GURU KASHI UNIVERSITY

Diploma in Civil Engineering

Session: 2024-25

Department of Civil Engineering

Programme Structure

Semester: I						
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**Credits**
DCE101	Applied Chemistry – I	Core	3	0	0	3
DCE102	Applied Mathematics - I	Core	3	0	0	3
DCE103	Applied Physics – I	Core	3	0	0	3
DCE104	English and Communication Skills – I	Core	3	0	0	3
DCE105	Engineering Drawing – I	Core	1	0	4	3
DCE106	Applied Chemistry – I Lab	Skill based	0	0	2	1
DCE107	Applied Physics – I Lab	Skill based	0	0	2	1
DCE108	English and Communication Skills – I Lab	Skill based	0	0	2	1
DCE109	General Workshop Practice – I	Skill based	0	0	4	2
DCE110	Basics of Information Technology Lab	Skill based	0	0	2	1
Total			**13**	**0**	**16**	**21**

Semester: II						
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**Credits**
DCE201	English and Communication Skills –II	Core	3	0	0	3
DCE202	Applied Mathematics -II	Core	3	0	0	3
DCE203	Applied Physics-II	Core	3	0	0	3
DCE211	Basic Electrical & Electronics Engineering.	Core	3	0	0	3
DCE205	English and Communication Skills –II Lab	Skill based	0	0	2	1
DCE206	Applied Physics-II Lab	Skill based	0	0	2	1
DCE212	Basic Electrical & Electronics Engineering Lab	Skill based	0	0	2	1
DCE209	Engineering Drawing-II	Skill based	1	0	4	3
DCE210	General Workshop Practice – II	Skill based	0	0	4	2
Total			**13**	**0**	**14**	**20**

Semester: III							
Sr.	Course Code	Course Name	Type of Course	(Hours Per Week)			No. of Credits
				L	T	P	
1	DCE301	Fluid Mechanics	Core	3	0	0	3
2	DCE302	Applied Mechanics	Core	3	0	0	3
3	DCE303	Surveying - I	Core	2	0	0	2
4	DCE304	Construction Materials	Core	4	0	0	4
5	DCE305	Building Construction	Core	5	0	0	5
6	DCE306	Building Drawing	Skill based	1	0	6	4
7	DCE307	Fluid Mechanics Lab	Skill based	0	0	2	1
8	DCE308	*Applied Mechanics Lab	Skill based	0	0	2	1
9	DCE309	Surveying – I Lab	Skill based	0	0	6	3
10	DCE310	Construction Materials Lab	Skill based	0	0	2	1
11	DCE311	Building Construction Lab	Skill based	0	0	2	1
Total				18	0	20	28

Semester: IV							
Sr.	Course Code	Course Name	Type of Course	(Hours Per Week)			No. of Credits
				L	T	P	
1	DCE401	Concrete Technology	Core	3	0	0	3
2	DCE402	Water Supply and Waste Water Engineering	Core	5	0	0	5
3	DCE403	Irrigation Engineering	Core	4	0	0	4
4	DCE404	Surveying – II	Core	2	0	0	2
5	DCE405	Structural Mechanics	Core	4	0	0	4
6	DCE406	Public Health & irrigation Engineering Drawing	Skill based	2	0	4	4
7	DCE407	Concrete Technology Lab	Skill based	0	0	2	1
8	DCE408	Water Supply and Waste Water Engineering Lab	Skill based	0	0	2	1
9	DCE409	Surveying – II Lab	Skill based	0	0	6	3
10	DCE410	Structural Mechanics Lab	Skill based	0	0	2	1
Total				20	0	16	28

Semester: V							
Sr.	Course Code	Course Name	Type of Course	(Hours Per Week)			No. of Credits
				L	T	P	
1	DCE501	Reinforced Concrete Design	Core	4	0	0	4
2	DCE502	Highway Engineering	Core	4	0	0	4
3	DCE503	Railways, Bridges and Tunnels	Core	4	0	0	4
4	DCE504	Soil and Foundation Engineering	Core	4	0	0	4
5	DCE505	Generic Skills and Entrepreneurship Development	Skill based	3	0	0	3
6	DCE506	Survey Camp	Skill based	0	0	10	5
7	DCE507	Computer Applications in Civil Engineering Lab	Skill based	0	0	6	3
8	DCE508	Minor Project Work	Skill based	0	0	4	2
9	DCE509	Highway Engineering Lab	Skill based	0	0	2	1
10	DCE510	Soil and Foundation Engineering lab	Skill based	0	0	2	1
11	DCE511	Industrial Training /Internship	Skill based	NA	NA	NA	4
Total				19	0	24	35

Semester: VI							
Sr.	Course Code	Course Name	Type of Course	(Hours Per Week)			No. of Credits
				L	T	P	
1	DCE601	Steel Structure Design	Core	4	0	0	4
2	DCE602	Earthquake Resistant Building Construction	Core	3	0	0	3
3	DCE603	Quantity Surveying & Valuation	Core	5	0	0	5
4	DCE604	Construction Management & Accounts	Core	5	0	0	5
5	DCE605	Structural Drawing	Skill based	1	0	2	2
6	DCE606	Major Project	Skill based	0	0	8	4
Discipline Elective (Any one of the following)							
7	DCE607	Environmental Engineering	Discipline Elective	3	0	0	3
8	DCE608	Prestressed Concrete					
Total				21	0	10	26

SEMESTER: I

COURSE TITLE: APPLIED CHEMISTRY –I
COURSE CODE: DCE101

L	T	P	Credits
3	0	0	3

Total Hours: 45

COURSE CONTENT

UNIT-I **15 Hours**

Basic Concepts of Chemistry: Units and Dimensions, dimensional formulas- dimensional analysis principle of homogeneity of dimensions and their limitations, derived units (with special reference to pressure, volume, temperature, density, specific gravity, surface tension, viscosity and conductivity, thermodynamic parameters-significance and applications), Matter, element, compound and mixtures, atoms, molecules, ions, symbols and formulae, Atomic mass (A), atomic number (Z) isotopes, isobars, isotone (recapitulation only), Mole concept, solution, standard solution, methods to express concentration of solution molar mass, molar volume of gases, strength of solutions in grams per liter, molarity (M), molality (m), mass and volume percentages and mole fraction, Chemical equations, thermo-chemical equations, balancing of chemical equations and simple stoichiometric calculations. Numerical problems based on mole concept and molarity.

Atomic Structure, Periodic Table and Chemical Bonding: Fundamental particles- electrons, protons and neutrons, Bohr's model of atom and its limitations (qualitative treatment only). Wave particle duality and Heisenberg's uncertainty principle (elementary idea only), Modern concept of atom, definition of orbit and orbitals, shapes of s and p orbitals only, quantum numbers (significance only), electronic configuration of elements up to atomic number 30 on the basis of Aufbau Principle, Pauli's Principle and Hund's Rule, Modern periodic law and periodic table, groups and periods. Classification of elements into s, p, d, and f blocks (periodicity in properties are excluded), Chemical bond and cause of bonding. Ionic bond, valence bond approach of covalent bond, hybridization (sp3, sp2 and sp) sigma (σ) and pi (π) bonds. Metallic bonding – electric, magnetic and dielectric properties based on Band model.

UNIT-II **10 Hours**

Water: Sources of water, impurities in water (dissolved –gases, salts and suspended), Hardness of water, types of hardness, degree of hardness, units of hardness-ppm, ^{o}Cl, ^{o}Fr – numerical problems. Disadvantages of using hard water in domestic and in industries: Laundry work (action of soap on water), paper, textile and beverage industries. Boiler feed water and its quality -

causes and prevention of Scale and sludge formation, Priming and foaming, Boiler corrosion, Caustic embitterment, Softening of hard water by Ion exchange process- dematerialized water advantages and limitations of this method, Desalting of sea water by reverse osmosis (RO) method, Calgon process, Characteristics of drinking water and ICMR, ISI –quality criteria, Water analysis: Quantitative analysis of hardness by EDTA method, alkalinity, and estimation of total dissolved solids (TDS)-numerical problems, Enlist applications of various kinds of water in engineering and chemical industry.

UNIT-III **10 Hours**

Gas laws, Terminology of Thermodynamics and Equilibrium: Definition of gas and perfect gas, gas laws- Boyle's Law, Charles law & Avagadro's law, Gas constant (R), Terminology of Thermodynamics- thermodynamic system, surroundings, types of systems, extensive and intensive properties, state of a system, state functions, isothermal, adiabatic reversible, irreversible spontaneous and non-spontaneous processes, meaning of ΔE, ΔH, ΔS and ΔG, free energy of spontaneous and non-spontaneous processes (mathematical derivations are excluded), Elementary idea of zeroth, 1st, 2nd, and 3rd laws of thermodynamics (without mathematical derivation), Applications of free energy change (ΔG) criteria (in metallurgy and electric work without any mathematical derivation), Equilibrium state and its significance statement of Le-Chatelier's principle, equilibrium constant (K) and its applications, Electrolytes, non-electrolytes, ionization in aqueous solutions, degree of ionization, ionic product of water (Kw), Concept of pH, pH- scale and industrial applications of pH, Definitions - acids, bases, neutralization and acid base titrations, indicators and choice of indicators for acid base titration., Buffer (acidic, basic and neutral) solutions, enlist applications of buffer solution, Simple numerical problems (only on 4.1, 4.5. 4.6 and 4.7 sections)

UNIT-IV **10 Hours**

Electrochemistry: Electronic concept of oxidation and reduction, redox reactions, Electrolytes, non-electrolytes and electrolysis, Faraday's Laws of electrolysis and applications in electrometallurgy and electroplating in automobile, Standard reduction potential (SRP), activity series, electrochemical cell and their e.m.f. , Chemistry of commercial electrochemical cells, primary cells - Daniel cell and dry cell, secondary cell - lead acid storage cell, Wetson-cadmium cell, nicad battery, LiI battery, Hg – button cell and Ag- button cell, Fuel cells, Simple numerical problems related

(to only 5.1, 5.3 and 5.4 sections)., secondary cell - lead acid storage cell, Wetson-cadmium cell, nicad battery, LiI battery, Hg – button cell and Ag-button cell, Fuel cells, Simple numerical problems related (to only 5.1, 5.3 and 5.4 sections).

Organic Chemistry: Tetra covalency of carbon in carbon compounds, catenation (definition only), Classification of organic compounds on the bases of functional group, IUPAC nomenclature of simple organic compounds (containing one functional group only) and their common names (if any)

Suggested Readings:

- *Chemistry in Engineering by J.C. Kuricose and J. Rajaram, Tata McGraw Hill, Publishing Company Limited, New Delhi.*
- *Engineering Chemistry by P.C.Jain and Monika Jain, Dhanapat Rai Publishing Company, New Delhi.*
- *Engineering Chemistry by Shashi Chawla.*
- *Engineering Chemistry – A text Book by H. K. Chopra and A Parmer- Narosa Publishing House New Delhi.*
- *Applied Chemistry-I by Dr.P.K. Vij&ShikshaVij, Lords Publications, Jalandhar*

Course Title: APPLIED MATHEMATICS–I
Course Code: DCE102

L	T	P	Credits
3	0	0	3

Total Hours: 45

Course Content

UNIT-I **10 Hours**

Algebra: Complex Numbers: Complex number, representation, modulus and amplitude. De-movier's theorem, its application in solving algebraic equation. Basics and properties of logarithms and its applications in solving problems related to basic logarithmic formulas. Geometrical progression, its nth term and sum of n terms and to infinity. Application of Arithmetic progression and Geometrical progression to Engineering problem such as maximum possible output of the machine, vibration of the spring, finding out capacity of tank etc. Partial fractions (linear factors, repeated linear factors, non-reducible quadratic factors excluding repeated factors)

UNIT-II **10 Hours**

Permutations and Combinations: Value of ${}^{n}p_{r}{}^{n}c_{r}$. Simple problems of formulation of words from given alphabets (with and without repetition), circular permutations etc. Binomial theorem (without proof) for positive integral index (expansion and general form); binomial theorem for any index (expansion without proof) first and second binomial approximation with applications to engineering problems.

UNIT-III **10 Hours**

Trigonometry: Concept of angles, measurement of angles in degrees, grades and radians and their conversions. Applications of angles such as angle subtended by an arc, diameter of moon etc. 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).
Graphs of Sin x, Cos x, tan x and ex. Applications of Trigonometric terms in engineering problems such as to find an angle of elevation, height, distance etc.

UNIT-IV **15 Hours**

Co-ordinate Geometry: 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. Equation of straight line in various standard forms (without proof), inter section of two straight lines, angle between two lines. Parallel and perpendicular lines, perpendicular distance formula. 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. Equation(s) of a straight line, circle, and conics (ellipse, parabola and hyperbola) and their application in solving engineering problems.

Transaction Modes

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning

Suggested Readings

- *Elementary Engineering Mathematics by BS Grewal, Khanna Publishers, New Delhi.*
- *Engineering Mathematics by Vol. I & II by S Kohli, IPH, Jalandhar.*
- *Applied Mathematics by RD Sharma.*
- *Applied Mathematics, Vol. I & II by SS Sabharwal &Sunita Jain, Eagle Parkashan, Jalandhar.*
- *Comprehensive Mathematics, Vol. I & II by Luxmi Publications.*

Course Title: APPLIED PHYSICS-I
Course Code: DCE103

L	T	P	Credits
3	0	0	3

Total Hours: 45

COURSE CONTENTS

UNIT-I **10 Hours**

Units and Dimensions: Units - fundamental and derived units, systems of units (FPS, CGS, MKS and SI units), dimensional formulae of physical quantities, Dimensional equations and principle of homogeneity, applications to conversion from one system of units to another, checking the correctness of physical relations and derivation of simple physical relations, Error in measurement, random and systematic errors, Application of units and dimensions in measuring length, diameter, Circumference, volume, surface area etc. of metallic and non-metallic blocks, wires, pipes etc (at least two each).

Force and Motion: Scalar and vector quantities – examples, addition and multiplication (scalar product and vector product) of vectors, Force, resolution and composition of forces: resultant, parallelogram law of forces, Newton's laws of motion and their engineering applications, derivation of force equation from Newton's second law of motion; conservation of momentum, impulse. Simple numerical problems, Circular motion: angular displacement, angular velocity and angular acceleration, Relation between linear and angular variables (velocity and acceleration), Centripetal force (derivation) and centrifugal force with their applications.

UNIT-II **10 Hours**

Waves and Vibrations: Wave motion: transverse and longitudinal wave motion with examples, velocity, frequency and wave length of a wave (relationship $v = n\lambda$) and their applications, Wave equation, $y = r \sin t$, phase, phase difference, superposition of waves and their applications, Simple Harmonic Motion(SHM): definition, expression for displacement, velocity, acceleration, time period, frequency in S.H.M., Free, forced and resonant vibrations with examples, Acoustics of buildings – reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time and their applications, Ultrasonic – production (magnetostriction and piezoelectric methods) and their engineering and medical applications

UNIT-III **12 Hours**

Rotational Motion: Definitions of torque, angular momentum and their relationship, Conservation of angular momentum (qualitative) and its examples, Moment of inertia and its physical significance, radius of gyration, Theorems of parallel and perpendicular axes (statements), Moment of inertia of rod, disc, ring and sphere (Formulae only), Application of rotational motions in transport vehicles, trains and aero plane turbine/engine.

Work, Power and Energy: Work: definition and its SI units, Work done in moving an object on horizontal and inclined plane (incorporating frictional forces) with its application, Power: definition and its SI units, calculation of power with numerical problems, Energy: Definition and its SI units: Kinetic energy and Potential energy with examples and their derivation, Principle of conservation of mechanical energy (for freely falling bodies), transformation of energy from one form to another with its application, Friction: concept, types and its engineering applications, Application of Friction in brake system of moving vehicles, trains, aero planes and other objects.

UNIT-1V **13 Hours**

Properties of Matter: Elasticity: definition of stress and strain, stress – strain diagram, Hooke's law with its applications, Pressure: definition, its units, atmospheric pressure, gauge pressure, absolute pressure, U-tube, manometers and barometer gauges and their applications, Surface tension: concept, its units, angle of contact, measurement of surface tension by capillary tube method, applications of surface tension, effect of temperature and impurity on surface tension, Fluid motion, Equation of Continuity, Bernoulli's Theorem and their applications. Viscosity and coefficient of viscosity: Buoyant force, buoyancy, Stoke's Law and derivation of terminal velocity, effect of temperature on viscosity and its application in hydraulic systems.

Thermometry: Difference between heat and temperature, Principles of measurement of temperature and different scales of temperature and their Relationship, Resistance thermometers and Pyrometers with their field applications, Expansion of solids, liquids and gases and the respective , coefficients along with relation amongst them, various modes of transfer of heat with examples, Co-efficient of thermal conductivity, determination of thermal conductivity of good conductor (Searle's method) and bad conductor (Lee's disc method)

Transaction Modes

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning

Suggested Readings

- *Suggested Readings of Physics for Class XI (Part-I, Part-II) N.C.E.R.T*
- *Suggested Readings of Physics for Class XII (Part-I, Part-II) N.C.E.R.T*
- *Applied Physics Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, New Delhi*
- *Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi*
- *Fundamentals of Physics by Resnick and Halliday & Walker, Asian Book Pvt. Ltd., New Delhi*

Course Title: English and Communication Skills – I
Course Code: DCE104

L	T	P	Credits
3	0	0	3

Total Hours: 45

COURSE CONTENTS

UNIT-I **10 Hours**

Introduction: Definition, Introduction and Process of Communication, Objectives of Communication, Essentials of Communication, Media and Modes of Communication, Channels of Communication, Barriers to Communication, Body language, Humour in Communication, Silence in Communication

Listening: Significance, Essentials, barriers and effectiveness of Listening.

Speaking: Significance, essentials, barriers and effectiveness of Speaking, Introduction to phonetics (Dictionary: meaning and pronunciation of words as given in the standard dictionary using symbols of phonetics)

UNIT-II **15 Hours**

Reading: Techniques of reading: Skimming, Scanning, Intensive and Extensive Reading, Comprehension, Vocabulary enrichment and grammar exercises based on the following selective readings.

Section-I: Homecoming – R.N. Tagore, the Selfish Giant - Oscar Wilde, the Stick – Justice Surinder Singh.

Section-II: I Have a Dream – Martin Luther King, My struggle for An Education- Booker T Washington, Life Sketch of Sir MokshagundamVisvesvarayya.

Section-III: Ozymandias – P.B. Shelley, Daffodils – William Wordsworth, Stopping by Woods on a Snowy Evening – Robert Frost.

Comprehension exercises on unseen passages, Exercises on interpretation of tables, charts, graphs, signs and pictures etc.

UNIT-III **10 Hours**

Writing: Significance, essentials and effectiveness of writing, Paragraph of 100-120 words.

UNIT-1V **10 Hours**

Vocabulary: Vocabulary of commonly used words, Pair of words (Words commonly confused and misused).

Grammar: Identification of parts of speech, using a word as different parts of speech, Correction of in-correct sentences, Tenses, Voice.

Transaction Modes

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning

Suggested Readings

- *Spoken English (2nd Edition) by V Sasikumar& PV Dhamija; Published by Tata MC Graw*
- *Hills, New Delhi.*
- *Spoken English by MC Sreevalsan; Published by M/S Vikas Publishing House Pvt. Ltd;*
- *New Delhi.*
- *Spoken English –A foundation course (Part-I & Part-II) By KamleshSdanand&Susheela*
- *Punitha; Published by Orient BlackSwan, Hyderabad*
- *Practical Course in English Pronunciation by J Sethi, KamleshSadanand& DV Jindal;*

Course Title: ENGINEERING DRAWING - I
Course Code: DCE105

L	T	P	Credits
1	0	4	3

Total Hours: 45

COURSE CONTENT

UNIT-I **10 Hours**

Introduction to Engineering Drawing: Introduction to drawing instruments, materials and layout of drawing sheets.

Free Hand Sketching and Lettering: Different types of lines in Engineering drawing as per BIS specifications, Practice of vertical, horizontal and inclined lines, geometrical figures such as triangles, rectangles, circles, ellipses and curves, hexagonal, pentagon with the help of drawing instruments. Practice of vertical, horizontal and inclined lines, geometrical figures such as triangles, rectangles, circles, ellipses and curves, hexagonal, pentagon with the help of drawing instruments. Free hand lettering (Alphabet and numerals) – lower case and upper case, single stroke, vertical and inclined at 75 degrees in different standards, series of 3,5,8 and 12 mm heights in the ratio of 7:4

UNIT-II **10 Hours**

Dimensioning Technique: Necessity of dimensioning, method and principles of dimensioning (mainly theoretical instructions), Dimensioning of overall sizes, circles, threaded holes, chamfered surfaces, angles, tapered surfaces, holes, equally spaced on P.C.D., counter sink holes, counter bored holes, cylindrical parts, narrow spaces and gaps, radii, curves and arches.

Scales: Scales - their need and importance (Theoretical instructions), Drawing of plain and diagonal scales.

UNIT-III **10 Hours**

Projection: Theory of projections (Elaborate theoretical instructions), Projection of Points: Production of a point in the first quadrant, Projection of a point in the third quadrant. Projection of Straight Line: Line parallel to both the planes, Line perpendicular to any one of the reference planes, Line inclined to any one of the reference planes. Drawing 3 views of given objects (non-symmetrical objects may be selected for this exercise). Drawing 6 views of given objects (non-symmetrical objects may be selected for this exercise). Identification of surfaces on drawn views and objects drawn, Exercises on missing lines and views.

Note: At least one sheet in third angle projection.

UNIT-IV **15 Hours**

Sections: Importance and salient features, Methods of representing sections, conventional sections of various materials, classification of sections, conventions in sectioning. Drawing of full section, half section, partial or broken out sections, offset sections, revolved sections and removed sections. Drawing of different conventions for materials in section, conventional breaks for shafts, pipes, rectangular, square, angle, channel, rolled sections, Exercises on sectional views of different objects.

Isometric Views: Fundamentals of isometric projections (Theoretical instructions), Isometric views of combination of regular solids like cylinder, cone, cube and prism.

Transaction Modes

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning

Suggested Readings

- *A Suggested Readings of Engineering Drawing by Surjit Singh, Dhanpat Rai & Co., Delhi.*
- *Engineering Drawing by PS Gill, SK Kataria& Sons, New Delhi.*
- *Elementary Engineering Drawing in First Angle Projection by ND Bhatt, Charotar Publishing House.*
- *Engineering Drawing, I & II by JS Layall, Eagle Parkashan, Jalandhar.*

Course Title: APPLIED CHEMISTRY –I LAB
Course Code: DCE106

L	T	P	Credits
0	0	2	1

Total Hours: 15

List of Practical's

1. Introduction to volumetric analysis, apparatus used in volumetric analysis and molarity based calculations.
2. Preparation of standard solution of oxalic acid {(COOH)2.2H2O} or potassium permanganate (KMnO4) or potassium dichromate (K2Cr2O7)
3. To verify the physical (state, colour, odour solubility, boiling and melting points) properties and few chemical properties of ionic (e.g. NaCl) and covalent (kerosene oil or any other such compound may be given) compounds.
4. To determine strength of given solution of sodium hydroxide by titrating against standard solution of oxalic acid using phenolphthalein indicator.
5. To determine total acid number of given oil volumetrically
6. To prepare cup ammonium {Cu(NH3)4SO4} and estimate cupric ion in the given solution of copper sulphate solution by spectrophotometric method.
7. To distinguish between aldehyde and ketone by Tollen's reagent (benzaldehyde and acetone may be used)
8. To verify the first law of electrolysis. (Electrolysis of copper sulphate solution using copper electrode).
9. To prepare iodoform from ethanol or acetone
10. To prepare Bakelite.
11. To prepare the Mohr's salt from ferrous sulphate and ammonium sulphate.
12. Estimation of hardness of water by EDTA method.
13. Estimation of total alkalinity in the given sample of water by titrating against standard solution of sulphuric acid
14. Determination of pH of given solution using pH meter.

Course Title: APPLIED PHYSICS-I LAB
Course Code: DCE107

L	T	P	Credits
0	0	2	1

Total Hours: 15

List of Practical's

1. To find the diameter of wire using a screw gauge
2. To find volume of solid cylinder and hollow cylinder using a vernier calipers
3. To determine the thickness of glass strip and radius of curvature using a 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
11. To determine the viscosity of glycerin by Stoke's method
12. To determine the coefficient of linear expansion of a metal rod
13. To find the coefficient of thermal conductivity of Bakelite sheet (bad conductor) by Lee's Disc Method
14. To determine the coefficient of thermal conductivity of a copper strip using Searle's Thermal Conductivity apparatus.

Course Title: ENGLISH AND COMMUNICATION SKILLS –I LAB
Course Code: DCE108

L	T	P	Credits
0	0	2	1

Total Hours: 15

List of Practicals

1. LISTENING

- ✓ Using pre-recorded CDs/DVDs with pre-listening exercise to prepare students about what they are going to hear and comprehension based on the audio
- ✓ Note-taking
- ✓ Listening for the main ideas
- ✓ Assessing listening proficiency

2. SPEAKING

- ✓ Exercises on pronunciation of common words as given in the standard dictionary using symbols of phonetics
- ✓ Greetings for different occasions
- ✓ Introducing oneself, others and leave taking (talking about yourself)
- ✓ Just a minute (JAM) sessions: Speaking extempore for one minute on given topics
- ✓ Paper reading before an audience (reading unseen passages)
- ✓ Situational Conversation/role-playing with feedback, preferably through video recording
- ✓ Reading aloud of Newspaper headlines and important articles
- ✓ Improving pronunciation through tongue twisters

3. READING

- ✓ Paper reading
- ✓ Poetry recitation
- ✓ Reading newspaper headlines

4. WRITING

- ✓ Exercises on spellings
- ✓ Group exercises on writing paragraphs on given topics

5. VOCABULARY

- ✓ To look up words in a Dictionary: meaning and pronunciation of words as given in the standard dictionary using symbols of phonetics
- ✓ To seek information from an Encyclopaedia

Course Title: GENERAL WORKSHOP PRACTICE -I
Course Code: DCE109

L	T	P	Credits
0	0	4	2

Total Hours: 30

COURSE CONTENTS:

The following shops are included in the syllabus:

1. Welding Shop –I
2. Fitting Shop–I
3. Sheet Metal Shop –I
4. Electric Shop-I
5. Carpentry Shop–I
6. Smithy Shop–I

1. WELDINGSHOP– I

1.1 Introduction and importance of welding as compared to other material joining processes. Specifications and type of welding machines, classification and coding of electrodes, welding parameters, welding joints and welding positions. Materials to be welded, safety precautions.

1.2 Jobs to be prepared

Job I Practice of striking arc (Minimum4beadson100mmlong M.S. flat).

Job II Practice of depositing beads on plate at different current levels. (Minimum 4 beads on M.S. plate at four setting of current level).

Job III Preparation of lap joint using arc welding process.

Job IV Preparation of butt joint using arc welding process. (100mmlong).

Job V Preparation of T Joint using gas or arc welding (100mmx6mmM.S. Flat).

2. FITTINGSHOP– I

2.1 Useofpersonalprotectiveequipmentandsafetyprecautionswhileworking.

2.2 Basic deburring processes.

2.3 Introduction to fitting shop tools, marking and measuring devices/equipment.

2.4 Identification of materials. (Iron, Copper, Stainless Steel, Aluminium etc.)

2.5 Identification of various steel sections (flat, angle, channel, bar etc.).

2.6 Introduction to various fitting shop operations/processes (Hacksawing, Drilling, Chipping and Filing).

Job I Marking of job, use of marking tools, filing and use of measuring instruments. (Vernier caliper, Micrometer and Vernier height gauge).

Job II Filing a rectangular/square piece to maintain dimensions with in an accuracyof.25 mm. ±

Job III Making a cut-out from a square piece of MS flat using hand Hack saw and chipping.

3. SHEETMETALSHOP–I

3.1. Introduction to sheet metal shop, use of hand tools and accessories e.g. different types of hammers, hard and soft mallet, sheet and wire gauge, necessary allowance required during job fabrication, selection of material.

3.2 Introduction and demonstration of hand tools used in sheet metal shop.

3.3 Introduction and demonstration of various machines and equipment used in sheet metal shop e.g. Shearing Machine, Bar Folder, Burring Machine, Turning Machine, Wiring Machine, Setting Down Machine, Forming Machine, Brake etc.

3.4 Introduction and demonstration of various raw materials used in sheet metal shop e.g. black-plain sheet, galvanized-iron plain sheet, galvanised corrugated sheet, aluminium sheet etc.

3.5 Study of various types of nuts, bolts, rivets, screws etc.

Job I Shearing practice on a sheet using hand shears.

Job II Practice on making Single riveted lap joint/Double riveted lap Joint.

Job III Practice on making Single cover plate chain type, zig-zag type and single riveted Butt Joint.

4. ELECTRICSHOP-I

4.1 Study, demonstration and identification of common electrical materials with standard ratings and specifications such as wires, cables, switches, fuses, cleats, clamps and allied items, tools and accessories.

4.2 Study of electrical safety measures and protective devices.

Job II Identification of phase, Neutral and Earth wires for connection to domestic electrical appliances and their connections to three pin plugs.

Job II Carrying out house wiring circuit suing fuse, switches, sockets, ceiling rose etc. in batten or P.V.C. casing-capping.

4.3 Study of common electrical appliances such as auto electric iron, electric kettle, ceiling/table fan, desert cooler etc.

4.4 Introduction to the construction of lead acid battery and its working.

Job III Installation of battery and connecting two or three batteries in series and parallel.

4.5 Introduction to battery charger and its functioning.

Job IV Charging a battery and testing with hydro meter and cell tester

5. CARPENTRYSHOP- I

5.1 General Shop Talk

5.1.1 Name and use of raw materials used in carpentry shop: wood & alternative materials

5.1.2 Names, uses, care and maintenance of hand tools such as different types

of Saws, C-Clamp, Chisels, Mallets, Carpenter's vices, Smarking gauges, Try-squares, Rulers and other commonly used tools and materials used in carpentry shop by segregating as cutting tools, supporting tools, holding tools, measuring tools etc.

5.1.3 Specification of tools used in carpentry shop.

5.1.4 Different types of Timbers, their properties, uses & defects.

5.1.5 Seasoning of wood.

5.1.6 Estimation.

5.2 Practice

5.2.1 Practices for Basic Carpentry Work

5.2.2 Sawing practice using different types of saws

5.2.3 Assembling jack plane — Planning practice including sharpening of jack plane cutter

5.2.4 Chiseling practice using different types of chisels including sharpening of chisel

5.2.5 Makingofdifferenttypesofwoodenpinandfixingmethods.Markingmeasuring and inspection of jobs.

5.3 Job Practice

Job 1 Marking, sawing, planning and chiseling and their practice

Job II Half Lap Joint (cross, Lor T– anyone)

Job III Mortise and Tenon joint (T-Joint)

Job IV Dove tail Joint (Lapor Bridle Joint)

6. SMITHYSHOP-I

6.1 General Shop Talk

6.1.1 Purpose of Smithy shop

6.1.2 Different types of Hearths used in Smithy shop

6.1.3 Purpose, specifications, uses, care and maintenance of various tools and equipments used in hand forging by segregating as cutting tools, supporting tools, holding tools, measuring tools etc.

6.1.4 Types of fuel used and maximum temperature obtained

6.1.5 Types of raw materials used in Smithy shop

6.1.6 Uses of Fire Bricks & Clays in Forging workshop.

6.2 Practice

6.2.1 Practice of firing of hearth/Furnace, Cleaning of Clinkers and Temperature Control of Fire.

6.2.2 Practice on different basic Smithy/Forging operations such as Cutting, Upsetting, drawing down, Setting down, Necking,

Bending, Fullering, Swaging, Punching and Drifting

a) Demonstration—Making cube, hexagonal cube, hexagonal bar from round bar

6.2.3 Practice of Simple Heat treatment processes like Tempering, Normalizing Hardening etc

Job Practice: Job Preparation

Job I Making a cold/hot, hexagonal/octagonal flat chisel including Tempering of edges.

Job II Production of utility goods e.g. hexagonal bolt / square shank boring tool, fan hook (long S-type) [Two jobs are to be done by the students].

Job III To prepare a cube from a M.S. round by forging method.

Transaction Modes

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning

Suggested Readings

- *Workshop Technology I, II, III, by S K Hajra, Choudhary and A K Chaoudhary. Media Promoters and Publishers Pvt. Ltd., Bombay*
- *Workshop Technology by Manchanda Vol. I, II, III India Publishing House, Jalandhar.*
- *Manual on Workshop Practice by K Venkata Reddy, KL Narayana et al; MacMillan India Ltd. New Delhi*
- *Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi*
- *Workshop Technology by B.S. Raghuwanshi, Dhanpat Rai and Co., New Delhi*
- *Workshop Technology by HS Bawa, Tata McGraw Hill Publishers, New Delhi*

Course Title: BASICS OF INFORMATION TECHNOLOGY LAB
Course Code: DCE110

L	T	P	Credits
0	0	2	1

Total Hours: 15

List of Experiments:

1. Various Components of a Computer.
2. Introduction to Microsoft Word & Presentation
3. Make a simple presentation on your college,
4. use 3D effects, on prescribed presentation
5. Applications of Ms-Office Ms-Word
6. Ms-Excel
7. Ms-PowerPoint
8. Create web pages for your college using different tags.
9. Web Browser and E- Mail
10. Conversion of a word documents into PDF/ Image conversion using image file format.

Transaction Modes

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning

Suggested Readings

- *Fundamentals of Computer by V Rajaraman; Prentice Hall of India Pvt. Ltd., New Delhi*
- *Information Technology for Management by Henery Lucas, 7th edition, Tata Mc Graw Hills, New Delhi*
- *Computers Fundamentals Architecture and Organisation by B Ram, revised Edition, New Age International Publishers, New Delhi*
- *Computers Today by SK Basandara, Galgotia publication Pvt ltd. Daryaganj, New Delhi.*
- *MS-Office 2000 for Everyone by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., New Delhi*

SEMESTER-II

Course Title: ENGLISH AND COMMUNICATION SKILLS -II
Course Code: DCE201

L	T	P	Credits
3	0	0	3

Total Hours: 45

The curriculum aims to develop the use of English for three major purposes social interaction, academic achievement and professional use. Listening, speaking, reading, and writing skills cannot be thought of as independent skills. They are generally perceived as interdependent where one skill often activates the other skills as well as the paralinguistic skills required for the achievement of effective communication. It is believed that the most effective way to achieve these purposes is through the adoption of a thematic, integrated, content-based approach to teaching and learning.

COURSE CONTENTS:

UNIT-I **10 Hours**

Reading: Comprehension, Vocabulary enrichment and grammar exercises based on the following selective readings:

Section-I: The Portrait of a Lady - Khushwant Singh, the Lost Child by Mulk Raj Anand, The Refugees – Pearl S. Buck.

Section-II: Life Sketch of Dr. Abdul Kalam, Abraham Lincoln's letter to his son's Headmaster.

Section-III: All The World's A Stage – W. Shakespeare, Say Not, The Struggle NoughtAvaileth – A.H. Clough, Pipa's Song – Robert Browning, A Viewpoint – RP Chaddah. Comprehension exercises on unseen passages

UNIT-II **15 Hours**

Writing: The Art of Précis Writing, Correspondence: Business and Official, Drafting: Report Writing: Progress report and Project report, Inspection Notes, Notices: Lost and found; Obituary; Auction, Memos and Circular, Notices, Agenda and Minutes of Meetings, Use of internet and E-Mails, Press Release, Applying for a Job: Resume writing; forwarding letter and follow-up. Writing Telephonic messages, Filling-up different forms such as Banks and on-line forms for Placement etc.

UNIT-III **10 Hours**

Vocabulary: Vocabulary of commonly used words, Glossary of Administrative

Terms (English and Hindi), One-word substitution, Idioms and Phrases, Prefixes and Suffixes, Punctuation, Narration, Forms of verbs: Regular and irregular.

UNIT-IV **10 Hours**

Employable skills: Importance of developing employable and soft skills; List and tips for developing of employable skills.

Transaction Modes

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning

Suggested Readings

- *Spoken English (2nd Edition) by V Sasikumar& PV Dhamija; Published by Tata MC Graw Hills, New Delhi.*
- *Spoken English by MC Sreevalsan; Published by M/S Vikas Publishing House Pvt. Ltd; New Delhi.*
- *Spoken English –A foundation course (Part-I & Part-II) By KamleshSdanand&SusheelaPunitha; Published by Orient BlackSwan, Hyderabad*
- *Practical Course in English Pronunciation by J Sethi, KamleshSadanand& DV Jindal; Published by PHI Learning Pvt. Ltd; New Delhi.*
- *A Practical Course in Spoken English by JK Gangal; Published by PHI Learning Pvt. Ltd; New Delhi.*

Course Title: APPLIED MATHEMATICS -II
Course Code: DCE202

L	T	P	Credits
3	0	0	3

Total Hours: 45

COURSE CONTENTS

UNIT-I **10 Hours**

Algebra: Determinants: Elementary properties of determinants up to 3rd order, consistency of equations, Crammer's rule. Matrix: Algebra of matrices, Inverse of a matrix, matrix inverse method to solve a system of linear equations in 3 variables. Application of Matrix in computer programming.

Differential Calculus: Definition of function; Concept of limits.

Four standard limits $\lim_{x \to a} \frac{x^n - a^n}{x - a}$,

$\lim_{x \to 0} \frac{\sin x}{x}$, $\lim_{x \to 0} \frac{a^x - 1}{x}$, $\lim_{x \to 0} (1+x)^{1/x}$

Differentiation of x^n, sin x, cos x, tan x, e^x, $\log_a x$ (Please take one example of differentiation by definition), Differentiation of sum, product and quotient of functions. Differentiation of function of a function, Differentiation of trigonometric inverse functions. Logarithmic differentiation. Exponential differentiation, Successive differentiation (excluding nth order), Application of differential calculus in:: Rate Measures, Errors and increments, Maxima and minima, Equation of tangent and normal to a curve (for explicit functions only).

UNIT-II **15 Hours**

Integral: Integration as inverse operation of differentiation with simple examples. Simple integration by substitution, by parts and by partial fractions (for linear factors only). Evaluation of definite integrals (simple problems)-

Evaluation of $\int_0^{\pi/2} \sin^n x.\, dx$, $\int_0^{\pi/2} \cos^n x\, dx$, $\int_0^{\pi/2} \sin^m x \cos^n x\, dx$

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

Applications of integration for: Simple problem on evaluation of area bounded by a curve and axes. Calculation of volume of a solid formed by revolution of an area about axes. (Simple problems). To calculate average and root mean square value of a function and Area by Trapezoidal Rule and Simpson's Rule.

UNIT-III **10 Hours**

Statistics and Probability: Measures of Central Tendency: Mean, Median, Mode with example of daily life, Measures of Dispersion: Mean deviation, Standard deviation. Probability definition and addition law of probability, theorem and simple numerical problems, General view of normal probability curve (No numericals), Explanation of different sampling techniques (No numericals).

UNIT-IV **10 Hours**

Differential Equations: Solution of first order and first degree differential equation by variable separation method (simple problems). Differential equations of homogeneous equation.

Transaction Modes

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning

Suggested Readings

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*

Course Title: APPLIED PHYSICS-II
Course Code: DCE203

L	T	P	Credits
3	0	0	3

Total Hours: 45

COURSE CONTENTS:

UNIT-I **10 Hours**

Optics: Review of basic optics laws: Reflection and Refraction, Refractive index and magnification, image formation in lenses, lens formulae (thin lens only),power of lens, total internal reflection and their applications, Simple concepts of interference, diffraction, Polarization and their applications like Commercial equipment, optic glasses and its manufacturing and use of Polari meter in sugarcane industry and distilleries (No explanation required), Simple and compound microscope, astronomical telescope, magnifying power and its calculation (in each case) and their applications.

UNIT-II **10 Hours**

Electrostatics: Coulombs law, unit charge and electric lines of force, Electric flux and Gauss's Law, Electric field intensity and electric potential, Electric field due to point charge, straight charged conductor, plane charged sheet and charged sphere (Inside and outside the sphere), Capacitance, types of capacitors, capacitance of parallel plate capacitor, series and parallel combination of capacitors, Dielectric and its effect on capacitance, and dielectric break down, Pollution, different types of pollution and polluting agents, Use of Electronics in reducing Air and Water pollution e.g. precipitation of microbes and moisture reparation from air and gases in industry (small explanation only).

UNIT-III **15 Hours**

DC Circuits: Concept of electricity, various applications of electricity, Current, voltage, resistance, potential difference and e.m.f, power, electrical energy and their units, advantages of electrical energy over other forms of energy and Alternating Current and Direct Current, Ohm's law and its applications, specific resistance, effect of temperature on resistance, co-efficient of resistance, series and parallel combination of resistors an Resistance, Definitions of Conductance and Super Conductor's, Kirchhoff's laws, Wheatstone bridge principle and its applications, Heating effect of current and concept of electric power, energy and their units, related numerical problems and their applications, Examples of DC Circuits e.g. Various electrical and electronic equipment CRO, T.V., Audio system,

Computers (Only examples, no explanations).

Electromagnetism: Magnetic field and its units, magnetic intensity, magnetic lines of force, magnetic flux and their units, Permeability and susceptibility and their applications. Electromagnetic Induction, Lanz's law and its uses like dynomo, Right hand and left hand rules, Magnetic lines of force due to straight conductor, Solenoid and Circular coil. Force on a current carrying rectangular coil placed in magnetic field and its uses in moving coil galvanometer, electric motor (Concept only). Lorentz force, Force on a current carrying conductor (straight and rectangular), Moving coil galvanometer its principle, construction and working.

UNIT-IV **10 Hours**

Semiconductor physics: Energy bands, intrinsic and extrinsic semiconductors, p-n junction diode and its characteristics, Diode as rectifier – half wave and full wave rectifier, semiconductor transistor pnp and npn (concept only).

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 their engineering and medical applications, Fibre optics: introduction to optical fiber materials, types, light propagation and applications in communication.

Transaction Modes

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning.

Suggested Readings

- *Suggested Readings of Physics for Class XI (Part-I, Part-II) N.C.E.R.T*
- *Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi*
- *Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi*
- *Fundamentals of Physics by Resnick, Halliday and Walker, Asian Book Pvt. Ltd., New Delhi.*
- *Fundamentals of Optics by Francis A. Jenkins & Harvey E White, McGraw Hill International Editions, Physics Series.*

Course Title: BASIC ELECTRICAL & ELECTRONICS ENGINEERING

Course Code: DCE211

L	T	P	Credits
3	0	0	3

Total Hours: 45

COURSE CONTENT

UNIT-I **10 Hour**

Application and Advantage of Electricity: Difference between ac and dc, various applications of electricity, advantages of electrical energy over other types of energy

UNIT-II **10 Hours**

Basic Electrical Quantities: Definition of voltage, current, power and energy with their units, name of instruments used for measuring above quantities, connection of these instruments in an electric circuit

UNIT-III **10 Hours**

AC Fundamentals: Electromagnetic Induction-Faraday's Laws, Lenz's Law; Fleming's rules, Principles of a.c. Circuits; Alternating emf, Definition of cycle, frequency, amplitude and time period. Instantaneous, average, r.m.s and maximum value of sinusoidal wave; form factor and Peak Factor. Concept of phase and phase difference. Concept of resistance, inductance and capacitance in simple a.c. circuit. Power factor and improvement of power factor by use of capacitors. Concept of three phase system; star and delta connections; voltage and current Relationship (no derivation) capacitance.

UNIT-IV **10 Hours**

Semiconductor Diode: PN Junction, mechanism of current flow in PN junction, drift and diffusion currents, depletion layer, potential barrier, effect of forward and reverse biasing in a PN junction. Use of diode as half wave and full wave rectifiers (centre tapped and bridge type), relation between DC output and AC input voltage, rectifier efficiency. Concept of ripples, filter circuits – shunt capacitor, series inductor, and pie (π) filters and their applications, Various types of diodes such as zener diode, light emitting diode, photo diode; their working characteristics and applications. Zener diode and its characteristics. Use of zener diode for voltage stabilization.

Transaction Modes

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning.

Suggested Readings

- *Basic Electrical Engineering by PS Dhongal; Tata McGraw Hill Publishers, New Delhi*
- *A Text Book of Electrical Technology, Vol. I and II by BL Thareja; S Chand andCo., New Delhi*
- *Basic Electricity by BR Sharma; Satya Prakashan, New Delhi*
- *Basic Electrical Engineering by JB Gupta, S Kataria and Sons, Delhi*
- *Experiments in Basic Electrical Engineering by SK Bhattacharya and KMRastogi, New Age International Publishers Ltd., New Delhi*

Course Title: ENGLISH AND COMMUNICATION SKILLS –II LAB

Course Code: DCE205

L	T	P	Credits
0	0	2	1

Total Hours: 15

List of Practical's:

1. **LISTENING**

- ✓ Pre-recorded CDs of famous speeches and dialogues: Comprehension exercises based on the audio
- ✓ Note-taking
- ✓ Drawing inferences
- ✓ Summarizing

2. **SPEAKING**

- ✓ Voice Modulation: Horizons (pitch, tone, volume, modulation)
- ✓ Word stress, rhythm, weak and strong form, pauses, group-sense, falling sounds, accent, influence of mother tongue etc.
- ✓ Situational Conversation/role-playing with feedback, preferably through video recording
- ✓ Telephonic Conversation: Types of calls, agreeing and disagreeing, making and changing appointments, reminding, making complaints and handling complaints, general etiquettes,
- ✓ A small formal and informal speech
- ✓ Seminar
- ✓ Debate

3. **VOCABULARY**

- ✓ Vocabulary of commonly used words, Glossary of Administrative Terms (English and Hindi),
- ✓ One-word substitution,
- ✓ Idioms and Phrases
- ✓ Prefixes and Suffixes
- ✓ Punctuation
- ✓ Narration
- ✓ Forms of verbs: Regular and irregular

4. **EMPLOYABLE SKILLS**

- ✓ Group discussions
- ✓ Presentations, using audio-visual aids (including power-point)
- ✓ Interview techniques: Telephonic interviews, Group interviews, face to face Interviews.
- ✓ Mannerism and etiquette etc.

Course Title: APPLIED PHYSICS-II LAB
Course Code: DCE206

L	T	P	Credits
0	0	2	1

Total Hours: 15

List of Practicals

1. To find the focal length of convex lens by displacement method.
2. To determine the magnifying power of an astronomical telescope
3. To verify ohm's laws by drawing a graph between voltage and current.
4. To verify laws of resistances in series and in parallel connection.
5. To find resistance of galvanometer by half deflection method
6. To measure very low resistance and very high resistance using Wheat Stone bridge.
7. To determine the capacity of a parallel plate capacitor by discharging through a voltmeter and also find out the tine constant of the given capacitor.
8. To draw characteristics of a pn junction diode and determine knee and break down voltages.
9. To find wave length of He Ne semiconductor LASER.
10. Use of CRO in plotting AC/DC

Course Title: BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB
Course Code: DCE212

L	T	P	Credits
0	0	2	1

Total Hours: 15

List of Practical's:

1. Connection of a three-phase motor and starter with fuses and reversing of direction of rotation
2. Connection of a single-phase induction motor with supply and reversing of its direction of rotation
3. Connection and reading of an electric energy meter
4. Use of ammeter, voltmeter, wattmeter, and multi-meter
5. Measurement of power and power factor in a given single phase ac circuit
6. Study of different types of fuses, MCBs and ELCBs
7. Study of zener as a constant voltage source and to draw its V-I characteristics
8. To draw V-I characteristics of a (i) NPN transistor (ii) thyristor (SCR)
9. Study of construction and working of a (i) stepper motor and (ii) servo moto

Course Title: ENGINEERING DRAWING-II
Course Code: DCE209

L	T	P	Credits
1	0	4	3

Total Hours: 45

COURSE CONTENT

Note:

1. First angle projection is to be followed
2. Minimum 15 sheets to be prepared
3. BIS Code SP 46 -1988 should be followed

Instructions relevant to various drawings may be given along with appropriate demonstration, before assigning drawing practice to the students

1. 20 percent of drawing sheets to be prepared on the third angle projection
2. Punjab State Board of Technical Education may recommend any of the CAD software viz. Solid Works, Pro Engineer, CATIA, NX, Inventor-AutoCAD etc.
3. The State Directorate of Technical Education may allocate funds for the purchase of computer systems and CAD software for drawing classes.
4. Continuous evaluation be done by the teachers for exercises/work done on CAD software. For this proper record may be maintained for its inclusion in the internal assessment**.**

1. Detail and Assembly Drawing

1.1. Principle and utility of detail and assembly drawings
1.2. Introduction to CAD Software
1.3. Practical exercise on drawing from detail to assembly or vice versa using wooden joints as example with CAD Software.

2. Threads (Min.02 sheets)

2.1 Nomenclature of threads, types of threads (metric). Single and multiple start threads
2.2 Forms of various external thread sections such as V, Square, Acme, Knuckle, Metric, Seller and Buttress thread
2.3 Simplified conventions of left hand and right hand threads, both external and internal threads
2.4 Draw at least one sheet using CAD Software

3. Nuts and Bolts (Min.02 sheets)

3.1 Different views of hexagonal and square headed bolts and nuts
3.2 Assembly of nuts and bolts with washers
3.3 Draw at least one sheet using CAD Software

4. Locking Devices (01 sheet)

4.1 Lock nuts, Castle nuts, Sawn nuts, Split pin lock nut
4.2 Spring washers, locking plates.
4.3 Draw different locking devices using CAD Software

5. Screws, Studs and Washers (01 sheet)

5.1 Drawing various types of machine screws
5.2 Drawing various types of studs
5.3 Drawing various types of washers
5.4 Redraw the above sheet using CAD Software

6. Keys and Cotters (Min.03 sheets)

3.3 Various types of keys and their application. Preparation of drawing
of various Keys and cotters

1. Various types of joints (a) Sleeve and Cotter joint (b) Knuckle joint (c) Spigot and Socket joint
2. Draw any one joint using CAD Software

7. Rivets and Riveted Joints (02 sheets)

7.1 Types of general purpose rivet heads

7.2 Types of rivetted joints - lap, butt (single cover plate and double cover plate), chain and zig-zag riveting.

7.3 Caulking and fullering of rivetted joints.

7.4 Draw any one type of rivetted joint using CAD Software

RECOMMENDED BOOKS

- *A Text Book of Engineering Drawing by Surjit Singh, Dhanpat Rai & Co., New Delhi*
- *Engineering Drawing by PS Gill, SK Kataria& Sons, New Delhi*
- *Elementary Engineering Drawing in First Angle Projection by ND Bhatt, Charotar Publishing House*
- *Engineering Drawing I & II by JS Layall, Eagle Parkashan, Jalandhar*
- *AutoCAD 2010: For Engineers & Designers by Prof. Sham Tickoo& D. Sarvanan, Wiley India Pvt. Ltd., Delhi*

Course Title: FLUID MECHANICS
Course Code: DCE301

L	T	P	Credits
3	0	0	3

RATIONALE

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.

DETAILED CONTENTS THEORY

1.Introduction:

1.1 Fluids: Real and ideal fluids

1.2 Fluid Mechanics, Hydrostatics, Hydrodynamics, Hydraulics

2. Properties of Fluids (definition only)

2.1 Mass density, specific weight, specific gravity, viscosity, surface tension - cohesion, adhesion and, capillarity, vapour pressure and compressibility.

2.2 Units of measurement and their conversion

3. Hydrostatic Pressure:

1.1 Pressure, intensity of pressure, pressure head, Pascal's law and its applications.

1.2 Total pressure, resultant pressure, and centre of pressure.

1.3 Total pressure and centre of pressure on horizontal, vertical and inclined Plan surface of triangular, trapezoidal shapes and rectangular, circular (No derivation)

4. Measurement of Pressure:

4.1 Piezometer, simple manometer and differential manometer, Bourden gauge and dead weight pressure gauge.

5. Fundamentals of Fluid Flow: (6 hr)

Types of Flow: Steady and unsteady flow, laminar and turbulent flow, uniform and non-uniform flow

5.1 Discharge and continuity equation (flow equation) {No derivation}

5.2 Types of hydraulic energy: Potential energy, kinetic energy, pressure energy

5.3 Bernoulli's theorem; statement and description (without proof of theorem)

6. Flow Measurements (brief description with simple numerical problems

6.1 Venturimeter and mouthpiece

6.2 Pitot tube

6.3 Orifice and Orifice meter

6.4 Current meters
6.5 Notches and weirs (simple numerical problems)
7. Flow through Pipes:
2.1 Definition of pipe flow; Reynolds number, laminar and turbulent flow - explained through Reynold's experiment
2.2 Critical velocity and velocity distributions in a pipe for laminar flow
2.3 Head loss in pipe lines due to friction, sudden expansion and sudden contraction, entrance, exit, obstruction and change of direction (No derivation of formula)
2.4 Hydraulic gradient line and total energy line
2.5 Flow from one reservoir to another through a long pipe of uniform cross section (simple problems)
2.6 Pipes in series and parallel
2.7 Water hammer phenomenon and its effects (only definition and description)
8. Flow through open channels:
8.1 Definition of an open channel, uniform flow and non-uniform flow
8.2 Discharge through channels using
i) Chezy's formula (no derivation)
ii) Manning's formula (no derivation)
8.3 Most economical channel sections (no derivation)
i) Rectangular
ii) Trapezoidal
8.4 Head loss in open channel due to friction
9. Hydraulic Pumps: (2 hrs)

Hydraulic pump, reciprocating pump, centrifugal pumps (No numericals and derivations) (may be demonstrated with the help of working models)

Note: Visit to Hydraulic research station is must to explain the various concepts.

RECOMMENDED BOOKS

- *Jagdish Lal, "Fluid Mechanics and Hyraulics" Delhi Metropolitan Book Co. Pvt Ltd.*
- *Modi, PN, and Seth, SM; "Hydraulics and Fluid Mechanics", Delhi Standard Publishers Distributors.*
- *Khurmi RS, "Hydraulics and Hydraulics Machines", Delhi S Chand and Co.Likhi SK., Laboratory Manual in Hydraulics, Delhi Wiley Eastern.*
- *BirinderSingh , "Fluid Mechanics", Kaptian Publishing, New Delhi.*
- *Sarao A.S., "Fluid Mechanics", Tech. India Publication, New Delhi*

Course Title: APPLIED MECHANICS S
Course Code: DCE302

L	T	P	Credits
3	0	0	3

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.

DETAILED CONTENTS

1.Introduction

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

2.Laws of forces

- 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

3. Free body diagram

- Equilibrant force and its determination
- Lami's theorem (concept only) [Simple problems on above topics]

4. 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]

  4.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.
- Calculation of least force required to maintain equilibrium of a body on a rough inclined plane subjected to a force:
- Acting along the inclined plane Horizontally At some angle with the inclined plane
- 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]

  6. 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, Weston's Differential Pulley Block, 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]

RECOMMENDED BOOKS

1. *A Text Book of Applied Mechanics by S Ramamurtham,Dhanpat Rai Publishing Co. Ltd.*
2. *Applied Mechanics By, Col. Harbhajan Singh, TL Singha and Parmod Kumar Singla Published By Abhishek Publication, 57-59, Sector-17, Chandigarh*
3. *A Text Book of Engineering Mechanics (Applied Mechanics) by RK Khurmi; S Chand and Co. Ltd., New Delhi.*
4. *A Text Book of Applied Mechanics by RK Rajput; Laxmi Publications, New Delhi..*
5. *Text Book of Applied Mechanics by Birinder Singh, Kaption Publishing House,*

Course Title: SURVEYING – I
Course Code: DCE303

L	T	P	Credits
2	0	0	2

RATIONALE

The important functions of a diploma civil engineer include 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 levelling, 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.

DETAILED CONTENTS THEORY

1. Introduction:
   - 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
2. Chain surveying:
   - Introduction, advantages and disadvantages
   - Direct and indirect ranging offsets and recording of field notes
3. Compass surveying:
   - Purpose of compass surveying. 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.
4. Levelling:
   - 4.1 Purpose of levelling, concept of a level surface, horizontal surface, vertical surface, datum, reduced level and bench marks
   - 4.2 Identification of various parts of Dumpy level and use of Dumpy level, Engineer' level, Auto level: advantages and disadvantages, use of auto level.

4.3 Concepts of line of collimation, axis of the bubble tube, axis of the telescope and vertical axis
4.4 Levelling staff: single piece, folding, invar precision staff, telescopic
4.5 Temporary adjustment and permanent adjustment of dumpy level by two peg method.
4.6 Concept of back sight, foresight, intermediate sight, change point, to determine reduce levels
4.7 Level book and reduction of levels by
- Height of collimation method and
- Rise and fall method.

4.8 Arithmetic checks, problem on reduction of levels, fly levelling, check levelling and profile levelling (L-section and X-section), errors in levelling, permissible limits, reciprocal levelling. Numerical problems.
4.9 Computations of Areas of regular figures and irregular figures. Simpson's rule: prismatic formula and graphical method use of planimeter for computation of areas, numerical problems

5. Plane Table Surveying
- Purpose of plane table surveying, equipment used in plane table survey:
- Setting of a plane table:

(a) Centering
(b) Levelling
(c) Orientation
- Methods of plane table surveying
  - Radiation,
  - Intersection
  - Traversing
  - Resection

6. Concept of Two point and Three point problems (Concept only)
7. Errors in plane table survey and precautions to control them.
8. Testing and adjustment of plane table and alidad

RECOMMENDED BOOKS

- *Hussain, SK and Nagraj, MS; "Text Book of Surveying"; New Delhi, S Chand and Co Ltd.*
- *Deshpande, RS; "A Text Book Surveying and Levelling"; Poona, United Book Corporation*
- *Kocher, CL; "A Text Book of Surveying"; Ludhiana, Katson Publishing House*
- *Kanetkar, TP; and Kulkarni, SV; "Surveying and Leveling" Poona, AVG Prakashan*

Course Title: CONSTRUCTION MATERIALS
Course Code: DCE304

L	T	P	Credits
4	0	0	04

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.

DETAILED CONTENTS THEORY

1. Building Stones:

- Classification of Rocks: (General Review)
- Geological classification: Igneous, sedimentary and metamorphic rocks
- Chemical classification; Calcareous, argillaceous and siliceous rocks
- Physical classification: Unstratified, startified 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

2. Bricks and Tiles:

- Introduction to bricks
- Raw materials for brick manufacturing and properties of good brick making earth
- Manufacturing of bricks
- Preparation of lay (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-flash 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, terrazo and PVC tiles, their properties and uses,
- Vitrified tiles, Paver blocks.

- Stacking of bricks and tiles at site

3. Cement: Introduction, raw materials, flow diagram of manufacturing of cement 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 sulphate cement, Tests of cement – fineness, soundness, initial and final setting time etc.as per B.I.S. Code.

- Properties of cement

4. Lime:

- Introduction: Lime as one of the cementing materials
- Classification and types of lime as per BIS Code
- Calcination and slaking of lime

5. Timber and Wood Based Products:

Identification and uses of different types of timber: Teak, Deodar, Shisham, Sal, Mango, Kail, Chir, Fir, Hollock, Champ

- 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, sun mica, plywood, veneers, nu-wood and study of the brand name and cost of the wood based products available in the market, Cement Panel Board, Moulded Door.

6. Paints and Varnishes:

- 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
- Trade name of different products.
- 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.
- Aluminium & Stainless Steel.

8. Miscellaneous Materials:

- Plastics – Introduction and uses of various plastic products in buildings such as doors, water tanks and PVC pipes
- Fibre Sheets and their manufacture process.
- 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, methods of doing POP

NOTE: A field visit may be planned to explain and show the relevant things

RECOMMENDED BOOKS

- *Sharma, SK; and Mathur, GC; "Engineering Materials;" Delhi-Jalandhar, S. Chand and Co.*
- *Surendra Singh; "Engineering Materials;" New Delhi, Vikas Publishing House Pvt. Ltd.*
- *Chowdhuri, N; "Engineering Materials;" Calcutta, Technical Publishers of India.*
- *Bahl, SK; "Engineering Materials;" Delhi, Rainbow Book Co.*
- *TTTI, Chandigarh "Civil Engineering Materials:" New Delhi Tata McGraw Hill Publication*
- *Kulkarni, GJ; "Engineering Materials;" Ahmedabad, Ahmedabad Book Depot.*
- *Shahane; "Engineering Materials"; Poona, Allied Book Stall.*
- *Gurcharan Singh; "Engineering materials",Delhi Standard Publishers Distributors*
- *SC Rangawala," Construction Materials", Charotar Publishers*
- *Alam Singh, "Constrution Materials"*
- *Dr. Hemant Sood "Lab Manual in Testing of Engineering Materials", New Age International (P) Ltd., New Delhi*

Course Title: CONSTRUCTION MATERIALS
Course Code: DCE305

L	T	P	Credits
5	0	0	5

RATIONALE

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.

DETAILED CONTENTS THEORY:

1. Introduction:
- Definition of a building, classification of buildings based on occupancy
- Different parts of a building

2. 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, masonry pillars and concrete columns

3. 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

Sss
- Scaffolding, construction details and suitability of mason's brick layers and tubular scaffolding, shoring, underpinning

4. Masonry
- Brick Masonry: Definition of terms like header, stretcher, queen closer, king closer, frog and quoin, course, bond, facing, backing, hearting, jambs, reveals, soffit, plinth, pillars and pilasters
- 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
- Importance towards special care during execution on: soaking of bricks, maintenance of bonds and plumb, filling of horizontal and vertical joints, masonry work, restriction height of construction on a given day, every fourth course, earthquake resistance measure, making of joints to receive finishes
- Stone Masonry: Glossary of terms – natural bed, bedding planes, string course, corbel, cornice, block in course grouting, moulding, templates, corner stone, bond stone, throating, through stone, parapet, coping, pilasters and buttress
- Types of stone masonry: rubble masonry - random and coursed; Ashlar masonry, principles to be observed in construction of stone masonry walls
- Importance towards special care during execution of stone masonry work on dressing of stone, size and placing of bond and corner stones, filling joints, proper packing of internal cavities of rubble masonry wall, raking of joints to receive finishes

5. Arches and Lintels:

5.1 Meaning and use of arches and lintels:

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

5.3 Arches: Arc

5.3.1 Type of hes- semi-circular, pa and ra relieving bolgic flat, inverted

5.3.2 Stone arches and their construction

5.3.3 Brick arches and their construction

3.4 Lintels

(b) Purpose of lintel

(c) Materials used for lintels

(d) Cast-in-situ and pre-cast lintels

(e) Lintel along with sun-shade or chhajja

6. Doors, Windows and Ventilators:

6.1 Glossary of terms with neat sketches

6.2 Classification based on materials i.e. wood, metal and plastic and their suitability for different situations. Different type of doors-panel door, flush door, flazed door, rolling shutter, steel door, sliding door, plastic and aluminium doors

6.3 Window – Panel window, glazed windows (fixed and openable) ventilators, sky light window, Louvres shutters, plastic and

aluminium windows.

6.4 Door and window frames – materials and sections, door closures, hold fasts

7. Damp Proofing and Water Proofing

7.1 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

7.2 Sources 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.

7.3 Damp proofing materials and their specifications: rich concrete and mortar, bitumen, bitumen mastic, polymer coating, use of chemicals

7.4 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

8. Floors

8.1 Glossary of terms-floor finish, topping, under layer, base course, rubble filling and their purpose

8.2 Types of floor finishes - cast-in-situ, concrete flooring (monolithic, bonded) Terrazzo tile flooring, stone (marble and kota) flooring, PVC flooring, Terrazzo flooring, glazed tiles flooring, Timber flooring, description with sketches. The methods of construction of concrete, terrazzo and timber floors and their BIS specifications

8.3 Special emphasis on level/slope/reverse slope in bathrooms, toilets, kitchen, balcony and staircase

9. Roofs

9.1 Types of roofs, concept of flat, pitched and arched roofs

9.2 Glossary of terms for pitched roofs - batten, eaves, facia board, gable, hip, lap, purlin, rafter, rag bolt, valley, ridge, rain water gutter, anchoring bolts

9.3 False ceilings using gypsum, plaster boards, cellotex, fibre boards

9.4 Special emphasis on maintenance of slopes, overlaps of roofing materials, applicability and problems of wind ties, size of anchoring bolts

10. 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, Aluminium
- 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

11. Surface Finishes

11.1 Plastering - classification according to use and finishes like plain plaster, grit finish, rough cast, pebble dashed, concrete and stone cladding etc.,
dubbing, proportion of mortars used for different plasters, techniques of plastering and curing

4.1 Pointing - different types of pointing and their methods

4.2 Painting - preparation of surface, primer coat and application of paints on wooden, steel and plastered wall surfaces

4.3 Application of white washing, colour washing and distempering, polishing, application of cement and plastic paints

4.4 Selection of appropriate paints/finishes for interior and exterior surfaces

4.5 Importance of preparation of surfaces such as hacking, grooving etc before application of surface finishes

12. 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

13. Building Planning

13.1 Site selection: Factors to be considered for selection of site for residential, commercial, industrial and public building

13.2 Basic principles of building planning, arrangement of doors, windows, cupboards etc for residential building

13.3 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, concept of Vastu-Shastra

13.4 Planning of building services

13.5 Introduction to National Building code.

14. Building Services

Introduction Firefighting systems, ducting for to air-conditioning, service line for telephone, and electrical wiring, garbage disposals cable systems. Elementary idea of interior decoration. wall panelling, false ceiling, flooring etc.

Note : An expert may be invited from field/ industry for extensions lecture
A Field visit may be planned to explain and show the relevant things

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
11. National Building Code
12. Handbook of Civil Engineering by PN Khanna
13. Video films on Damp proofing, water proofing, surface finishes

Course Title: BUILDING DRAWING

Course Code: DCE306

L	T	P	Credits
1	0	6	4

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.

DETAILED CONTENTS

Section-I

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 apron have to be shown in the drawing.

Drawing No. 2: (one sheet)
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: (one sheet)
Drawing plan, elevation of arches: circular arch, segmental arch

Drawing No. 4: (four sheet)
Elevation, sectional plan and sectional side elevation of flush door, glazed door, panelled door with wire gauge shutter. Sketches of various joints of different members.

Drawing No.5
Draw at least one sheet using CAD software

Section-II

Drawing No. 6: (2 sheet)
Drawing plan, elevation of a small building by measurement and foundation detail and sectional elevation.

Drawing No.7: (4 sheets)
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. 8 (one sheet)

Drawings of following floors

Cement concrete floors on ground and at first floor

10. Conglomerate
11. Bonded cement concrete flooring
12. Terrazo flooring
13. Ceramic/vitrified tile flooring

Drawing No. 9: (one sheet)

Drawing of flat roof, showing the heat/thermal insulation provisions.

Drawing No.10

Draw at least one sheet using CAD software

Section-III

Drawing No. 11 (one sheet)

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

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*

Course Title: FLUID MECHANICS LAB

Course Code: DCE307

L	T	P	Credits
0	0	2	1

PRACTICAL EXERCISES

i) To verify Bernoulli's Theorem
ii) To find out venturimeter coefficient
iii) 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
6. To perform Reynold's experiment
7. To verify loss of head in pipe flow due to
   Sudden enlargement
   Sudden contraction
   Sudden bend
8. Demonstration of use of current meter and pitot tube
9. To determine coefficient of discharge of a rectangular notch/triangular notch.

INSTRUCTIONAL STRATEGY

Hydraulics being a fundamental subject, teachers are expected to lay considerable stress on understanding the basic concepts, principles and their applications. For this purpose, teachers are expected to give simple problems in the class room and provide tutorial exercises so as to develop necessary knowledge for comprehending the basic concept and principles. As far as possible, the teaching of the subject be supplemented by demonstrations and practical work in the laboratory. Visit to hydraulic research stations must be carried out.

Course Title: FLUID MECHANICS LAB

Course Code: DCE308

L	T	P	Credits
0	0	2	1

LIST OF PRACTICALS

1. Verification of the polygon law of forces using Gravesend apparatus.
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 Title: SURVEYING – I LAB

Course Code: DCE309

L	T	P	Credits
0	0	6	3

PRACTICAL EXERCISES

- Chain surveying:
  - i) a) Ranging a line
    - b) Chaining a line and recording in the field book
    - c) Taking offsets - perpendicular and oblique (with a tape only)
    - d) Setting out right angle with a tape
  - ii) Chaining of a line involving reciprocal ranging
  - iii) Chaining a line involving obstacles to ranging
  - iv) Chain Survey of a small area.
  - v) Study of prismatic compass
    - Setting the compass and taking observations
    - Measuring angles between the lines meeting at a point

III. Levelling:

- i) a) Study of dumpy level and levelling staff
  - b) Temporary adjustments of various levels
  - c) Taking staff readings on different stations from the single setting and finding differences of level between them
- ii) a) To find out difference of level between two distant points by shifting the instrument
- iii) Longitudinal and cross sectioning of a road/railway/canal
- iv) Setting a gradient by dumpy and auto-level

V. Plane Table Surveying:

- i) a) Study of the plane table survey equipment
  - Setting the plane table
  - Marking the North direction
  - 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)

1. Layout of Buildings (from given drawing of two room residential building) by use of surveying instruments.

INSTRUCTIONAL STRATEGY

This is highly practice-oriented course. While imparting theoretical instructions, teachers are expected to demonstrate the use of various instruments in surveying, stress should be laid on correct use of various instruments so as to avoid/minimize errors during surveying. It is further recommended that more emphasis should be laid in conducting practical work by individual students. Technical visit to Survey of India, Northern Region and Great Trigonometrical Survey(GTS), Dehradun.

Course Title: CONSTRUCTION MATERIALS LAB	L	T	P	Credits
Course Code: DCE310	0	0	2	01

PRACTICAL EXERCISES:

i) To identify the stones used in building works by visual examination
ii) To determine the crushing strength of bricks
iii) To determine the water absorption of bricks and efflorescence of bricks
iv) To identify various types of timbers such as: Teak, Sal, Chir, Sissoo, Deodar, Kail & Hollock by visual examination only
v) To determine fineness (by sieve analysis) of cement
vi) To conduct field test of cement.
vii) To determine normal consistency of cement
viii) To determine initial and final setting times of cement
ix) To determine soundness of cement
x) To determine compressive strength of cement
xi) The students should submit a report work on the construction materials, covering water proofing material, cements, steel, paints and timber products available in the local market. They will also show the competitive study based upon the cost, brand name, sizes available in the local market.

INSTRUCTIONAL STRATEGY

Teachers are expected to physically show various materials while imparting instructions. Field-visits should also be organized to show manufacturing processes and use of various materials in Civil engineering works. Students should be encouraged to collect sample of various building materials so as to create a museum of materials in the polytechnic

Course Title: BUILDING CONSTRUCTION LAB

Course Code: DCE311

L	T	P	Credits
0	0	2	01

PRACTICAL EXERCISES

1. Demonstration of tools and plants used in building construction
2. To prepare Layout of a building: two rooms building with front verandahss
3. To construct brick bonds (English bond only) in one, one and half and two brick thick: (a) Walls for L, T and cross junction (b) Columns
4. Demonstration of following items of work at construction site by:
   Timbering of excavated trenching
   Damp proof courses laying
   Construction of masonry walls
   Laying of flooring on an already prepared lime concrete base
   Plastering and pointing exercise
   Constructing RCC work
   Pre-construction and post construction termite treatment of building and woodwork

INSTRUCTIONAL STRATEGY

While imparting instructions in this subject, teachers are expected to take students to work site and explain constructional process and special details for various sub-components of a buildings. It is also important to make use of audio-visual aids/video films (if available) to show specialised operations. The practical work should be given due importance and efforts should be made that each student should perform practical work independently. For carrying out practical works, polytechnics should have construction yard where enough raw materials is made available for students to perform practical work

Course Title: CONCRETE TECHNOLOGY

L	T	P	Credits
3	0	0	03

Course Code: DCE401

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.

DETAILED CONTENTS THEORY

1. Introduction: Definition of concrete, uses of concrete in comparison to other building materials.
2. Ingredients of Concrete:
   2.1 Cement: physical properties of cement; different types of cement as per IS Codes
   2.2 Aggregates:
   2.2.1 Classification of aggregates according to size and shape
   2.2.2 Characteristics of aggregates: Particle size and shape, surface texture, specific gravity of aggregate; bulk density, water absorption, surface moisture, bulking of sand, deleterious materials soundness
   2.2.3 Grading of aggregates: coarse aggregate, fine aggregate; All-in-aggregate; fineness modulus; interpretation of grading charts
   2.3 Water: Quality requirements as per IS:456-2000
3. Water Cement Ratio:
   3.1 Hydration of cement principle of water-cement ratio, Duff Abram's Water-cement ratio law: Limitations of water-cement ratio law and its effects on strength of concrete
4. Workability:
   4.1 Workability factors affecting workability, 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
5. Properties of Concrete:
5.1 Properties in plastic state: Workability, Segregation, Bleeding and Harshness
5.2 Properties in hardened state: Strength, Durability, Impermeability, Dimensional changes;

6. Proportioning for Normal Concrete:

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

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

6.4. Introduction to IS-10262-2009-Code for controlled mix design.

7 Introduction to Admixtures (chemicals and minerals) for improving performance of concrete

8. Special Concretes (only features)

8.1 Concreting under special conditions, difficulties and precautions before, during and after concreting

8.1.1 Cold weather concreting

8.1.2 Under water concreting

8.1.3 Hot weather concreting

8.2 Ready mix concrete

8.3 Fibre reinforced concrete

8.4 Polymer Concrete

8.5 Fly ash concrete

8.6 Silica fume concrete

9. Concreting Operations:

9.1 Storing of Cement:

i. Storing of cement in a warehouse

ii. Storing of cement at site

5.4 Effect of storage on strength of cement

5.5 Determination of warehouse capacity for storage of Cement

9.2 Storing of Aggregate: Storing of aggregate on site

- Batching (to be shown during site visit)
- Batching of Cement
- Batching of aggregate by:
  Volume, using gauge box (farma) selection of proper gauge box
  Weight spring balances and batching machines
  Measurement of water

9.4 Mixing:

- Hand mixing
- Machine mixing - types of mixers, capacities of mixers, choosing appropriate size of mixers, operation of mixers
- Maintenance and care of machines

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

i. Placement of concrete:

ii. Checking of form work, shuttering and precautions to be taken during placement

iii) 9.7 Compaction:

Hand compaction

Machine compaction - types of vibrators, internal screed vibrators and form vibratssors Selection of suitable vibrators for different situations

2. Finishing concrete slabs - screeding, floating and trowelling
3. Curing: Objective of curing, methods of curing like ponding, membrane curing, steam curing, chemical curing Duration for curing and removal of form work
4. Jointing: Location of construction joints, treatment of construction joints, expansion joints in buildings - their importance and location
5. Defects in concrete: Identification of and methods of repair

10. Importance and methods of non-destructive tests (introduction only) (1 hr)

NOTE: A field visit may be planned to explain and show the relevant things.

RECOMMENDED BOOKS

3.2 Kulkarni, PD; Ghosh, RK and Phull, YR; "Text Book of Concrete Technology"; Oxford and IBH Publishing Co. New Delhi

3.3 Krishnamurthy, KT; Rao, A Kasundra and Khandekar, AA; "Concrete Technology"; Dhanpat Rai and Sons, Delhi,

3.4 Gupta BL and Gupta Amit; "Text Book of Concrete Technology"; Standard Publishers Distributors, Delhi.

3.5 Varshney, RS;"Concrete Technology";, Oxford and IBH Publishing, New Delhi

3.6 Neville, AM; "Properties of Concrete", Pitman (ELBS Edition available), London

3.7 Orchard; "Concrete Technology"; Vol I, II, and III

3.8 Handoo, BL; Puri, LD and Mahajan Sanjay "Concrete Technology"; Satya Prakashan, New Delhi,

3.9 Sood, Hemant, Mittal LN and Kulkarni PD; "Laboratory Manual on Concrete Technology", CBS Publishers, New Delhi, 2002

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

Course Title: CONCRETE TECHNOLOGY

Course Code: DCE402

L	T	P	Credits
5	0	0	05

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 supplemented 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.

DETAILED CONTENTS THEORY

A. WATER SUPPLY

1. Introduction
   - Necessity and brief description of water supply system.
2. Quantity of Water
   - Water requirement
   - Rate of demand and variation in rate of demand
   - Per capita consumption for domestic, industrial, public and firefighting uses as per BIS standards (no numerical problems)
   - Population Forecasting
3. 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
4. Water Treatment (brief introduction)
   - 4.1 Sedimentation - purpose, types of sedimentation tanks
   - 4.2 Coagulation flocculation - usual coagulation and their feeding
   - 4.3 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) Aerations fountain (ii) mixer (iii) floculator, (iv) classifier, (v) slow and rapid sand filters (vi) chlorination chamber.

5. Conveyance of Water

5.1 Different types of pipes - cast iron, PVC, steel, asbestos cement, concrete and lead pipes. Their suitability and uses, types of joints in different types of pipes.

5.2 Appurtenances: Sluice, air, reflux valves, relief valves, scour valves, bib cocks, stop cocks, fire hydrants, water meters their working and uses

5.3 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

6. Laying out Pipes

6.1. Setting out alignment of pipes
6.2. Excavation for laying of pipes and precautions to be taken
6.3. Handling, lowering beginning and jointing of pipes
6.4. Testing of pipe lines
6.5. Back filling
6.6. Use of boring rods

7. Building Water Supply, Connections to water main (practical aspect only)

7.2 Water supply fixtures and installations and terminology related to plumbing

WASTE WATER ENGINEERING

8. Introduction

5. Purpose of sanitation
6. Necessity of systematic collection and disposal of waste
7. Definition of terms in sanitary engineering
8. Collection and conveyance of sewage
9. Conservancy and water carriage systems, their advantages and Disadvantages
10. Surface drains (only sketches) : various types, suitability

Types of sewage: Domestic, industrial, storm water and its seasonal variation

9. Sewerage System

6. Types of sewerage systems, materials for sewers, their sizes and joints
7. Appurtenance: Location, function and construction features. Manholes, drop manholes, tank hole, catch basin, inverted siphon, flushing tanks grease and oil traps. Storm regulator, ventilating shafts and Construction of Sewer:
8. Setting out/ alignments of sewers
9. Excavations, checking the gradient with boning rods preparation of bedding, handling and jointing testing and back filling of sewers/pipes.
10. Construction of surface mains and different sections required.

- Sewage characteristics:
- Properties of sewage and IS standards for analysis of sewage
- Physical, chemical and bacteriological parameters

12. Natural Methods of Sewerage Disposal
    1. General composition of sewage and disposal methods
    2. Disposal by dilution
    3. Self-purification of stream
    4. Disposal by land treatment
    5. Nuisance due to disposal

13. Sewage Treatment Meaning and principle of primary and secondary treatment and activated sludge process their flow diagrams

- Introduction and uses of screens, grit chambers, detritus tanks, skimming tanks, plain sedimentation tanks, primary clarifiers, secondary clarifiers, filters, control beds, intermittent sand filters, trickling filters, sludge treatment and disposal, oxidation ponds (Visit to a sewage treatment plant)

14. Building Drainage
    - Aims of building drainage and its requirements
    - 14.2 Different sanitary fittings and installations
    - Traps, seals, causes of breaking seals
    - A field visit may be planned to explain and show the relevant things.

REFERENCES

- *Duggal, KN; "Elements of Public Health Engineering";, S. Chand and Co. New Delhi*
- *Rangwala, SC; "Water Supply and Sanitary Engineering"; AnandCharotar Book Stall*
- *Kshirsagar, SR; "Water Supply Engineering"; Roorkee Publishing House, Roorkee*
- *Kshirsagar, SR; "Sewage and Sewage Tratement"; Roorkee, Roorkee Publishing House*
- *Hussain, SK; "Text Book of Water Supply and Sanitary Engineering"; Oxford and IBH Publishing Co, New Delhi,*
- *Birdie, GS; "Water Supply and Sanitary Engineering"; Dhanpat Rai and Sons, Delhi*
- *Garg, Santosh Kumar; "Water Supply Engineering"; Khanna Publishers, Delhi*
- *Garg, Santosh Kumar; "Sewage and Waste Water Disposal Engineering"; Khanna Publishers, Delhi*
- *Steel, EW; "Water Supply and Sewerage"; McGraw Hill.*
- *Duggal, Ajay K and Sharma, Sanjay, "A Laboratory Manual in Public Health Engineering", ,Galgotra Publications, 2006, New Delhi*

- *Gurjar,B.R. " Sludge Treatment & Disposal" Oxford and IBH Co Pvt Ltd New Delhi.*
- *Mahajan Sanjay, Water Supply and Waste Water Engineering, Satya Prakashan Ltd., Delhi*

Course Title: IRRIGATION ENGINEERING

Course Code: DCE403

L	T	P	Credits
4	0	0	04

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 tube wells. 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.

DETAILED CONTENTSTHEORY

1. Introduction:
   - Definition of irrigation
   - Necessity of irrigation
   - History of development of irrigation in India
   - Major, medium and minor irrigation projects
2. Water Requirement of Crops
   Principal crops in India and their water requirements
   - 2.2 Crop seasons – Kharif and Rabi
   - 2.3 Soil water, soil crop and crop water relationships, Duty, Delta and Base Period, their relationship
   - 2.4 Gross commanded area (GCA), culturable commanded area (CCA),
   - Intensity of Irrigation, Irrigable area
3. 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.

4. Methods of Irrigation

Flow irrigation – its advantages and limitations

Lift Irrigation – Tube well, submersible and well irrigation advantages and disadvantages, Sprinkler irrigation conditions favourable and essential requirements for sprinkle irrigation, sprinkler system – classification and component parts, Drip irrigation, suitability of drip irrigation, layout, component parts, advantages

5. Canals
   - classification, appurtenances 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
   - Breaches and their control
   - Maintenance of lined and unlined canal
6. 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
   - Water Harvesting Techniques: Need and requirement of various methods, Run-off from roof top and ground surface, construction of recharge pits and recharge wells and their maintenance.
7. Dams

Classification of dams; earth dams - types, causes of failure; cross-section of zoned earth dam, method of construction, gravity dams – types, cross-sections of a dam, method of construction

Concept of small and micro dams

Concept of spillways and energy dissipaters

8. Canal Head Works and Regulatory Works

Definition, object, general layout, functions of different parts of head works. Difference between weir and barrage

9. Cross Drainage Works

9.1 Functions and necessity of the following types: aqueduct, super passage, level crossing, inlet and outlet

9.2 Sketches of the above cross drainage works

10. Definitions of following Hydraulic Structures with Sketches

Falls

10.2 Cross and head regulators

10.3 Outlets

10.4 Canal Escapes

11. River Training Works

Methods of river training, guide banks, retired (levees) embankments, groynes and spurs,

pitched island, cut-off

12. 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

12.3 Concept and various techniques used for ground water re-charge

INSTRUCTIONAL STRATEGY

The teaching of the subject should be supplemented by field visits at regular intervals of time to expose the students to irrigation works. Students should be asked to prepare and interpret drawings of various irrigation works.

RECOMMENDED BOOKS

- *Bharat Singh, `Fundamentals of Irrigation Engineering', , Nem Chand and Bros, Roorkee*
- *Garg, Santosh Kumar, `Irrigation Engineering and Hydraulics Structures', Khanna Publishers, Delhi,*
- *Punmia, BC; and Pande Brij Bansi Lal, `Irrigation and Water Power Engineering', Delhi, Standard Publishers Distributors, Delhi,*
- *Sharma, RK; `Text Book of Irrigation Engineering and Hydraulics Structures', , Oxford and IBH Publishing Company, New Delhi*
- *Sharma, SK; `Principles and Practice of Irrigation Engineering', Prentice Hall of India Pvt. Ltd., New Delhi,*
- *Varshney RS, Gupta SC, Gupta RL at all. "Theory and Design of Irrigation Structures", Vol. I and II,*
- *Saharsabudhe SR, "Irrigation Engineering and Hydraulic Structures"*
- *Priyani BB, 'The Fundamental Principles of Irrigtion and Water Power BIS Codes*
- *Wan. E. Houk, "Irrigation Engineering" Vol. I and II*
- *Central Ground Water Board and Central Water Commission Guidelines and Reference Books.*

Course Title: SURVEYING – II

Course Code: DCE404

L	T	P	Credits
2	0	0	02

RATIONALE

The important functions of a civil engineer include 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 surveying, 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.

DETAILED CONTENTS

1. 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

2. 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

3. 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 and Numerical problems.

4. 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:
By linear measurements only:
Offsets from the tangen
Successive bisection of arcs
Offsets from the chord produced
By tangential angles using a theodolite

iv) 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

v) Vertical curve, Setting out of a vertical curve

2. Introduction to the use of Modern Surveying equipment and techniques such as:
   EDM or Distomat
   Planimeter
   Total stations
   Introduction to remote sensing and GPS

NOTE: No sketch of the instruments may be asked in the examination

RECOMMENDED BOOKS

- *Hussain, SK and Nagraj, MS "Text Book of Surveying";, S Chand and Co Ltd., New Delhi*
- *Deshpande, RS "A Text Book Surveying and Levelling"; United Book Corporation, Pune,*
- *Kocher, CL; "A Text Book of Surveying"; Katson Publishing House Ludhiana,*
- *Kanetkar,TP and Kulkarni, SV., "Surveying and Leveling", Poona, AVG Parkashan, Pune*
- *Kanetkar, TP; and Kulkarni, SV; "Surveying and Leveling-Vol.2" AVG Prakashan, Pune*
- *Punima, BC; "Surveying and Leveling ", Standard Publishers Distributors, Delhi*
- *Shahai, PB; "A Text Book of Surveying ", Oxford and IBH Publishing Co.*
- *Lilly Sant "Remote Sensing and Image Interpretation"*
- *Mahajan, Sanjay, "Surveying-II", Satya Prakashan, Delhi*

Course Title: STRUCTURAL MECHANICS

Course Code: DCE405

L	T	P	Credits
4	0	0	04

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.

DETAILED CONTENTS THEORY:

1. Properties of Materials

1.1 Classification of materials, elastic materials, plastic materials, ductile materials, brittle materials.

1.2 Introduction to tensile test, compressive test, impact test, fatigue test, torsion test on metals.

2. Simple Stresses and Strains:

4.1 Concept of stress, normal and shear stresses,

4.2 Concept of strain and deformation, longitudinal and transverse strain, poison's ratio, volumetric strain

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

4.4 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.

4.5 Stress-strain diagram for mild steel and HYSD steel, mechanical properties, factor of safety. Temperature stresses and strains.

3. Shear Force and Bending Moment:

- Concept of a beam and supports (Hinges, Roller and Fixed), types of beams: simply supported, cantilever, propped, over hang, cantilever and continuous beams (only concept).
- Types of loads (dead load, live load, snow load, wind load seismic load as per IS Codes etc.) and types of loading (point, uniformly distributed and uniformly varying loads)

2.1 concept of bending moment and shear force, sign conventions

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

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

4. 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.

5. Bending Stresses in Beams:

- Concept of pure/simple bending
- Assumptions made in the theory of simple bending, derivation and application of bending equation to circular cross-section, I section, T&L

Moment of resistance

Calculations of bending stresses in simply supported beam

6. 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 dams and retaining walls
- Shear Stresses in Beams (4 hrs)

7.1 Concept of shear stresses in beams, shear stress distribution in rectangular, circular I, T, L sections (Formula to be stated, no derivation)

8. Slope and Deflection: (4 hrs)

- Necessity for determination of slope and deflection
- Moment area theorem (no derivation, numerical problem

9. Columns: (4 hrs)

- Theory of columns
- Rulers and Rankine Formula (No derivation)

7.1 Analysis of Trusses:

1. Concept of a perfect, redundant and deficient frames
2. Assumptions and analysis of trusses by:

Method of joints, Method of sections, Graphical method

RECOMMENDED BOOKS

- *Ramamrutham, S., "Strength of Materials", Dhanpat Rai and Sons., New Delhi*
- *Ram Chandra, "Applied Mechanics and Strength of Materials", Standard Publishers. Delhi:*
- *Punmia, BC., "Strength of Materials", Standard Publishers, Delhi,*
- *Prasad VS " Structural mechanics Galgotia publications Pvt Ltd, Delhi*
- *Sadhu Singh "Strengths of Materials" Standard Publishers, New Delhi*
- *Singh Birinder "Structural Mechanics" Kaption Publishers, Ludhiana*
- *Singh Harbhajan, " Structure Mechanics" ., Abhishek Publishers, Chandigarh*
- *Singh Harbhajan, "Design of Masonry and Timber Structures" Abhishek Publishers, Chandigarh.*

Course Title: PUBLIC HEALTH AND IRRIGATION ENGINEERING DRAWING	L	T	P	Credits
Course Code: DCE406	2	0	4	04

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 PART: A

WATER SUPPLY AND WASTE WATER ENGINEERING DRAWING

1. Drains and Sewers

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

1.1 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

1.2 Septic Tank and Soak Pit
Detailed plan and cross sections of a domestic septic tank with soak pit for 5-10 users

1.3 Bath room and W.C connections:

- 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
- Plan of a bathroom showing positions of lavatory, bath tub, wash-basin, taps and showers
- Draw sectional elevation of a two storeyed building showing details of one pipe and two pipes systems with sanitation system.

3.1 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.

3.2 Detailed Layout Plan of Sewage Treatment Plant for a residential area and Effluent Treatment Plant for an industrial unit.

PART B

4.1 IRRIGATION ENGINEERING DRAWING:

3.2 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.

5.4 Layout plan of a canal head works.

5.5 Draw the typical L-section of a weir

5.6 Draw the X-section of an Earthen
Dam Homogeneous
Zoned type
Diaphragm type
Cross section of
SSa tube well

6. Layout and cross section of rain water harvesting system.

Important Note: Use of BIS: 456-2000 is permitted in the examination

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

- *Layal JS "Civil Engineering Drawing", Satya Parkashan, New Delhi Chandel RP " Civil Engineering Drawings"*
- *Kumar; NS " Civil Engineering Drawing " IPH, New Delhi*
- *Malik RS and Meo GA, "Civil Engineering Drawing" Asian Publishing House, New Delhi*

Course Title: CONCRETE TECHNOLOGY LAB

Course Code: DCE407

L	T	P	Credits
0	0	2	01

PRACTICAL EXERCISES:

- To determine the physical properties of cement as per IS Codes
- To determine flakiness and elongation index of coarse aggregates
- To determine silt in fine aggregate
- Determination of specific gravity and water absorption of aggregates
- Determination of bulk density and voids of aggregates
- To determine surface moisture in fine aggregate by displacement method
- Determination of particle size distribution of fine, coarse and all in aggregate by sieve analysis (grading of aggregate)
- To determine necessary adjustment for bulking of fine aggregate
- To determine workability by slump test:
- To verify the effect of water, fine aggregate/coarse aggregate ratio and aggregate/Cement ratio on slump
- Compaction factor test for workability
- Non-destructive test on concrete by:
- Rebound Hammer Test
  Ultrasonic Pulse Velocity
  Test
- Tests for compressive strength of concrete cubes for different grades of concrete

INSTRUCTIONAL STRATEGY

This subject is of practical nature. While imparting instructions, teachers are expected to organize demonstrations and field visits to show various stages of concreting operations. While working in the laboratory, efforts should be made to provide extensive practical training to students so as to make them confident in the preparation and testing of concrete. Teachers should also organize viva examination so as to develop understanding about concepts and principals involved. The experiments may be demonstrated to students through video programmes developed in the field of 'concrete technology' by NITTTR, Chandigarh.

Course Title: WATER SUPPLY AND WASTE WATER ENGINEERING LAB	L	T	P	Credits
Course Code: DCE408	0	0	2	01

LIST OF PRACTICALS

- To determine turbidity of water sample
- To determine dissolved oxygen of given sample
- To determine pH value of water
- To perform jar test for coagulation
- To determine BOD of given sample
- To determine residual chlorine in water
- To determine conductivity of water and total dissolved solids
- To study the installation of following:
- Water meter Connection of water supply of building with main, Pipe valves and bends, Water supply and sanitary fittings
- To study and demonstrate the joining/threading of GI Pipes, CI Pipes, SW pipes, D.I. pipes and PVC pipes.
- To demonstrate the laying of SW pipes for sewers
- Study of water purifying process by visiting a field lab.
- To test house drainage

INSTRUCTIONAL STRATEGY

Before imparting the instructions in the class room, visits to water works and sewage treatment plants can go a long way for increased motivation of students for learning in the class room. As the subject is of practical nature, lecture work be supplemented by field visits from time to time. Home assignments related to collection of information, pamphlets and catalogues from hardware shop dealing water supply and sanitary fittings will be very helpful for the student.

Course Title: SURVEYING – II LAB

Course Code: DCE409

L	T	P	Credits
0	0	6	03

PRACTICAL EXERCISES

1. Contouring:

- Preparing a contour plan by radial line method by the use of a Tangent Clinometer/Tachometer
- Preparing a contour plan by method of squares
- Preparing a contour plan of a Road/Railway track/Canal by taking cross sections.

2. Theodolite:

- Taking out the Theodolites, mounting on the tripod and placing it back in the box
- Study of a transit Vernier theodolite; temporary adjustments of theodolite
- Reading the Vernier and working out the least count, measurement of horizontal angles by repetition and reiteration method
- Measurement of vertical angles and use of tachometric tables
- Measurement of magnetic bearing of a line
- Running a closed traverse with a theodolite (at least five sides) and its plotting
- Height of objects with and without accessible bases

3.4 Curves

3.5 Setting out of a simple circular curve with given data by the following methods

- Offsets from the chords produced
- One theodolite method

IV Minor instruments:

1.1 Demonstration and use of minor instruments like Ceylon Ghat

1.2 Tracer,Tangent Clinometer, Pantagraph, Abney level etc.

1.3 Use of planimeter for computing areas

2.2 Demonstration of digital instruments through field visits to Survey of India and other government agencies.

VI Total Station (only demonstrations).

INSTRUCTIONAL STRATEGY

This is highly practice-oriented course. While imparting theoretical instructions, teachers are expected to demonstrate the use of various instruments in surveying, stress should be laid on correct use of various instruments so as to avoid/minimize errors during surveying. It is further recommended that more emphasis should be laid in conducting practical work by individual students

Course Title: STRUCTURAL MECHANICS LAB

Course Code: DCE410

L	T	P	Credits
0	0	2	01

PRACTICAL EXERCISES

8.1 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

8.2 Testing of HYSD Steel

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

8.4 Determination of modulus of rupture of a concrete beam

8.5 Determination of maximum deflection and young's modulus of elasticity in simply supported beam with load at middle third point

8.6 Verification of forces in a framed structure

INSTRUCTIONAL STRATEGY

Teachers are expected to give simple exercises involving the applications of various concepts and principles being taught in the subject. Efforts should be made to prepare tutorial sheets on various topics and students should be encouraged/guided to solve tutorial sheets independently. In the practical works, individual students should be given opportunities to do practical work, make observations and draw conclusions. Teachers should also conduct viva examination in which stress should be given on the understanding of basic concepts and principles.

Course Title: REINFORCED CONCRETE DESIGN

Course Code: DCE501

L	T	P	Credits
4	0	0	04

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

DETAILED CONTENTS

1. Introduction
   a. Concept of Reinforced Cement Concrete (RCC)
   b. Reinforcement Materials:
   - Suitability of steel as reinforcing material
   - Properties of mild steel and HYSD steel

   Loading on structures as per IS: 875
2. Introduction to following methods of RCC design
   - Working stress method
   - Limit state method
3. Shear and Development Length
   - Shear as per IS:456-2000 by working stress method
   - Shear strength of concrete without shear reinforcement
   - Maximum shear stress
   - Shear reinforcement
4. Singly Reinforced Beam (Working stress method)
   - Basic assumptions and stress strain curve, neutral axis, balanced, under-reinforcement and over reinforced beams, Moment of resistance for singly reinforced beam.
   - Design of singly reinforced beam including sketches showing
     - Concept of Limit State Method

       Definitions and assumptions made in limit state of collapse (flexure)
     - Partial factor of safety for materials
     - Partial factor of safety for loads
     - Design loads
     - Stress block, parameters

     Reinforcement details.
6. Singly Reinforced beam

   Theory and design of singly reinforced beam by Limit State Method

7. Doubly Reinforced Beams

Theory and design of simply supported doubly reinforced rectangular beam by Limit State Method

- Behaviour of T beam, inverted T beam, isolated T beam and 'L' beams (No Numerical)

8. One Way Slab

Theory and design of simply supported one-way slab including sketches showing reinforcement details (plan and section) by Limit State Method.

9. Two Way Slab

Theory and design of two-way simply supported slab with corners free to lift, no provisions for torsional reinforcement by Limit State Method including sketches showing reinforcement details (plan and two sections)

10. Axially Loaded Column

Definition and classification of columns

- Effective length of column,
- Specifications for longitudinal and lateral reinforcement
- Design of axially loaded square, rectangular and circular short columns by Limit State Method including sketching of reinforcement (sectional elevation and plan)

11. Prestressed Concrete
12. Concept of pre-stressed concrete
13. Methods of pre-stressing: pre-tensioning and post tensioning
14. Advantages and disadvantages of prestressing
15. Losses in pre-stress

Important Note:

Use of BIS:456-2000 is permitted in the examination.

INSTRUCTIONAL STRATEGY

Teachers are expected to give simple problems for designing various RCC structural members. For creating comprehension of the subject, teachers may prepare tutorial sheets, which may be given to the students for solving. It would be advantageous if students are taken at construction site to show form work for RCC as well as placement of reinforcement in various structural members. Commentary on BIS:456 may be referred along with code for relevant clauses.

RECOMMENDED BOOKS

- *Rai and Sons, Delhi*
- *Gambhir, M.L., "Reinforced Concrete Design", Macmillan India Limited*

- *Singh, Birinder "RCC Design and Drawing", Kaption Publishing House, New Delhi*
- *Singh Harbhajan "Design of Reinforced Concrete Structures" Abhishek Publishers Ltd., Chandigarh*
- *Mallick, SK; and Gupta, AP; "Reinforced Concrete", Oxford and IBH Publishing Co, New Delhi.*

Course Title: HIGHWAY ENGINEERING

Course Code: DCE502

L	T	P	Credits
4	0	0	04

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.

DETAILED CONTENTS THEORY

1. Introduction
   - Importance of Highway engineering
   - Functions of IRC, CRRI, MORT&H, NHAI
   - IRC classification of roads
2. 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

     (Note: No design/numerical problem to be taken)
3. Highway Surveys and Plan
   - 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
4. Road Materials
   - Different types of road materials in use; soil, aggregate, binders – bitumen, cutback, Emulsion and Modified Bitumen (CRMB, PMB0
   - Introduction to California Bearing Ratio, method of finding CBR value and its significance. Aggregate : Source and types, important

properties, strength, durability

- 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

5. 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, preparation of subgrade, methods of checking camber, gradient and alignment as per recommendations of IRC, equipment used for subgrade preparation. Stabilization of subgrade. Types of stabilization mechanical stabilization, lime stabilization, cement stabilization, fly ash stabilization etc. (introduction only)

5.4 Base Course:

Granular base course:

- Water Bound Macadam (WBM)
- Wet Mix Macadam (WMM)

Bitumen Courses:

- Bituminous Macadam
- Dense Bituminous Macadam (DBM)

*Methods of construction as per MORT&H

3. Surfacing:

Types of surfacing Prime coat and tack coat

Surface dressing with seal coat

- Open graded premix carpet
- Mix seal surfacing
- Semi dense bituminous concrete
- Bituminous Concrete

Methods of constructions as per MORT&H specifications and quality control; equipment's used for above.

3.3 Rigid Pavements:

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

6. Hill Roads:

- 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, use of geogrids, geoflexbiles, geo synthetics Drainage, Soil erosion Snow: Snow clearance, snow avalanches, frost Land Subsidence

7. 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
8. Road Maintenance:
   - Common types of road failures of flexible pavements: Pot hole, cracks, rutting, alligator, cracking, 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
9. 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, Asphalt mixer and tar boilers

   Road pavers, An expert may be invited from field/industry for extension lecture on this topic.

10. Airport Engineering: - Necessity of study of airport engineering, aviation transport scenario in India. Factors to be considered while selecting a site for an airport with respect to zoning laws. Introduction to Runways, Taxiways and Apron

RECOMMENDED BOOKS

- *Khanna, SK and Justo, CEG, "Highway Engineering", Nem Chand and Bros., Roorkee*
- *ii) Vaswani, NK, "Highway Engineering" , Roorkee Publishing House, Roorkee,*
- *Priyani, VB, "Highway and Airport Engineering" Anand, Charotar Book Stall*
- *Sehgal, SB; and Bhanot, KL; "A Text Book on Highway Engineering and Airport" S Chand and Co, Delhi*
- *Bindra, SP; "A Course on Highway Engineering" ,Dhanpat Rai and Sons,*

New Delhi

- *Sharma, RC; and Sharma, SK; "Principles and Practice of Highway Engineering", Asia Publishing House, New Delhi*
- *Duggal AK, Puri VP., "Laboratory Manual in Highway Engineering", New Age Publishers (P) Ltd, Delhi,*
- *NITTTR, Chandigarh "Laboratory Manual in Highway Engineering",*
- *RK Khitoliya, "Principles of Highway Engineering (2005)", Dhanpat Rai Publishing Co., New Delhi*
- *Rao, GV' Transportation Engineering*
- *Duggal AK, "Maintenance of Highway – a Reader", NITTTR, Chandigarh*
- *Duggal AK "Types of Highway constitution ", NITTTR Chandigarh*
- *Rao, "Airport Engineering"*
- *Singh,Jagrup, "Highway Engineering", Eagle Publications Jalandhar*

IRC Publications

- *MORTH Specifications for Road and Bridge Works (Fifth Revision)*
- *MORTH Pocket book for Highway Engineers, 2001*
- *MORTH Manual for Maintenance of Roads, 1983*

Course Title: RAILWAYS, BRIDGES AND TUNNELS

Course Code: (DCE503)

L	T	P	Credits
4	0	0	04

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.

DETAILED CONTENTS

PART – I: RAILWAYS **(35 hrs)**

1. Introduction to Indian Railways
2. Railway surveys: Factors influencing the railways route, brief description of various types of railway survey
3. Classification of permanent way describing its component parts
4. Rail Gauge: Definition, types, practice in India
5. Rails – types of rails
6. Rail Fastenings: Rail joints, types of rail joints, fastenings for rails, fish plates, bearing plates
7. Sleepers: Functions of sleepers, types of sleepers, requirements of an ideal material for sleepers.
8. Ballast: Function of ballast, requirements of an ideal material for ballast
9. Crossings and signalling's: Brief description regarding different types of crossings/ signalling's
10. Maintenance of track: Necessity, maintenance of track, inspection of soil, track and fixtures; maintenance and boxing of ballast maintenance gauges, tools
11. Earth work a drainage: Features of rail road, bed level, width of formation, side slopes, drains, methods of construction, requirement of drainage system

PART-II: BRIDGES

1. Introduction

    - 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 deck level – Deck, through and semi-through

- According to material –timber, masonry, steel, RCC, pre-stressed
- According to structural form;

Grade Separators-Railway Overbridges (ROB), Railway underbridge Beam type –RCC, T-Beam, steel girder bridges, plate girder and box girder, balanced cantilever, Trussed bridges. Arch type – open spandrel and filled spandrel barrel and rib type

- Suspension type – unstiffened and stiffened and table (its description with sketches)
- According to the position of highest flood level submersible and non-submersible
- IRC classification

2. Bridge Foundations: Introduction to open foundation, pile foundation, well foundation

3. Piers, Abutments and Wing walls

15.1 Piers-definition, parts; types –solid (masonry and RCC), open

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

16. Bridge bearings

Purpose of bearings; types of bearings – fixed plate, rocker and roller, Elastomeric bearings.

17. Maintenance of Bridges

- Inspection of bridges
- Routine maintenance SS

PART - III: TUNNELS

18. Definition and necessity of tunnels
19. Typical section of tunnels for a national highway and single and double broad gauge railway track
20. Ventilation –necessity and methods of ventilation, by blowing, exhaust and combination of blowing and exhaust

21. Drainage method of draining water in tunnels
22. Lighting of tunnels

Notes: i) Field visits may be organized to Bridge construction site or aBridge/Tunnel construction site/Railways tracks to explain the various components and a field visit report shall be prepared by the students, as teamwork

ii) Examiners should set questions from all the parts

INSTRUCTIONAL STRATEGY

This subject is of practical nature. While imparting instructions, teachers are expected to organize demonstrations and field visits to shows various components and construction of railway track, bridges and tunnel.

RECOMMENDED BOOKS

- Vaswani, NK, "Railway Engineering", Publishing House, Roorkee
- Rangwala, SC, "Railway Engineering", Anand, Charotar Book Stall
- Deshpande, R, "A Text Book of Railway Engineering", Poonam United Book Corporation
- Algia, JS "Bridge Engineering", Anand, Charotar Book Stall
- Victor Johnson, "Essentials of Bridge Engineering" Oxford and IBH, Delhi
- Rangwala S.C., "Bridge Engineering", Anand, Charotar Book Stall
- IRC Bridge Codes
- MORTH drawings for various types of bridges
- MORTH pocket books for bridge Engineers, 2000 (First Revision)
- Subhash C Saxena, "Tunnal Engineering", Dhanpat Rai and Sons, Delhi

Course Title: SOIL AND FOUNDATION ENGINEERING

Course Code: DCE504

L	T	P	Credits
4	0	0	04

RATIONALE

Civil Engineering diploma engineers are required to supervise the construction of 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.

DETAILED CONTENTS

THEORY

1. Introduction:
   - 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 Punjab, dunes and loess, glacial deposits, black cotton soils, 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
2. Physical Properties of Soils:
   - Constituents of soil and representation by a phase diagram
   - Definitions of void ratio, porosity, degree of saturation, water content, specific gravity, unit weight, bulk density/bulk unit weight, dry unit weight, saturated unit weight and submerged unit weight of soil grains and correlation between them

- Simple numerical problems with the help of phase diagrams

3. 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 cohesionless soils
- Behaviour 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

4. 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

5. 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

6. Deformation of Soils

Meaning, conditions/situations of occurrence with emphasis on practical significance of:

- Consolidation and settlement
- Creep
- Plastic flow
- Heaving
- Lateral movement
- Freeze and thaw of soil

10. Definition and practical significance of compression index, coefficient of consolidation, degree of consolidation.
11. Meaning of total settlement, uniform settlement and differential settlement; rate of settlement and their effects
12. Settlement due to construction operations and lowering of water table
    - Tolerable settlement for different structures as per BIS
13. Shear Strength Characteristics of Soils:
14. Concept and Significance of shear strength

15. Factors contributing to shear strength of cohesive and cohesion less 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

7. Compaction:

- Definition and necessity of compaction
- Laboratory compaction test (standard and modified proctor test as per IS) definition and importance of optimum water content, maximum dry density; moisture dry density relationship for typical soils with different comp active efforts

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

Soil Exploration:

- Purpose and necessity of soil exploration

8. Reconnaissance, methods of soil exploration, Trial pits, borings (auger, wash, rotary, percussion to be briefly dealt)
9. 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.
10. Presentation of soil investigation results
10. Bearing Capacity of soil

a. Concept of bearing capacity
b. Definition and significance of ultimate bearing capacity, net safe bearing capacity and allowable bearing pressure
c. Guidelines of BIS (IS 6403) for estimation of bearing capacity
d. Factors affecting bearing capacity
e. Concept of vertical stress distribution in soils due to foundation loads, pressure bulb
f. Applications of SPT, unconfined compression test and direct shear test in estimation of bearing capacity
g. Plate load test (no procedure details) and its limitations
h. Improvement of bearing capacity by sand drain method, compaction, use of geo-synthetics.

11. Foundation Engineering:

Concept of shallow and deep foundation; types of shallow foundations: combined, isolated, strip, mat, 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.

RECOMMENDED BOOKS

- *Punmia, BC, "Soil Mechanics and Foundations"; Standard Publishers, Delhi*
- *ii) Bharat Singh and Shamsher Prakash; "Soil Mechanics and Foundations Engineering", Nem Chand and Bros, Roorkee,*
- *Sehgal, SB, "A Text Book of Soil Mechanics"; CBS Publishers and Distributors, Delhi,*
- *Bowles,Joseph E, "Engineering Properties of soils and their Measurement"; Tata McGraw Hill., Delhi,*
- *Gulati, SK and Manoj Dutta, "Geotechnical Engineering ", Tata McGraw Hill, Delhi,*
- *Khan, Iqbal H, "A Text Book of Geotechnical Engineering", Prentice Hall of India, Delhi,*
- *Ranjan Gopal and Rao ASR "Basic and Applied Soil Mechanics", New Age Publication (P) Ltd., New Delhi*
- *S Mittal and JP Shukla, "Soil Testing for Engineers", Khanna Publishers Ltd., Delhi*
- *Duggal, AK., Ramana, TR.,Krishnamurthy, S., "Soil Sampling and Testing*
- *A Laboratory Manual, Galgitra Publications, Delhi*
- *BIS Codes IS 6403 (latest edition) and IS 1498 (latest edition)*
- *xi Jagroop Singh, "Soil and Foundation Engineering", Eagle Parkashan, Jalandhar*
- *Rabinder Singh, " Soil and foundation engg" SK Kataria and Sons, Ludhiana*
- *NITTTR, Chandigarh, "Shallow Foundations"*
- *Video films on Geo-technical Laboratory Practices by NITTTR, Chandigarh*

Course Title: GENERIC SKILLS AND ENTREPRENEURSHIP DEVELOPMENT

Course Code: DCE505

L	T	P	Credits
3	0	0	03

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 aim 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.

DETAILED CONTENTS

1. Introduction to Generic Skills
   - 1.1 Importance of Generic Skill Development (GSD)
   - 1.2 Global and Local Scenario of GSD
   - 1.3 Life Long Learning (LLL) and associated importance of GSD.
2. Managing Self
   - 2.1 Knowing Self for Self Development Self-concept, personality, traits, multiple intelligence such as language intelligence, numerical intelligence, psychological intelligence etc.
   - 2.2 Managing Self - Physical
     Personal grooming, Health, Hygiene, Time Management
   - 2.3 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

   Note: Practical sessions should be coupled with teaching of effective listening, speaking, reading and writing.

   - 2.4 Managing Self – Psychological
     Stress, Emotions, Anxiety-concepts and significance (Exercises related to stress management)

Techniques to manage the above

3. Managing in Team

2.5 Team - definition, hierarchy, team dynamics

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

2.7 Communication in group - conversation and listening skills

4 Task Management

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

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

5. Problem Solving

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.

6. Entrepreneurship

6.1 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.

6.2 Market Survey and Opportunity Identification (Business planning) How to start a small scale industry procedure 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.

RECOMMENDED BOOKS

- *Soft Skills for Interpersonal Communication by S.Balasubramaniam; Published by Orient BlackSwan, New Delhi*
- *Generic skill Development Manual, MSBTE, Mumbai.*
- *Lifelong learning, Policy Brief (www.oecd.orf)*
- *Lifelong learning in Global Knowledge Economy, Challenge for Developing Countries – World Bank Publication*
- *Towards Knowledge Society, UNESCO Paris Publication*
- *Your Personal Pinnacle of Success by DD Sharma, Sultan Chand and Sons, New Delhi Human Learning, Ormrod*
- *A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)*
- *Entrepreneurship Development by CB Gupta and P Srinivasan, Sultan Chand and*
- *Sons, New Delhi Handbook of Small Scale Industry by PM Bhandari*

SURVEY CAMP (DCE506) **10 Days Duration**

Purpose

1. To impart intensive training in the use of surveying instruments
2. To train the students to appreciate practical difficulties in surveying on the field
3. Making the students conversant with the camp life
4. Training the students to communicate with the local population
5. Providing an opportunity to the students to develop team spirit
6. 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 10 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 interval. 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 work done, during survey camp, which will be dully examined, while awarding the internal assessment.

Course Title: COMPUTER APPLICATIONS IN CIVIL ENGINEERING

Course Code: DCE507

L	T	P	Credits
0	0	6	03

RATIONALE

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

DETAILED CONTENTS

PRACTICAL EXERCISES

5.1 Introduction and use of AutoCAD for making 2D Drawings and develop plan, section and elevation of 2 rooms building.

5.2 Demonstration of various civil engineering software's like STAAD-Pro, MS Project or Primavera Project Planner, Auto Civil, MX Road or any other equivalent software for above mentioned software's

Note:

6.1 The polytechnic may use any other software available with them for performing these exercises

6.2 If the above software is not available in the institution, the demonstration of the above said software should be arranged outside the institute.

Course Title: MINOR PROJECT WORK (CONSTRUCTION SITE ORIENTED)

Course Code: DCE508

L	T	P	Credits
0	0	4	02

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 following (or any other field project related to Civil Engineering):

1 Building construction sites
2 Water treatment plant, Sewage treatment plant
3 Crusher plant, Cement Manufacturing Plant, Brick kiln
4 Highway construction site
5 Material and Soil testing laboratory, Soil investigation projects
6 Hydel Power Project
7 Land surveying projects
8 Community development works
9 Constructional site like building, bridge, tunnel, canal lining, highway, railway track, irrigation works etc.

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 and give seminar using computer aided presentation slides using photographs. These students should be guided by respective subject teachers. Each teacher may guide a group of 10 – 15 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. Construction of different components of a building
6. Identification of water-supply fittings and replacement of defective fittings and then prepare report.
7. Construction of a pipe/slab culvert
8. Ferro-cement construction techniques
   a) Low cost housing

b) New construction materials

9. Study and preparation of models of hydraulic pumps.

This Industry oriented minor project work will carry 50 marks for internal assessment.

A group of students not exceeding 5 may work on any one project. 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. Further they are required to present the Project Report of work done by them through seminar in the class for internal assessment. External examiner will ask the questions on the construction, working, processes observed by the students during their project work: Shortcomings in the works (site) and their remedial measures may be suggested by the students.

Course Title: HIGHWAY ENGINEERING LAB

Course Code: DCE509

L	T	P	Credits
0	0	2	01

PRACTICAL EXERCISES

- Determination of penetration value of bitumen
- Determination of softening point of bitumen
- Determination of ductility of bitumen
- Determination of impact value of the road aggregate
- Determination of abrasion value (Los Angeles') of road aggregate
- Determination of the California bearing ratio (CBR) for the sub-grade soil
- Visit to Hot mix plant
- Visit to highway construction site for demonstration of operation of:
- Tipper, tractors (wheel and crawler), scraper, bulldozer, dumpers, shovels, grader, roller, dragline, road pavers, JCB etc.
- Mixing and spraying equipment
- A compulsory visit to Ready Mix Concrete plant.

INSTRUCTIONAL STRATEGY

While imparting instructions, it is recommended that emphasis should be laid on constructional details and quality control aspects. Students should be asked to prepare sketches and drawings, clearly indicating specifications and constructional details for various sub components of a highway. It will be also advantageous to organize field visits to show the actual construction of roads at site.

Course Title: SOIL AND FOUNDATION ENGINEERING LAB

Course Code: DCE510

L	T	P	Credits
0	0	2	01

PRACTICAL EXERCISES

1. To determine the moisture content of a given sample of soil

2. 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

7. Extraction of Disturbed and Undisturbed Samples
   - Extracting a block sample
   - Extracting a tube sample
   - Extracting a disturbed samples for mechanical analysis.
   - Field identification of samples

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

9. Liquid Limit and Plastic Limit Determination:
   - Identifying various grooving tools
   - Preparation of sample
   - Conducting the test
   - Observing soil behaviour during tests
   - Computation, plotting and interpretation of results

10. Mechanical Analysis
    - Preparation of sample
    - Conducting sieve analysis
    - Computation of results
    - Plotting the grain size distribution curve
    - Interpretation of the curve

11. Laboratory Compaction Tests (Standard Proctor test)
    - Preparation of sample
    - Conducting the test
    - Observing soil behaviour during test
    - Computation of results and plotting

- Determination of optimum moisture and maximum dry density

7. Demonstration of Unconfined Compression Test
   a) Specimen preparation
   b) Conducting the test
   c) Plotting the graph
   d) Interpretation of results and finding/bearing capacity
8. Demonstration of:
   a) Direct shear and vane shear test on sandy soil samples
   b) Permeability test apparatus

INSTRUCTIONAL STRATEGY

The teacher while imparting instructions are expected to lay greater emphasis on the practical aspects rather than theory and mathematical treatment. To bring clarity regarding concepts and principles involved, teachers should organize demonstrations in the laboratories and fields. It is necessary to create understanding that soils fail either under shear or settlement due to heavy loads. This can be shown by making use of photographs on working models of such failures. Efforts should be made in the practical classes that students perform practical exercises individually. Conduct of viva examination at the end of each practical work will develop clear understanding about the concepts and principles related to this subject.

Course Title: STEEL STRUCTURES DESIGN

Course Code: DCE601

L	T	P	Credits
4	0	0	04

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

DETAILED CONTENTS THEORY

1. Structural Steel and Sections:
   - 1.4 Properties of structural steel as per IS Code
   - 1.5 Designation of structural steel sections as per IS handbook and IS:800
2. Riveted Connections: Types of rivets, permissible stresses in rivets, types of riveted joints, specifications for riveted joints as per IS 800. Failure of a riveted joint. Assumptions in the theory of riveted joints. Strength and efficiency of a riveted joint. Design of riveted joints for axially loaded members (No Staggered riveting).
3. Welded connections:
   Types of welds and welded joints, advantages and disadvantages of welded joints design of fillet and butt weld. Plug and slot welds (Descriptive No numerical on plug and slot welds)
4. Tension Members
   Analysis and design of single and double section tension members and their riveted and welded connections with gusset plate as per IS:800
5. Compression Members
   Analysis and design of single and double angle sections compression members (struts) and their riveted and welded connections with gusset plate as per BIS:800
6. Roof Trusses
   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 (no design, only concept)

- Columns:

Concept of buckling of columns, effective length and slenderness ratio, permissible stresses in compression as per IS: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)

- 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

Fabrication and Erection of Steel Structures like trusses, columns and girders

Masonry structures – Design of brick column and wall foundations

Important Note:

Use of IS: 800 and Steel Tables are permitted in examination.

INSTRUCTIONAL STRATEGY

Teachers are expected to give simple problems for designing various steel structural members. For creating comprehension of the subject, teachers may prepare tutorial sheets, which may be given to the students for solving. It would be advantageous if students are taken at construction site to show fabrication and erection of steel structures. IS:800 may be referred along with code for relevant clauses

RECOMMENDED BOOKS

- *Duggal SK, "Design of Steel Structures" by Standard Publishers, Delhi*
- *Birinder Singh, "Steel Structures Design and Drawing", Kaption Publishing House, Ludhiana*
- *Ram Chandra, "Design of Steel Structures", Standard Publishers,Delhi*
- *LS Negi, "Design of Steel Structure" Tata McGraw Hill, New Delhi*
- *S Ramamurthan, "Design of Steel Structures",*
- *Harbhajan Singh ,"Design of Steel Structures" , Abhishek Publishing, Chandigarh*
- *Steel Structure Design by Rajeev Bhatia; Eagle Prakashan, Jalandher*

Course Title: EARTHQUAKE RESISTANT BUILDING CONSTRUCTION

Course Code: DCE602

L	T	P	Credits
3	0	0	03

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

DETAILED CONTENTS

1.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.

2.Seismic Behaviour of Traditionally-Built Constructions of India

Performance of building during earthquakes and Mode of failure (Out-of-plane failure, in-plane failure, Diaphragm failure, Connection failure, Non-structural components failure)

3.Special construction method, tips and precautions to be observed while planning, designing and construction of earthquake resistant building.

Introduction to IS: 4326, IS: 13828, IS: 1893(Part 1), 154326 and IS: 13920 (latest edition)

4.Seismic Provision of Strengthening and Retrofitting Measures for Traditionally-

5.Built Constructions, Brick and RCC Structures

6. Provision of reinforcement detailing in masonry and RC constructions

Disaster Management: Disaster rescue, psychology of rescue, rescue workers, rescue plan, rescue by steps, rescue equipment, safety in rescue operations, debris clearance and casuality management.

INSTRUCTIONAL STRATEGY (06hrs)

The student may be taken for visit to various building construction sites where precautions related to earthquake resistant construction are being taken so that the students may appreciate the importance of the subject.

RECOMMENDED BOOKS

- *Elements of Earthquake Engineering by Jai Krishana and AR Chandersekaran; SaritaParkashan, Meerut.*
- *Building Construction by BL Gupta and NL Arora, Satya Prakashan, New Delhi*
- *Manual Published by Earthquake Engineering department, IIT Roorkee / IIT Kanpur*
- *IS 13920, IS: 13827, IS: 13828, IS 1893-2002, IS 4326 (latest edition)*
- *Earthquake Engineering by RL Weigel, Prentice Hall Inc., N.I., 1970*
- *Dynamics of Structure by AK Chopra, Prentice Hall Inc. New Delhi*
- *Earthquake Resistant Building Construction by Jagroop Singh; Eagle Prakashan, Jalandher*

Course Title: QUANTITY SURVEYING AND VALUATION

Course Code: DCE603

L	T	P	Credits
5	0	0	05

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.

DETAILED CONTENTS

7.2 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

xii) Detailed estimates

Definition
Stages of preparation – details of measurement and calculation of quantities and abstract

3. Measurement

1.4 Units of measurement for various items of work as per BIS:1200
1.5 Rules for measurements
1.6 Different methods of taking out quantities – centre line method and long wall and short wall method

4. Preparation of Detailed and Abstract Estimates from Drawings for:

3.3 A small residential building with a flat roof comprising of - Two rooms with W.C., bath, kitchen and verandah
3.4 Earthwork for unlined channel
3.5 WBM road and pre-mix carpeting
3.6 Single span RCC slab culvert
3.7 Earthwork for plain and hill roads
3.8 RCC work in beams, slab, column and lintel, foundations
3.9 10 users septic tank

5. Calculation of quantities of materials for

5.7 Cement mortars of different proportion
5.8 Cement concrete of different proportion
5.9 Brick/stone masonry in cement mortar

5.10 Plastering and pointing
5.11 White washing, painting

6. Analysis of Rates

6.5 Steps involved in the analysis of rates. Requirement of material, labour, sundries, contractor's profit and overheads

6.6 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
RCC in roof slab/beam/lintels/columns
Brick masonry in cement mortar
Cement Plaster
White washing, painting
Running and maintenance cost of construction equipment

7 Contractorship : 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
- Classification and types of contracting firms/construction companies

8 Preparation of Tender Document based on Common Schedule Rates (CSR) Introduction to CSR and calculation of cost based on premium on 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 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
  Tile flooring including base course

10. Exercises on preparation of comparative statements for item rate contract

a) Purpose of valuation, principles of valuation

b) Definition of various terms related to valuation like depreciation, sinking fund, salvage and scrap value, market value, fair rent,

year's purchase etc.

c) Methods of valuation (i) replacement cost method (ii) rental return method

INSTRUCTIONAL STRATEGY

This is an applied engineering subject. Teachers are expected to provide working drawings for various Civil Engineering works and students be asked to calculate the quantities of materials required for execution of such works and use of relevant software for preparing estimates. Teachers should conceptualize making analysis of rates for different items of works. It will be advantageous if students are given valuation reports for reading.

RECOMMENDED BOOKS

1. *Pasrija, HD, Arora, CL and S. Inderjit Singh, "Estimating, Costing and Valuation (Civil)", New Asian Publishers, Delhi,*
2. *Rangwala, S.C, Estimating and Costing", Anand, Charotar Book Stall*
3. *Chakraborti, M, "Estimating, Costing and Specification in Civil Engineering", Calcutta*
4. *Dutta, BN, "Estimating and Costing*
5. *Mahajan Sanjay, "Estimating and Costing" Satya Parkashan, Delhi*
6. *Quality surveying by Gurbakshish Singh; Eagle Prakashan, JalandherSSS*

Course Title: CONSTRUCTION MANAGEMENT AND ACCOUNTS	L	T	P	Credits
Course Code: DCE604	5	0	0	05

RATIONALE

This is an applied civil engineering subject. The subject aims at imparting basic knowledge about construction planning and management, site organisation, construction labour, control of work progress, inspection and quality control, accidents and safety and accounts.

DETAILED CONTENTS

THEORY

CONSTRUCTION MANAGEMENT:

1. Introduction:
   - Significance of construction management
   - Main objectives of construction management and overview of the subject
   - 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, architect and contractors, their functions and inter-relationship

2. Construction Planning:

   Importance of construction planning

   Stages of construction planning

   Pre-tender stage

   Contract stage

   2.4 Scheduling construction works by bar charts

   - Definition of activity, identification of activities though
   - Preparation of bar charts for simple construction work

   Preparation of schedules for labour, materials, machinery and finances for small works

   Limitations of bar charts

   3.2 Scheduling by network techniques

   - Introduction to network techniques; PERT and CPM

differences between PERT and CPM terminology

3. Organization:

Types of organizations: Line, line and staff, functional and their characterised

4. Site Organization:
   - 4.1 Principle of storing and stacking materials at site
   - 4.2 Location of equipment
   - 4.3 Preparation of actual job layout for a building
   - 4.4 Organizing labour at site

5. Construction Labour:
   - 5.1 Conditions of construction workers in India, wages paid to workers
   - 5.2 Important provisions of the following Acts:
     - Labour Welfare Fund Act 1936 (as amended)
     - Payment of Wages Act 1936 (as amended)
     - Minimum Wages Act 1948 (as amended)

6. Control of Progress: Methods of recording progress
   - 6.1 Analysis of progress
   - 6.2 Taking corrective actions keeping head office informed
   - 6.3 Cost time optimization for simple jobs - Direct and indirect cost, variation with time, cost optimization

7. Inspection and Quality Control:
   - 7.1 Need for inspection and quality control
   - 7.2 Principles of inspection
   - 7.3 Stages of inspection and quality control for
     - Earth work
     - Masonry
     - RCC
     - Sanitary and water supply services

8. Accidents and Safety in Construction:
   - 12. Accidents – causes and remedies
   - 13. Safety measures for
     - Excavation work
     - Drilling and blasting
     - Hot bituminous works
     - Scaffolding, ladders, form work
     - Demolitions
   - 14. Safety campaign and safety devices

ACCOUNTS

9. Public Work Accounts:

Introduction, technical sanction, allotment of funds, re-appropriation of funds bill, contractor ledger, measurement book running and final account bills complete, preparation of bill of quantities (BOQ), completion certificate & report, hand receipt, 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, road metal material charged direct to works, account - expenditure & revenue head, remittance and deposit head, defination of cash, precaution in custody of cash book, imprest account, temporary advance, treasury challan, preparation of final bills. Students must learn to prepare accounts register.

INSTRUCTIONAL STRATEGY

This is highly practice-based course and efforts should be made to relate process of teaching with direct experiences at work sites. Participation of students should be encouraged in imparting knowledge about this subject. To achieve this objective, the students should be taken to different work sites for clear conception of particular topics, such as site organization, inspection of works at various stages of construction and working of earth moving equipment.

RECOMMENDED BOOKS

1. *Shrinath, LS, "PERT and CPM - Principles and Applications", East West Press, New Delhi*
2. *Harpal Singh, "Construction Management and Accounts", Tata McGraw Hill Publishing Company., New Delhi*
3. *Peurifoy, RL, "Construction Planning, Equipment and Methods", McGraw Hill, Tokyo*
4. *Wakhlo, ON; "Civil Engineering Management", Light and Life Publishers, New Delhi*
5. *Verma, Mahesh; "Construction Equipment and its Planning and Application*
6. *Dharwadker, PP; "Management in Construction Industry", , Oxford and IBH Publishing Company, New Delhi*
7. *Gahlot PS; Dhir, BM; "Construction Planning and Management", Wiley Eastern Limited, New Delhi*
8. *MS Project – Microsoft USA*
9. *Primavera*
10. *Construction Management & Accounts by Jagroop Singh; Eagle Prakashan, Jalandher*

Course Title: STRUCTURAL DRAWINGS

Course Code: DCE605

L	T	P	Credits
0	0	2	01

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.

DETAILED CONTENTS

PART A

Drawing Exercises

5. RC Structures:
   Reinforcement details from the given data for the following structural elements with bar bending schedules

Drawing No. 1: RC Slabs - One-way slab, Two-way slab and Cantilever Slab.

Drawing No.2: Beams - Singly and doubly reinforced rectangular beams and Cantilever beam (All beams with vertical stirrups)

Drawing No.3: Columns and Footings – Square, Rectangular and Circular Columns with lateral ties and their isolated sloped column footings.

Drawing No. 4: Portal Frame – Three bay two storey RC portal frame with blow up of column beam junctions.

Drawing No. 5: Draw at least one sheet using CAD software

PART B

Steel Structures:

Structural drawing from given data for following steel structural elements.

Drawing No. 1: Roof Truss – Drawing of Fink Roof Truss with details of joints, fixing details of purlins and roof sheets.

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.

Drawing No.3: Column Beam Connections

- Sealed and Framed Beam to Beam Connections

- Sealed and Framed beam o Column Connections

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.

Drawing No. 5 : Draw atleast one sheet using CAD software

RECOMMENDED BOOKS

1.1 Layal JS "Civil Engineering Drawing", Satya Parkashan, New Delhi

1.2 Chandel RP " Civil Engineering Drawings"

1.3 Kumar; NS " Civil Engineering Drawing " IPH, New Delhi

1.4 Malik RS and Meo GA, "Civil Engineering Drawing" Asian Publishing House, New Delhi

1.5 Singh, Birinder "RCC Design and Drawing" Kaption Publishing House, New Delhi.

1.6 Singh, Birinder "Steel Structures Design and Drawing", Kaption Publishing House, New Delhi

1.7 Structural Drawings by Rajeev Bhatia; Eagle Prakashan, Jalandhar

Course Title: MAJOR PROJECT WORK
INDUSTRY/FIELD ORIENTED PRACTICE BASE

Course Code: DCE606

L	T	P	Credits
0	0	12	06

As far as possible students should be given live project problems with a view to :

- 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.
- Develop understanding of subject based knowledge given in the classroom in the context of its application at work places.
- Provide first-hand experience to develop confidence amongst the students to enable them to use and apply classroom based knowledge and skills to solve practical problems of the world of work.
- Develop special skills and abilities like interpersonal skills, communication skills, attitudes and values.

For the fulfilment of above objectives, polytechnics may establish close linkage with 8-10 relevant organization for providing such an experience. It is necessary that each organization is visited well in advance by respective teachers and activities to be performed by students are well defined. The chosen activities should be such which are of curricular interest to students and of professional value to industrial/field organizations. Each teacher is expected to supervise and guide 5 - 6 students

Effort should be made to identify actual field problems to be given as project work to the students. Project selected should not be too complex which is beyond the comprehension level of the students. The placement of the students for such a practical cum project work should match with the competency profile and interest of students. Students may be assessed both by industry and polytechnic faculty. The suggested performance criteria is given below:

a) Punctuality and regularity 10

b) Initiative in learning/working at site 10

c) Level/proficiency of practical skills acquired 10

d)	Sense of responsibility	10
e)	Self expression/Communication skills	10
f)	Interpersonal skills	10
g)	Report writing skills	20
h)	Viva voce	20

Some of suggested projects are given below: These are only guidelines, teacher may SStake 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:

i. 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 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

j. 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

k. Construction of seating benches in polytechnic campus
- Welding of angle iron and Expanded metal jali to prepare fencing in polytechnic campus
- Construction of toilets and baths for a shopping complex in a township
- Construction of bridal path 4 kms long
- Construction of shopping complex by detailing of RCC drawings, estimating and costing of material

l. Rainwater harvesting
   - Assessment of catchment's area
   - Intensity of rainfall
   - Collection of water
   - Soak pit design

- Supply of water
- Monitoring during rainy season

m. Design and construction of septic tank with soak pit for 100 users

n. Preparing plumbing detailed drawings of a two storey building and material estimate and costing

o. 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

14. Construction of concrete cubes by mixing appropriate quantity of fly ash with fibres
    (i) the fibres like polypropylene, carbon, steel etc. can be used
    (ii) students will show the comparison between concrete mixed with fibres verses the quality controlled concrete.

15. Estimation and designing of a State Highway Road
    (i) Reconniance survey of proposed road
    (ii) To take L - section and cross sections
    (iii) Fixing of grades
    (iv) Estimation of cutting and filling of earth mass
    (v) Plane tabling survey of proposed road
    (vi) Estimation of proposed road

16. Designing a small height gravity dam
    (i) Constructing of catchment area
    (ii) Calculating the reservoir capacity
    (iii) Designing of gravity dam by taking into account various forces

17. Designing of Ferro-cement water tank and toilet. Testing of the ferro-cement products in civil engineering labs.

Note: The projects undertaken should be field oriented

Course Title: ENVIRONMENTAL ENGINEERING

Course Code: DCE607

L	T	P	Credits
3	0	0	03

Civil Engineering diploma holders must have the knowledge of different types of environmental aspects related to development activities so that they may help in maintaining the ecological balance and control pollution. They should also be aware of the related environmental laws for effectively combating environmental pollution. The class room instructions should be supplemented by field visits to show the pollution caused by urbanization and the combatment measures being adopted at site. Extension lectures by experts may be encouraged.

DETAILED CONTENTS

1. Study of Importance of Environmental Engineering

   Importance of clean environment, control of environmental pollution with respect to air, land and water. Conservation of natural resources, environmental education and awareness, sustainable development.

2. Environments and Ecology

   Definition and understanding of environment and ecology concept, ecosystem and types of ecosystems, energy flow in an ecosystem, food chain, ecological pyramids, consortium and ecological balance

3. Water Pollution: Causes of pollution in surface and underground water eutrophication of lakes and its preventing measure; BIS standards for water quality.

4. Air Pollution: Definition, principal air pollutants, atmospheric parameters influencing air pollution, types of air contaminants and their sources, effects of air pollution on human beings, plants, animals, automobile pollution, BIS ambient air quality standards and measures to combat air pollution

5. Noise Pollution: Definition, unit of measurement of noise, sources and effects of noise pollution and control of noise pollution.

6. Effects of mining, blasting and deforestation

   Ill effects of mining, blasting and deforestation on the environment human life and wild life.

7. Land Use

   Effect of land use on environmental quality, land use and natural disasters,(land slidesetc) soil degradation problems - erosion, water logging, soil pollution etc.

8. Environmental Impact Assessment

   Definition and requirements, environmental impact assessment. Flour chart of environmental impact assessment methodology. Describe the need and importance of EIA.

9. Legislation to Control Environmental Pollution (idea)

   Indian legislative acts for water, land and air pollution control – provisions, scope and implementation

10. Global Issues of Environmental Engineering

    Global warming, ozone depletion, acid rain, oil pollution; radiation hazards and their control

11. Renewable Source of Energy

    Role of non-conventional sources of energy (biogas, solar, wind etc) in environmental protection. Conservation of energy resources like coal, oil etc., alternative fuels, bio-diesel etc.

INSTRUCTIONAL STRATEGY

Students should be encouraged to undertake project work related to environmental problems. They should visit industrial effluent treatment plant, water treatmet plant and environmental engineering laboratory and study the impact of utilization of reclaimed by products

RECOMMENDED BOOKS

1 Deswal DS and Deswal SS "Environmental Engineering" Dhanpat Rai and Company (P) Ltd., Delhi

2 Odum EP, "Fundamentals of Ecology", Amarind Publication Co., Delhi

3 Dhamija SK "Environmental Engineering and Management ; SK Kataria and Sons, Delhi

4 De AK, "Engineers Chemistry", New Age Publication, Delhi

5 Kendeigh SC, "Ecology", Prentice Hall of India, Delhi

6 Khitoliya, RK, "Environmental Pollution', S Chand & Co. Ltd., New Delhi

7 Bhatia, HS, "A text book of Environmental Pollution and Control", Galgotia. Publishers, Delhi

8 Environmental Engineering by Eagle Prakashan, Jalandher

Course Title: ENVIRONMENTAL ENGINEERING

Course Code: DCE608

L	T	P	Credits
3	0	0	03

RATIONALE

Now a day, diploma holders in Civil Engineering has to supervise prestressed concrete construction. So, it is necessary that they should have basic knowledge of prestressed concrete.

DETAILED CONTENTS

1. Introduction

   Basic concept of prestressed concrete, advantages of prestressed concrete in comparison with RCC application of prestressed to various building elements, bridges, water tanks and precast elements

2. Materials

   Materials requirement for prestressing concrete – High strength concrete, prestressing steel wires, strands and high strength bars. Stresses in high strengh steel and stress-strain relationship, tendon profile

3. Prestressing Methods

   Introduction to prestressing methods – pre-tensioning and post-tensioning, their suitability and comparison, circular prestressing and its application

4. Bending and Shear Capacity

   Concept of bending and shear capacity of prestressed members. Calculation of bending stresses in rectangular simply supported beams with straight and parabolic profile of tendons

5. Losses in Prestressing

   Types of losses in prestress – Elastic shortening, creep and shrinkage of concerete, friction loss and stress relaxation in prestress steel. Computation of losses for simple beam problems

RECOMMENDED BOOKS

- *N Krishna Raju "Prestressed Concrete" , Tata McGraw Hill, Delhi*
- *P Dayaratnam "Prestressed Concrete"*
- *S Ramamurthum "Prestressed Concrete"*

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	10	20
2	8	16
3	8	16
4	12	32
5	10	16
Total	**48**	**100**