placing the concrete, compacting and finishing, curing, joints in concrete pavement, equipment used.

UNIT-IV

Hill Roads and Road Drainage:

Introduction: Typical cross-sections showing all details of a typical hill road, partly in cutting and partly in filling. Special problems of hill areas. Landslides: Causes, prevention and control measures. Drainage, Soil erosion, Snow: Snow clearance, snow avalanches, frost.

Road Drainage: Necessity of road drainage work, cross drainage works. Surface and subsurface drains and storm water drains. Location, spacing and typical details of side drains, side ditches for surface drainage. Intercepting drains, pipe drains in hill roads, details of drains in cutting embankment, typical cross sections.

UNIT-V

Road Maintenance and Equipment:

Common types of road failures of flexible pavements: Pot hole, cracks, rutting, corrugation, fatty surface, upheaval - their causes and remedies (brief description).

Maintenance of bituminous road such as seal-coat, patch-work and resurfacing. Maintenance of concrete roads-filling cracks, repairing joints, maintenance of shoulders (berms), maintenance of traffic control devices

Road Construction Equipment: Output and use of the following plant and equipment:

Hot mix plant. Tipper, tractors (wheel and crawler) scraper, bulldozer, dumpers, shovels, grader, roller, dragline. Mixing and spraying equipment. Road pavers – sensor paver

Course outcome

CO1: To get the knowledge and understanding of various aspects of highway geometrics, traffic engineering, different road materials, design of pavements, highway drainage, and airport engineering.
CO2: To study about the aspects of geometrics design of highway, traffic characteristics, traffic studies, traffic problem, road materials, highway drainage, road side development and airport engineering,
CO3: To develop their understanding in order to apply their knowledge in improving civil infrastructure for transportation.
CO4: To understand the various aspects of geometrics design of highway, traffic engineering, different road materials used in pavement.
CO5: To study design of pavements, highway drainage and airport engineering.

RECOMMENDED BOOKS

i) Khanna, SK and Justo, CEG, "Highway Engineering" Roorkee, Nem Chand and Bros.

ii) Vaswani, NK, "Highway Engineering" Roorkee, Roorkee Publishing House.

iii) Priyani, VB, "Highway and Airport Engineering" Anand, Charotar Book Stall

iv) Sehgal, SB; and Bhanot, KL; "A Text Book on Highway Engineering and Airport" Delhi, S Chand and Co

v) Bindra, SP; "A Course on Highway Engineering" New Delhi, Dhanpat Rai and Sons

vi) Sharma, RC; and Sharma, SK; "Principles and Practice of Highway Engineering", New Delhi, Asia Publishing House

viii) Duggal AK, Puri VP., "Laboratory Manual in Highway Engineering", Delhi, New Age Publishers (P) Ltd

ix) RK Khitoliya, "Principles of Highway Engineering (2005)", Dhanpat Rai Publishing Co. New Delhi

x) Rao, GV' Transportation Engineering

xi) Duggal AK, "Maintenance of Highway – a Reader", NITTTR, Chandigarh

NOTE FOR PAPER SETTER: The question paper shall comprise of 80 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER-V

Course Title: Railways, Bridges and Tunnels	Max. Marks: 100
Course Code: CE -503	External: 60
L T P	Internal Assessment: 40
4 0 0	Duration of Exam: 3 Hrs

RATIONALE

The subject will cater to the needs of those technicians who would like to find employment in the construction of railway tracks, bridges and tunnels. The subject aims at providing broad based knowledge regarding various components and construction of railway track, bridges and tunnels

UNIT-I

Introduction

Introduction – brief history of railways, advantages of railways, Indian railways and its salient features. Railway surveys: Factors influencing the railways route, brief description of various types of railway survey. Classification of permanent way describing its component parts.

Rail Gauge: Definition, types, practice in various countries and India, Uniformity of gauge, unigauge project of Indian Railways.

Rails – types of rails, steel for rails, corrugation, corrosion of rails, wear, methods to reduce wear, failure, coning of wheels, hogged rails, buckling, their cause and remedies creep: definition, causes, effects and remedies.

Rail Fastenings: Rail joints, types of rail joints, requirements of an ideal fastening, fastenings for rails, fish plates, brief idea of spikes, fang bolts, hook bolts, chairs and keys; bearing plates

UNIT-II

Laying and Maintenance of Rail lines

Sleepers: Functions of sleepers, types of sleepers, requirements of an ideal material for sleepers. Brief idea of timber and steel sleepers, concrete and pre-stress type sleepers: their salient features and advantages.

Ballast: Function of ballast, requirements of an ideal material for ballast, various methods used for laying ballast, size and quantity of ballast.

Plate lying: meanings of the terms, methods of plate laying, tram line method, telescopic method, American method, material required per unit length of track, ballast train, relaying a track.

Crossings and signallings: Brief description regarding different types of crossings/ signallings.

Maintenance of track: necessity, maintenance of track, inspection of soil, track and fixtures; maintenance and boxing of ballast maintenance gauges, tools.

Earth work and Drainage: features of rail road, bed level, width of formation, side slopes, drains, methods of construction, requirement of drainage system.

UNIT-III

Introduction & Classification of Bridges

Bridge – its function and component parts, difference between a bridge and a culvert. Classification of Bridges, Their structural elements and suitability: According to life-permanent and temporary, According to track level – Deck, through and semi-through, According to material –wooden, steel, RCC, pre-stressed and masonry. According to structural form; Beam type –RCC, T-Beam, steel girder bridges, plate girder and box girder, balanced cantilever. Trussed bridges, N and warren. Arch type – open spandrel and filled spandrel barrel and rib type. Suspension type – unstiffened sling type, its description with sketches

According to the position of highest flood level submersible and non submersible, Temporary bridges: Necessity, description with sketches of pontoon and boat bridges, Site Selection and Collection of Data: Factors affecting the selection of site for a bridge, data to be collected

UNIT-IV

Bridge Foundations, Abutments, Bearing and Maintenance:

Bridge Foundations: Pile foundation, well foundation, caisson, and cofferdams: types pile/well caps, Piers, Abutments and Wingwalls. Piers-definition, parts; types –solid (masonry and RCC), open; cylindrical and abutment piers. Definition of the terms: height of pier, water way (natural and artificial); afflux and clearance.

Abutments and wing walls – definition, types of abutments (straight and tee), abutment with wing walls (straight splayed, return and curved).

Bridge bearings: Purpose of bearings, types of bearings – fixed plate, sliding plate, deep cast base, knuckle, rocker, rocker and roller, their functions with sketches

Maintenance of Bridges:Inspection of bridges, Routine maintenance.

UNIT-V

Tunnels

Definition and necessity of tunnels, Typical section of tunnels for a national highway and single and double broad gauge railway track. Transfer of centre line of tunnel by shaft method. Method of construction of tunnels by needle beam method and full face method, Lining of tunnels with concrete. Ventilation –necessity and methods of ventilation, by blowing, exhaust and combination of blowing and exhaust. Drainage method of draining water in tunnels. Lighting of tunnels.

Course outcome

CO1: The subject will cater to the needs of those technicians who would like to find employment in the construction of railway tracks, bridges and tunnels.

CO2: The subject aims at providing broad based knowledge regarding various components and construction of railway track, bridges and tunnels.

CO3: Develop an understanding the basic concept in proportioning and design of bridges.

CO4: Understand the load flow and loads on bridges.

CO5: Carry out analysis of various components related to railways and tunnels.

RECOMMENDED BOOKS

1. Vaswani, NK; “Railway Engineering”, Roorkee Publishing House
2. Rangwala, SC; ‘Railway Engineering”, Anand, Charotar Book Stall
3. Deshpande, R: “A Text Book of Railway Engineering”, Poonam United Book Corporation
4. Algia, JS “Bridge Engineering”, Anand Charotar Book Stall.
5. Victor Johnson, “Essentials of Bridge Engineering” Oxford and IBH
6. Rangwala, “Bridge Engineering”, Aand, Charotar Book Stall
7. IRC Bridge Codes
8. MORTH drawings for various types of bridges
9. MORTH pocket books for bridge Engineers, 2000 (First Revision)

NOTE FOR PAPER SETTER: The question paper shall comprise of 80 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER-V

Course Title: Soil and Foundation Engineering Max. Marks: 100
Course Code: CE -504 External: 60
L T P Internal Assessment: 40
4 0 0 Duration of Exam: 3 Hrs

RATIONALE

Civil Engineering diploma engineers are required to supervise the construction of structural buildings, roads, pavements, dams, embankments, and other Civil Engineering structures. As such the knowledge of basic soil engineering is the pre-requisite for these engineers for effective discharge of their duties. This necessitates the introduction of Soil and Foundation Engineering subject in the curriculum for Diploma Course in Civil Engineering.

The subject covers only such topics which will enable the diploma engineers to identify and classify the different types of soils, their selection and proper use in the field for various types of engineering structures.

The emphasis will be more on teaching practical aspect rather than theory.

UNIT-I

Introduction, Properties and Classification of Soils

Importance of soil studies in Civil Engineering. Geological origin of soils with special reference to soil profiles in India: residual and transported soil, alluvial deposits, lake deposits, local soil found in J&K, dunes and loess, glacial deposits, conditions in which above deposits are formed and their engineering characteristics. Names of organizations dealing with soil engineering work in India, soil map of India.

Physical properties of Soils: Constituents of soil and representation by a phase diagram. Definitions and meaning of void ratio, porosity, degree of saturation, water content, specific gravity, unit weight, dry unit weight of soil grains and correlation between them. Simple numerical problems with the help of phase diagrams.

Classification and Identification of Soils: Particle size, shape and their effect on engineering properties of soil, particle size classification of soils. Gradation and its influence on engineering properties. Relative density and its use in describing cohesion less soils. Behavior of cohesive soils with change in water content, Atterberg's limit - definitions, use and practical significance. Field identification tests for soils. Soil classification system as per BIS 1498; basis, symbols, major divisions and sub divisions, groups, plasticity chart; procedure for classification of a given soil,Black cotton soils (Introduction and limitations only).

UNIT-II

Permeability, Deformation and Effective Stress of soils.

Flow of Water through Soils: Concept of permeability and its importance. Darcy's law, coefficient of permeability, seepage velocity and factors affecting permeability. Comparison of permeability of different soils as per BIS, Measurement of permeability in the laboratory.

Effective Stress (Concept only): Stresses in subsoil, Definition and meaning of total stress, effective stress and neutral stress, Principle of effective stress. Importance of effective stress in engineering problems.

Deformation of Soils: Meaning, conditions/situations of occurrence with emphasis on practical significance of: a) Consolidation and consolidation settlement b) Creep c) Plastic flow d) Heaving e)Lateral movement f) Freeze and thaw of soil.

Definition and practical significance of compression index, coefficient of consolidation, degree of consolidation. Meaning of total settlement, uniform settlement and differential settlement; rate of settlement and their effects. Settlement due to construction operations and lowering of water table. Tolerable settlement for different structures as per BIS

UNIT-III

Strength Characteristics of Soils

Factors contributing to shear strength of soils, Coulomb's law. Determination of shearing strength by direct shear test, unconfined compression test and vane shear test. Drainage conditions of test and their significance. Stress and strain curve, peak strength and ultimate strength, their significance. Examples of shear failure in soils, Numerical problems.

Compaction: Definition and necessity of compaction, Laboratory compaction test (standard and modified as per BIS) definition and importance of optimum water content, maximum dry density; moisture dry density relations for typical soils with different compactive efforts.

Compaction control; Density control, field density test, core method, sand replacement method, moisture control, Proctor's needle and its use, thickness control, jobs of an embankment supervisor in relation to compaction.

UNIT-IV

Bearing Capacity of Soil.

Concept of bearing capacity, Definition and significance of ultimate bearing capacity, net safe bearing capacity and allowable bearing pressure ,Guidelines of BIS (6403) for estimation of bearing capacity, Factors affecting bearing capacity, Concept of vertical stress distribution in soils due to foundation loads, pressure bulb. Plate load test (no procedure details) and its limitations.

Application of SPT and unconfined compression test and direct shear test in estimation of bearing capacity, Soil properties governing choice of foundation type. Improvement of bearing capacity (elementary), sand drain method compaction, use of geotextiles, grouting.

UNIT-V

Foundation Engineering and Soil Exploration.

Soil Exploration: Purpose and necessity of soil exploration. Reconnaissance, methods of soil exploration, Trial pits, borings, (Auger, wash, rotary, percussion to be briefly dealt). Sampling; undisturbed, disturbed and representative samples; selection of type of sample; thin wall and piston samples; area ratio, recovery ratio of samples and their significance, number and quantity of samples, resetting, sealing and preservation of samples. Presentation of soil investigation results.

Foundation Engineering: Concept of shallow and deep foundation; types of shallow foundations and their suitability. Factors affecting the depth of shallow foundations, deep foundations, type of piles and their suitability; pile classification on the basis of material, pile group and pile cap.

Course outcome

CO1: To let the students know about practical aspects of dry soil, wet soil and saturated soil.

CO2: To give the knowledge to students about the importance of Proctor and Modified Proctor.

CO3: Compaction Tests applied to Civil Engineering structures

CO4: To get the knowledge to students about practical aspects of Direct Shear test, Triaxial test , vane shear test and consolidation test applied to civil engg

RECOMMENDED BOOKS

1. Punmia, BC; "Soil Mechanics and Foundations"; Delhi Standard Publishers Distributors.
2. Bharat Singh and Shamsher Prakash; "Soil Mechanics and Foundations Engineering"; Roorkee, Nem Chand and Bros.
3. Sehgal, SB; "A Text Book of Soil Mechanics"; Delhi, CBS Publishers and Distributors
4. Bowles,Joseph E; "Engineering Properties of soils and their Measurement"; Delhi, Tata McGraw Hill.
5. Gulati, SK and Manoj Dutta; "Geotechnical Engineering ", Delhi, Tata McGraw Hill
6. Khan, Iqbal H, "A Text Book of Geotechnical Engineering", Delhi, Prentice Hall of India
7. Ranjan Gopal and Rao ASR "Basic and Applied Soil Mechanics", New Age Publication (P) Ltd., New Delhi
8. S Mittal and JP Shukla, "Soil Testing for Engineers", Khanna Publishers Ltd.
9. Duggal, AK., Ramana, TR.,Krishnamurthy, S., "Soil Sampling and Testing - A Laboratory Manual, Galgotra Publications, 2006
10. BIS Codes IS 6403 (latest edition) and IS 1498 (latest edition)
11. Jagroop Singh, Soil and Foundation Engineering, Eagle Parkashan, Jalandhar

NOTE FOR PAPER SETTER: The question paper shall comprise of 80 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER-V

Course Title: Generic Skills and Entrepreneurship Development — Max. Marks: 100
Course Code: CE/EE/ME/ECE– 505 — External: 60
L T P — Internal Assessment: 40
4 0 0 — Duration of Exam: 3 Hrs

RATIONALE

Generic Skills and Entrepreneurship Development is one of the courses from "Human Science" subject area. Generic skills have emerged as an important component of employability skills, which enable an individual to become and remain employable over lifetime and to lead happy and prosperous life. Entrepreneurship development aims at developing conceptual understanding for setting-up one's own business venture/enterprise. This aspect of Human Resource Development has become equally important in the era, when wage employment prospects have become meager.

Both the subject areas are supplementary to each other and soft skills are required to be developed in diploma passouts for enhancing their employability and self confidence.

UNIT- I

Introduction to Generic Skills and Managing Self

Importance of Generic Skill Development (GSD)
Global and Local Scenario of GSD
Life Long Learning (LLL) and associated importance of GSD.
Knowing Self for Self Development
Self-concept, personality traits, multiple intelligence such as language intelligence, numerical intelligence, psychological intelligence etc.
Managing Self – Physical
Personal grooming, Health, Hygiene, Time Management
Managing Self – Intellectual development

- Information Search: Sources of information
- Listening: Effective Listening
- Speaking: Effective Oral Communication
- Reading: Purpose of reading, different styles of reading, techniques of systematic reading;
- Note Taking: Importance and techniques of note taking
- Writing: Correspondence - personal and business

Managing Self – Psychological

- Stress, Emotions, Anxiety-concepts and significance (Exercises related to stress management)
- Techniques to manage the above

UNIT-II

Managing in Team

Team - definition, hierarchy, team dynamics

Team related skills- sympathy, empathy, co-operation, concern, lead and negotiate, work well with people from culturally diverse background

Communication in group - conversation and listening skills

UNIT-III

Task Management and Problem Solving

Task Initiation, Task Planning, Task execution, Task close out

Exercises/case studies on task planning towards development of skills for task management

Prerequisites of problem solving- meaningful learning, ability to apply knowledge in problem solving

Different approaches for problem solving.

Steps followed in problem solving.

Exercises/case studies on problem solving

UNIT-IV

Entrepreneurship

Introduction

Concept/Meaning and its need

Competencies/qualities of an entrepreneur

Entrepreneurial Support System e.g., District Industry Centres (DICs), Commercial Banks, State Financial Corporations, Small Industries Service Institute (SISIs), Small Industries Development Bank of India (SIDBI), National Bank of Agriculture and Rural Development (NABARD), National Small Industries Corporation (NSIC) and other relevant institutions/organizations at State/National level.

UNIT-V

Market Survey and Opportunity Identification (Business Planning)

- How to start a small scale industry
- Procedures for registration of small-scale industry
- List of items reserved for exclusive manufacture in small-scale industry
- Assessment of demand and supply in potential areas of growth.
- Understanding business opportunity
- Considerations in product selection
- Data collection for setting up small ventures.

Project Report Preparation

- Preliminary Project Report
- Techno-Economic Feasibility Report
- Exercises on Preparation of Project Report in a group of 3-4 students

INSTRUCTIONAL STRATEGY

This subject will require a blend of different teaching and learning methods beginning with lecture method. Some of the topics may be taught using question answer, assignment, case studies or seminar. In addition, expert lectures may be arranged from within the institution or from management organizations. Conceptual understanding of Entrepreneurship, inputs by teachers and outside experts will expose the students so as to facilitate in starting ones own business venture/enterprise. The teacher will discuss success stories and case studies with students, which in turn, will develop managerial qualities in the students. There may be guest lectures by successful diploma holding entrepreneurs and field visits also. The students may also be provided relevant text material and handouts.

Course outcome;

CO1: Student Generic skills have emerged as an important component of employability skills, which enable an individual to become and remain employable over lifetime and to lead happy and prosperous life
CO2: Entrepreneurship development aims at developing conceptual understanding for setting-up one's own business venture/enterprise
CO3: Students are acquainted with the knowledge for starting small scale business.
CO4:Conceptual understanding of Entrepreneurship, inputs by teachers and outside experts will expose the students so as to facilitate in starting ones own business venture/enterprise.

RECOMMENDED BOOKS

1. Generic skill Development Manual, MSBTE, Mumbai.
2. Lifelong learning, Policy Brief (www.oecd.org)
3. Lifelong learning in Global Knowledge Economy, Challenge for Developing Countries – World Bank Publication
4. Towards Knowledge Society, UNESCO Paris Publication
5. Your Personal Pinnacle of Success by DD Sharma, Sultan Chand and Sons, New Delhi
6. Human Learning, Ormrod
7. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)
8. Entrepreneurship Development by CB Gupta and P Srinivasan, Sultan Chand and Sons, New Delhi
9. Handbook of Small Scale Industry by PM Bhandari
10. Generic Skills and Entrepreneurship Development by Ishan Publishers (Ambala)

Generic Skills and Entrepreneurship Development by Poonam Goyal (GBD)-Punjab

NOTE FOR PAPER SETTER: The question paper shall comprise of 60 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER-V

Course Title: Highway Engineering
Course Code: CE-511

L	T	P
0	0	1

Max. Marks: 50
External: 25
Internal Assessment: 25

LIST OF PRACTICALS

1. Determination of penetration value of bitumen
2. Determination of softening point of bitumen
3. Determination of impact value of the road aggregate
4. Determination of abrasion value (Los Angeles') of road aggregate
5. Determination of ductility of bitumen
6. Determination of viscosity of tar/bitumen
7. Determination of the California bearing ratio (CBR) for the sub-grade soil (demonstration only)

Course outcome;
CO1: Differentiate between reinforcement in beams and slabs.
CO2:Understand the designing and detailing of columns and staircases
CO3: Understand the designing of footings
CO4: Understand the design of steel **structures.**

SEMESTER-V

Course Title: Soil and Foundation Engineering Max. Marks: 50
Course Code: CE - 512 External: 25
L T P Internal Assessment: 25
0 0 1

LIST OF PRACTICALS

1. Auger Boring and Standard Penetration Test
   a) Identifying the equipment and accessories
   b) Conducting boring and SPT at a given location
   c) Collecting soil samples and their identification
   d) Preparation of boring log and SPT graphs
   e) Interpretation of test results

2. Extraction of Disturbed and Undistrubed Samples
   a) Extracting a block sample
   b) Extracting a tube sample
   c) Extracting a disturbed samples for mechanical analysis. Compaction and limit test
   d) Field identification of samples

3. Field Density Measurement (Sand Replacement and Core Cutter Method)
   a) Calibration of sand
   b) Conducting field density test at a given location
   c) Determination of water content
   d) Computation and interpretation of results

4. Liquid Limit and Plastic Limit Determination:
   a) Identifying various grooving tools
   b) Preparation of sample
   c) Conducting the test
   d) Observing soil behaviour during tests
   e) Computation, plotting and interpretation of results

5. Mechanical Analysis
   a) Preparation of sample
   b) Conducting sieve analysis
   c) Computation of results
   d) Plotting the grain size distribution curve
   e) Interpretation of the curve
6. Laboratory Compaction Tests (Standard Proctor test)
   a) Preparation of sample
   b) Conducting the test
   c) Observing soil behaviour during test
   d) Computation of results and plotting
   e) Determination of optimum moisture and maximum dry density

7. Unconfined Compression Test
   a) Specimen preparation
   b) Conducting the test
   c) Plotting the graph
   d) Interpretation of results and finding/bearing capacity

8. Direct shear and vane shear tests on sandy soil samples

Course outcome;

CO1: To let the students know about practical aspects of dry soil, wet soil and saturated soil.
CO2: To give the knowledge to students about the importance of Proctor and Modified Proctor.
CO3: Compaction Tests applied to Civil Engineering structures
CO4: To get the knowledge to students about practical aspects of Direct Shear test, Triaxial test , vane shear test and consolidation test applied to civil engg

SEMESTER-V

Course Title: Computer Applications in Civil Engineering Max. Marks: 50
Course Code: CE-513 External: 25
L T P Internal Assessment: 25
0 0 1

RATIONALE

Computer applications plays a very vital role in present day life and more so, in the professional life of diploma engineer. In order to enable the students use the computers effectively in problem solving, this course offers applications of various computer softwares in civil engineering.

LIST OF PRACTICALS

1. Fundamentals of 3-D drafting. Making an existing 2-D plan drawing to 3-D drafting by using AutoCAD/Microstation

2. Estimate and costing by the use of Mirostation software/STAAD-Pro/QE-Pro

3. Project management by the use of Project Planner/MS Project/Primavera

4. Introduction and use of Concrete Mix Design and Pavement Design softwares

Course outcome;

CO1: Understand application in designing of structures using STAAD Pro.
CO2: Understand in making a plan in Auto CADD

SEMESTER-V

Course Title: Survey Camp (2 Weeks)
Course Code: CE-514

L	T	P
0	0	2

Max. Marks: 100
External: 50
Internal Assessment: 50

Purpose

a) Making the students conversant with the camp life
b) Providing an opportunity to the students to develop team spirit
c) Training the students to communicate with the local population
d) To impart intensive training in the use of all surveying instruments viz. Theodolite , Dumpy level, Compass, tachometer etc.
e) To train the students to appreciate practical difficulties in surveying on the field
f). To train the students for self management

Task:

Preparation of topographical plan of a given area. The survey camp will be organized for a duration of 15 days time span.

The students may be assigned an undulated area of about 1.5 to 2.00 sq.km. with level difference of 15m consisting of good number of physical features such as buildings, roads, bridges, culverts, railway tracks, electric lines etc. They are required to prepare the topographic map of above areas showing various features along with contours using a suitable contour intervals. They will mark a road alignment of given gradient connecting any two stations on the map consisting some horizontal and vertical curves and will prepare estimate of earthwork and submit the detailed technical report indicating therein practical difficulties faced during surveying for the features like ridge, line, valley lines, saddle cliffs etc.

The students should be divided in the groups consisting of 5-7 in numbers. They are required to submit the Report of workdone, during survey camp, which will be dully examined, while awarding the internal assessment.

Course outcome;
CO1: Making the students conversant with the camp life.
CO2: Providing an opportunity to the students to develop team spirit
CO3: Training the students to communicate with the local population
CO4: To impart intensive training in the use of all surveying instruments viz Theodolite, Auto level, Compass, tachometer etc.
CO5: To train the students to appreciate practical difficulties in surveying on the field
CO6: To train the students for self-management

SEMESTER-V

Course Title: Minor Project Work
Course Code: CE-515

L	T	P
0	0	4

Max. Marks: 100
External: 50
Internal Assessment: 50

Minor project work aims at exposing the students to field practices, size and scale of operations and work culture at works sites. For this purpose, students during middle of course, are required to be sent at different work sites where some construction activities are in progress or some operations are going on. Depending on the interests of the students, they may be sent to:

i) Building construction sites

ii) Water treatment plant

iii) Sewage treatment plant

iv) River valley projects

v) Crusher plant, Cement Manufacturing Plant, Brick kiln

vi) Highway construction site

vii) Material and Soil testing laboratory

viii) Soil investigation projects

ix) Hydel Power Project

x) Land surveying projects

xi) Community development works

xii) Any other constructional site like bridge, tunnel, canal lining, construction of railway track, irrigation works etc

xiii) Quality control projects

As a minor project activity, each student is supposed to study the operations at site and prepare a detailed project report of the observations/processes seen by him/her. These students should be guided by respective subject teachers. Each teacher may guide a group of 4 – 5 students.
The teachers along with field supervisors will conduct performance assessment of students. Some of the projects are suggested below:

1. Survey of a village approach road, drawings of L-section and x-sections
2. Estimation of white washing and distempering in hostel building
3. Preparation of detailed estimate with drawings of septic tank for 30-40 users
4. Plumbing work and installation of PVC over-head water tank on a toilet block and then prepare report

5. Identification of water-supply fittings and replacement of defective fittings and then prepare report.
6. Replacement of window by door or vice versa
7. Repair of plaster of a wall in polytechnic campus

This Industry oriented minor project work will carry 50 marks for internal assessment. 50% marks will be given by industrial/field supervisors and 50% marks by the teacher supervising this work. The suggestive components of evaluation may include the following:

a)	Punctuality and regularity	15%
b)	Initiative in learning new things	15%
c)	Relationship with workers	15%
d)	Industrial training report	40%
e)	Seminar based on Project	15%

A group of students not exceeding 5 may visit one or more sites mentioned above. Each student will prepare the project report of the activities observed by him. They will study the whole process of the plant, and explain the same in their project report. External examiner will ask the questions on the construction, working, processes observed by the students during their visit. Presentation of their technical report in their respective class for internal assessment.

Course outcome;

1.Become familier with research activities.

2.Visit different construction sites to know the latest trends in construction.

SEMESTER-V

Course Title: Personality Development Camp
Course Code: CE-516
L T P
0 0 4

Max. Marks: 50
Internal Assessment: 50

This is to be organized at a stretch for two to three days during fifth or sixth semester. Extension Lectures by experts or teachers from the polytechnic will be delivered on the following broad topics. There will be no examination for this subject.

1. Communication Skills
2. Correspondence and job finding/applying/thanks and follow-up
3. Resume Writing
4. Interview Techniques: In-Person interviews; telephonic interviews, panel interviews; group interviews and video conferencing etc.
5. Presentation Techniques
6. Group Discussions Techniques
7. Aspects of Personality Development
8. Motivation
9. Leadership
10. Stress Management
11. Time Management
12. Interpersonal Relationship
13. Health and Hygiene

SEMESTER-VI

Course Title: **Steel Structures Design** Max. Marks: 100
Course Code: CE-601 External: 60
L T P Internal Assessment: 40
4 0 0 Duration of Exam: 3 Hrs

RATIONALE

This subject is an applied engineering subject. Diploma holders in Civil Engineering will be required to supervise steel construction and fabrication. He may also be required to design simple structural elements, make changes in design depending upon availability of materials. This subject thus deals with elementary design principles as per BIS code of practice IS: 800

UNIT-I
Structural Steel, Sections and Connections
Properties of structural steel as per BIS Code. Designation of structural steel sections as per BIS handbook and BIS: 800
Structural Steel Connections: Riveted connections, types of rivets, permissible stresses in rivets as per BIS: 800, types of riveted joints, specifications as per BIS 800 for riveted joints, design of riveted joints for axially loaded members.
Welded connections: Types of welds, permissible stresses in welds, types of welded connections, design of butt and fillet welded connections subjected to axial loads.

UNIT-II
Design of Roof Truss
Form of trusses, pitch of roof truss, spacing of trusses, spacing of purlins, connection between purlin and roof covering. Connection between purlin and principal rafter.
Analysis and design of single and double section tension members and their riveted and welded connections with gusset plate as per BIS: 800

UNIT-III
Design of Compression Members
Analysis and design of single and double angle sections compression member (struts)and their rivetted and welded connections with gusset plate as per BIS:800

UNIT-IV
Columns and Beams:
Concept of buckling of columns, effective length and slenderness ratio, permissible stresses in compression as per BIS: 800 for different end conditions. Analysis and Design of axially loaded single section steel column.
Types of column bases (Descriptive only). Beam and column, frame and seated connections (descriptive only, no design).
Beams: Analysis and design of single section simply supported laterally restrained steel beams. Introduction to plate girder and functions of various elements of a plate girder.

UNIT-V

Timber Structures

Design of simply supported rectangular and circular beams. Design of compression and tension members for roof truss (rectangular/circular). Design of single section rectangular/circular columns

Course outcome;

CO1: To know the basic properties of steel and to understand the behaviour according to it.

CO2: To know the different steel structure analysis and design.

CO3: To know the design and analysis of angle sections, bolted & welded connection.

4. Design of steel structures according to IS-800-2007 by limit state method.

RECOMMENDED BOOKS

1. Arya, AS and Ajmani, JL; "Design of Steel Structures", Roorkee, Nem Chand and Bros.

2. Ram Chandra, "Design of Steel Structures", Delhi, Standard Publishers Distributors.

3. Duggal SK, "Design of Steel Structures", Standard Publishers Distributors.

4. Kazimi and. Jindal, “Design of Steel Structures”, Prentice Hall of India, New Delhi

5. LS Negi, ‘Design of Steel Structure”, Tata McGraw Hill, New Delhi

NOTE FOR PAPER SETTER: The question paper shall comprise of 80 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER-VI

Course Title: Earthquake Resistant Building Construction Max. Marks: 100
Course Code: CE - 602 External: 60
L T P Internal Assessment: 40
4 0 0 Duration of Exam: 3 Hrs

RATIONAL

Diploma holders in civil engineering have to supervise construction of various earthquake resistant buildings. Therefore, the students should have requisite knowledge regarding terminology of earthquake and the precautions to be taken while constructing earthquake resistant buildings

UNIT-I
Elements of Engineering Seismology
General features of tectonic of seismic regions. Causes of earthquakes, Seismic waves, earthquake size (magnitude and intensity), Epicentre, Seismograph, Classification of earthquakes, Seismic zoning map of India, Static and Dynamic Loading, Fundamental period.

UNIT-II
Seismic Behaviour of Traditionally-Built Constructions of India
Seismic performance of building during earthquakes and Mode of failure (Out-of-plane failure, in-plane failure, Diaphragm failure, Connection failure, Non-structural components failure)

UNIT-III
Seismic Provisions
Seismic Provision of Strengthening and Retrofitting Measures for Traditionally-Built Constructions
Introduction to BIS: 4326:1993, BIS: 13928:1993 and BIS: 13927:1993

UNIT-IV

Modes of Failure
Common Modes of failure of Reinforced Concrete Buildings. Horizontal and vertical irregularities, Identification of seismic damages in building components (Columns, beams, slab, infill wall, foundation etc), ductile detailing as per IS-13920. General strengthening techniques of buildings.

UNIT-V
Disaster Standards & Managment
Introduction to Indian Standard Code BIS: 1893 (Part 1).
Disaster Management: Disaster rescue, psychology of rescue, rescue workers, rescue plan, rescue by steps, rescue equipment, safety in rescue operations, debris clearance and casualty management.

Course outcome;

CO1: Students will be able to supervise construction of various earthquake resistant buildings.

CO2: Students will be able to analyse the various earthquake related instruments

CO3: Students will get the knowledge about the Indian Standard codes like Introduction to BIS: 4326:1993, BIS: 13928:1993 and BIS: 13927:1993

CO4: Prepare list of use of do's and don'ts applicable during disasters.

RECOMMENDED BOOKS

1. Elements of Earthquake Engineering by Jai Krishana and AR Chandersekaran; Sarita Parkashan, Meerut.

2. Building Construction by BL Gupta and NL Arora, Satya Prakashan, New Delhi

3. Manual Published by Earthquake Engineering department, IIT Roorkee / IIT Kanpur

4. IS 13920, IS: 13927, IS: 13928, IS 1893-2002, IS 4326

5. Earthquake Engineering by RL Weigel, Prentice Hall Inc., N.I., 1970

6. Dynamics of Structure by AK Chopta, Prentice Hall Inc. New Delhi

NOTE FOR PAPER SETTER: The question paper shall comprise of 80 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER-VI

Course Title: Quantity Surveying and Valuation
Course Code: CE -603
L T P
4 0 0

Max. Marks: 100
External: 60
Internal Assessment: 40
Duration of Exam: 3 Hrs

RATIONALE

Diploma holders in Civil Engineering are supposed to prepare material estimates for various Civil Engineering works namely; buildings, irrigation works, public health works and roads etc. In addition, they must have basic knowledge regarding analysis of rates, contracting, principles of valuation. Therefore, this subject has great importance for diploma holders in Civil Engineering.

UNIT-I

Introduction, Estimates and Measurements:

Introduction to quantity surveying and its importance. Duties of quantity surveyor.

Types of estimates: Preliminary estimates (Plinth area estimate, Cubic rate estimate, Estimate per unit base). Detailed estimates (Definition, Stages of preparation, details of measurement and calculation of quantities and abstract).

Measurement: Units of measurement for various items of work as per BIS: 1200, Rules for measurements, Different methods of taking out quantities, centre line method and long wall and -short wall method.

UNIT-II

Preparation of Detailed and Abstract Estimates from Drawings.

A small residential building with a flat roof comprising of - Two rooms with W.C., bath, kitchen and verandah.

Earthwork for unlined channel. Water supply lines. WBM road and pre-mix carpeting. Single span RCC slab culvert. Earthwork for plain and hill roads. RCC work in beams, slab, column and lintel. Masonry retaining walls. 10 users septic tank.

Calculation of quantities of materials for: Cement mortars of different proportion. Cement concrete of different proportion. Brick masonry in cement mortar. Plastering and pointing. White washing, painting. Cement concrete flooring. Terrazzo flooring. Bath room and toilet fittings.

UNIT-III

Analysis of Rates

Steps involved in the analysis of rates. Requirement of material, labour, sundries, contractor's profit and overheads. Analysis of rates for finished items when data regarding labour, rates of material and labour is given: Earthwork in excavation in hard/ordinary soil and filling with a concept of lead and lift, Cement concrete in foundation, RCC in roof slab/beam/lintels/columns, Brick masonry in cement mortar, Cement Plaster, White washing, painting, Running and maintenance cost of construction equipment

UNIT-IV

Preparation of Tender Document based on Common Schedule Rates (CSR)

Introduction to CSR: Exercises on writing detailed specifications of different types of building works from excavation to foundations, superstructure and finishing operation

Exercises on preparing tender documents for the following: Earth work , Masonry works ,Construction of a small house as per given drawing , RCC works ,Pointing, plastering and flooring , White-washing, distempering and painting , Wood work including polishing ,Sanitary and water supply installations ,False ceiling, aluminum (glazed) partitioning , Construction of an Industrial shed and Tile flooring

UNIT-V

Comparative Statements and Valuation

Meaning of contract, Qualities of a good contractor and their qualifications ,Essentials of a contract, Types of contracts, their advantages, dis-advantages and suitability, system of payment, Single and two cover-bids; tender, tender forms and documents, tender notice, submission of tender and deposit of earnest money, security deposit, retention money, maintenance period. Types of contracting firms/construction companies. Exercises on preparation of comparative statements for item rate contract

Valuation: Purpose of valuation, principles of valuation ,Definition of various terms related to valuation like depreciation, sinking fund, salvage and scrap value, market value, fair rent, year's purchase etc. Methods of valuation (i) replacement cost method (ii) rental return method

Course outcome;

CO1: To study about basic units, measurement and quantities.

CO2: Prepare rate analysis of different item works, quantity of items and valuation of properties.

CO3: To study about the methods of computing the quantities.

CO4: To study the estimate of compound wall, Two room up to plinth, Single storey and two- storey residential building, footing, R.C.C slab

RECOMMENDED BOOKS

1. Pasrija, HD; Arora, CL and S. Inderjit Singh, "Estimating, Costing and Valuation (Civil)", Delhi, New Asian Publishers

2. Rangwala, BS; Estimating and Costing". Anand, Charotar Book Stall

3. Kohli, D; and Kohli, RC; "A Text Book on Estimating and Costing (Civil) with Drawings", Ambala Ramesh Publications
4. Chakraborti, M; "Estimating, Costing and Specification in Civil Engineering", Calcutta
5. Dutta, BN; "Estimating and Costing

NOTE FOR PAPER SETTER: The question paper shall comprise of 80 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER-VI

Course Title: Construction Management & Accounts	Max. Marks: 100
Course Code: CE - 604	External: 60
L T P	Internal Assessment: 40
4 0 0	Duration of Exam: 3 Hrs

UNIT-I

Introduction:

Significance of construction management. Main objectives of construction management. Functions of construction management, planning, organising, staffing, directing, controlling and coordinating, meaning of each of these with respect to construction job. Classification of construction into light, heavy and industrial construction. Stages in construction from conception to completion. The construction team: owner, engineer and contractors, their functions and inter-relationship.

Construction Planning: Importance of construction planning. Stages of construction planning: Pre-tender stage and Contract stage.

Scheduling construction works by bar charts: Preparation of bar charts for simple construction work, Preparation of schedules for labour, materials, machinery and finances for small works, Limitations of bar charts.

Scheduling by network techniques: Introduction to network techniques; PERT and CPM, differences between PERT and CPM terminology

UNIT-II

Organization/ Labour Handling:

Types of organizations: Line, line and staff, functional and their characteristics. Principles of organization: only meaning and significance of Span control, Delegation of authority, Ultimate responsibility, Unity of command, Job definition.

Site Organization: Factors influencing selection and design of temporary services for a construction site. Principle of storing and stacking materials at site. Location of equipment. Preparation of actual job layout for a building. Organizing labour at site

Construction Labour: Conditions of construction workers in India, wages paid to workers. Trade Unions connected with construction industry.

Important provisions of the following Acts: Labour Welfare Fund Act 1936 ,Payment of Wages Act 1936 , Minimum Wages Act 1948, Workman Compensation Act 1923 , Indian Contract Act .

UNIT-III

Progress and Quality Control

Methods of recording progress. Analysis of progress. Taking corrective actions keeping head office informed. Cost time optimization for simple jobs - Direct and indirect cost, variation with time, cost optimization.

Need for inspection and quality control. Principles of inspection. Stages of inspection and quality control for: Earth work, Masonry, RCC, Sanitary and water supply services.

UNIT-IV

Equip/Accident Handling

Accidents – causes, Safety measures for: Excavation work, Drilling and blasting, Hot bituminous works, Scaffolding, ladders, form work, Demolitions, Safety campaign.
Earth Moving Equipment: Crawler and wheel tractors: their functions, types and specifications, gradability; bull dozers and their use, tractors pulled scrapers, their sizes and output; effect of grade and rolling resistance on the output of tractor pulled scrapers, earth loaders, placing and compacting earth fills.
Power shovels: Functions, selection, sizes, shovel dimensions and clearances, output; Draglines: Functions, types, sizes, output; clamshells; safe lifting capacities and working ranges of cranes; hoes, trenching machines: types and production rates

UNIT-V
Public Work Accounts
Introduction, accounts, work- major, repair, administrative approval – expenditure, Technical sanction, allotment of funds, bill, contractor ledger, running and final account bills complete, completion certificate & report, hand receipt, establishment-permanent, temporary, aquittance roll. Muster Roll labour, casual labour roll-duties and responsibility of different cadres, budget-stores, returns, account of stock, misc. P.W. advances T & P – verification, survey report, account- expenditure & revenue head, remittance and deposit head, cash book, imprest account, temporary advance, treasury challan, measurement book and its up keeping

Course outcome;
CO1: Successfully apply business and management skills in positions within the construction industry.
CO2: Apply technical skills and knowledge in mathematics, science, construction, and technology in support of planning, analyzing, and solving construction problems.
CO3: Use industry resources including associations and organizations, professional publications, and governmental data to analyze, evaluate, and apply current trends within the industry.
CO4: Practice informed decision-making in personal and professional endeavors.
CO5: Manage a quality construction project from start to completion while maintaining budget, schedule, and safety requirements.
RECOMMENDED BOOKS

1. Shrinath, LS, "PERT and CPM - Principles and Applications", New Delhi, East West Press
2. Harpal Singh, "Construction Management and Accounts", New Delhi, Tata McGraw Hill Publishing Company.
3. Peurifoy, RL, "Construction Planning, Equipment and Methods" Tokyo, McGraw Hill
4. Wakhlo, ON; "Civil Engineering Management", New Delhi Light and Life Publishers
5. Verma, Mahesh; "Construction Equipment and its Planning and Application
6. Dharwadker, PP; "Management in Construction Industry", New Delhi, Oxford and IBH Publishing Company.
7. Gahlot PS; Dhir, BM; "Construction Planning and Management", Wiley Eastern Limited, New Delhi
8. MS Project – Microsoft USA
9. Primavera

NOTE FOR PAPER SETTER: The question paper shall comprise of 80 marks. Two questions will be set from each unit. The student has to attempt five questions, at least one from each unit

SEMESTER–VI

Course Title: **Repair and Maintenance of Buildings** Max. Marks: 100
Course Code: CE-605 External: 60
L T P Internal Assessment: 40
4 0 0 Duration of Exam: 3 Hrs

RATIONALE

One of the major concerns of a civil engineer is to take care of the building works, already constructed, in order to keep these buildings in utmost workable conditions. Usually it is being felt that the buildings deteriorate faster for want of care and proper maintenance. The buildings usually have a shabby appearance due to cracks, leakage from the roofs and sanitary/water supply fittings. Thus the need for teaching the subject in proper perspective has arisen making students aware of importance of maintenance of buildings.

DETAILED CONTENTS

UNIT-I

Need for Maintenance and Agencies Causing Deterioration

Importance and significance of repair and maintenance of buildings
Meaning of maintenance
Objectives of maintenance
Factors influencing the repair and maintenance

Agencies Causing Deterioration (Sources, Causes, Effects)

Definition of deterioration/decay
Factors causing deterioration, their classification
Human factors causing deterioration
Chemical factors causing deterioration
Environmental conditions causing deterioration
Miscellaneous factors
Effects of various agencies of deterioration on various building materials i.e. bricks, timber, concrete, paints, metals, plastics, stones

UNIT-II

Investigation and Diagnosis of Defects

Systematic approach/procedure of investigation
Sequence of detailed steps for diagnosis of building defects/problems
List non-destructive and others tests on structural elements and materials to evaluate the condition of the building and study of three most commonly used tests

UNIT-III

Defects and their root causes

Define defects in buildings
Classification of defects
Main causes of building defects in various building elements

Foundations, basements and DPC
Walls
Column and Beams
Roof and Terraces

- Joinery
- Decorative and protective finishes
- Services
- Defects caused by dampness

UNIT-IV

Materials for Repair, maintenance and protection

Compatibility aspects of repair materials

State application of following materials in repairs:

- Anti corrosion coatings
- Adhesives/bonding aids
- Repair mortars
- Curing compounds
- Joints sealants
- Waterproofing systems for roofs
- Protective coatings

UNIT-V

Remedial Measures for Building Defects

Preventive maintenance considerations

Surface preparation techniques for repair

Crack repair methods

- Epoxy injection
- Grooving and sealing
- Stitching
- Adding reinforcement and grouting
- Flexible sealing by sealant

Repair of surface defects of concrete

- Bug holes
- Form tie holes
- Honey comb and larger voids

Repair of corrosion in RCC elements

- Steps in repairing
- Prevention of corrosion in reinforcement

Material placement techniques with sketches

- Pneumatically applied (The gunite techniques)
- Open top placement
- Pouring from the top to repair bottom face
- Birds mouth
- Dry packing
- Form and pump
- Preplaced – aggregate concrete
- Trowel applied method

Repair of DPC against Rising Dampness

- Physical methods
- Electrical methods
- Chemical methods

Repair of walls

- Repair of mortar joints against leakage
- Efflorescence removal

Waterproofing of wet areas and roofs

Water proofing of wet areas
Water proofing of flat RCC roofs
Various water proofing systems and their characteristics

Repair of joints in buildings
Types of sealing joints with different types of sealants
Techniques for repair of joints
Repair of overhead and underground water tanks

INSTRUCTIONAL STRATEGY

This is very important course and efforts should be made to find damaged/defective work spots and students should be asked to think about rectifying/finding solution to the problem. Visits to work site, where repair and maintenance activities are in progress can be very useful to students. The students will also prepare a project report based upon the available water proofing materials, sealant, special concrete for repair and adhesives and other repair material available in the market.

Course outcome;

1. Students are made to understand how to find defected sports in construction.
2. Reactify the defective work,.
3. find solutions to damaged and decayed structure.
4. work with different types of waterproofing materials.

RECOMMENDED BOOKS

1. Gahlot P.S. and Sanjay Sharma, “Building Defects and Maintenance Management”, CBS Publishers, New Delhi
2. Nayak, BS, "Maintenance Engineering for Civil Engineers", Khanna Publishers, Delhi
3. Ransom, WH "Building Failures - Diagnosis and Avoidance", Publishing E and F.N. Span
4. Hutchinson, BD; et al, "Maintenance and Repair of Buildings", Published by Newness – Butterworth

SEMESTER-VI

Course Title: Structural Drawing **Max. Marks: 50**
Course Code: CE-611 External: 25
L T P Internal Assessment: 25
0 0 2

RATIONALE

Diploma holders in Civil Engineering are required to supervise the construction of RC and steel structures. Thus one should be able to read and interpret structural drawings of RC and steel structures. The competence to read and interpret structural drawings is best learnt by being able to draw these drawings. Hence there is a need to have a subject devoted to preparation of structural drawings.

PART A

Drawing Exercises

1. RC Structures:

Reinforcement details from the given data for the following structural elements with bar bending schedules

(i) Drawing No. 1: RC Slabs - One way slab, Two way slab and Cantilever Slab.

(ii) Drawing No.2 : Beams - Singly and doubly reinforced rectangular beams and Cantilever beam (All beams with vertical stirrups)

(iii) Drawing No.3 : Columns and Footings – Square, Rectangular and Circular Columns with lateral ties and their isolated sloped column footings.

(iv) Drawing No. 4 : Portal Frame – Three bay two storey RC portal frame with blow up of column beam junctions.

(v) Drawing No.5: Dog legged stairs for single storey building

(vi) Drawing No.6 : Draw atleast one sheet using CAD software

PART B

2. Steel Structures:

Structural drawing from given data for following steel structural elements.

(i) Drawing No. 1: Roof Truss – Drawing of Fink Roof Truss with details of joints, fixing details of purlins and roof sheets.

(ii) Drawing No.2 : Column and Column Bases - Drawing of splicing of steel columns. Drawings of slab base, gusseted base and grillage base for single section steel columns.

(iii) Drawing No.3 : Column Beam Connections

(a) Sealed and Framed Beam to Beam Connections
(b) Sealed and Framed beam o Column Connections

(iv) Drawing No. 4 : Plate Girder

Plan and Elevation of Plate Girder with details at supports and connection of stiffness, flange angles and cover plate with web highlighting curtailment of plates.

(v) Drawing No. 5 : Draw atleast one sheet using CAD software

Course outcome;
CO1: Prepare drawings of steel roof truss with its joints.
CO2: Draw column beam connections.
CO3: Draw plan and elevation for riveted plate girder.
CO4: Prepare drawings of timber kingpost roof truss.

RECOMMENDED BOOKS

5. Layal JS "Civil Engineering Drawing", Satya Parkashan, New Delhi

6. Chandel RP " Civil Engineering Drawings"

7. Kumar; NS " Civil Engineering Drawing " IPH, New Delhi

8. Malik RS and Meo GA, "Civil Engineering Drawing" Asian Publishing House, New Delhi

9. Singh, Birinder "RCC Design and Drawing" Kaption Publishing House, New Delhi.

10. Singh, Birinder "Steel Structures Design and Drawing", Kaption Publishing House, New Delhi

11. Singh, Harbhajan, "Structural Drawings", Abhishek Publishers, Chandigarh

12. B.V. Sikka, Civil Engineering Drawing.

SEMESTER-VI

Course Title: Project Work — Max. Marks: 300
Course Code: CE-612 — External: 150
L T P — Internal Assessment: 150
0 0 6

Project Work

i) Develop understanding regarding the size and scale of operations and nature of field work in which students are going to play their role after completing the courses of study.

ii) Develop understanding of subject based knowledge given in the classroom in the context of its application at work places.

iii) Provide first hand experience to develop confidence amongst the students to enable them to use and apply polytechnic based knowledge and skills to solve practical problems of the world of work.

iv) Develop special skills and abilities like interpersonal skills, communication skills, attitudes and values.

Some of suggested projects are given below: These are only guidelines, teacher may take any project related to Civil Engineering depending upon the availability of projects. Preference should be given to practical oriented projects.
According to the need of the polytechnic, the following major projects are suggested:

1. Construction of a small concrete road consisting of following activities
   - Survey and preparation of site plan
   - Preparation of drawings i.e. L-Section and X-Section
   - Estimating and earth work
   - Preparation of sub grade with stone ballast
   - Laying of concrete
   - Testing of slump, casting of cubes and testing
   - Material estimating and costing with specifications
   - Technical report writing

2. Water Supply system for a one or two villages
   - Surveying
   - Design of water requirements and water distribution system
   - Preparation of drawing of overhead tank
   - Material estimating and costing
   - Specifications
   - Technical report writing

3. Construction of seating benches in polytechnic campus

4. Welding of angle iron and Expanded metal jali to prepare fencing in polytechnic campus

5. Construction of toilets and baths for a shopping complex in a township

6. Construction of bridal path 4 km long

7. Construction of shopping complex detailing of RCC drawings, estimating and costing of material

8. Rainwater harvesting
   - Assessment of catchment area
   - Intensity of rainfall
   - Collection of water
   - Soak pit design
   - Supply of water
   - Monitoring during rainy season

9. Design and construction of septic tank with soak pit for 100 users

10. Preparing plumbing detailed drawings of a two storey building and material estimate and costing

11. Planning and design of sports stadium in a township or cluster of villages

12. Design of small residential building including structural members, specifications, estimating and costing of materials, report writing and municipal drawings for water supply and sewerage system

13. Concrete Mix Design
    The suggested performance criteria is given below:

a)	Punctuality and regularity		20%
b)	Level/proficiency of practical skills acquired		20%
c)	Sense of responsibility	20%	
d)	Report Writing skills		40%
e)	Viva voce		50%

Note: The projects undertaken should be field oriented and practice based

Course outcome;

CO1: Develop understanding regarding the size and scale of operations and nature of field work in which students are going to play their role after completing the courses of study.

CO2: Develop understanding of subject based knowledge given in the classroom in the context of its application at work places.

CO3: Provide firsthand experience to develop confidence amongst the students to enable them to use and apply polytechnic based knowledge and skills to solve practical problems of the world of work.

CO4: Develop special skills and abilities like interpersonal skills, communication skills, attitudes and values.

SEMESTER-VI

Course Title: Student Centred Activities
Course Code: CE-613
L T P
0 0 4

Max. Marks: 50
Internal Assessment: 50

SCA will comprise of co-curricular activities like extension lectures, library studies, games, hobby clubs e.g. photography, painting, singing, seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities, Civil Defence/ Disaster Management activities etc.