

1.1 ENGLISH AND COMMUNICATION SKILLS - I

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RATIONALE

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

DETAILED CONTENTS

1. Facets of Literature (14 hrs)
 - 1.1 Short Stories
 - 1.1.1 Homecoming – R.N. Tagore
 - 1.1.2 The Selfish Giant - Oscar Wilde
 - 1.1.3 The Diamond Necklace- Guy- De Maupassant
 - 1.1.4 The Stick – Justice Surinder Singh
 - 1.2 Prose
 - 1.2.1 I Have A Dream – Martin Luther King
 - 1.2.2 On Habits – A. G. Gardiner
 - 1.2.3 My struggle for An Education- Booker T Washington
 - 1.2.4 Seeing People Off – Max Beerbohm
 - 1.3 Poems
 - 1.3.1 Ozymandias – P.B. Shelley
 - 1.3.2 Daffodils – William Wordsworth
 - 1.3.3 Stopping by Woods on a Snowy Evening – Robert Frost
 - 1.3.4 Forefathers- Edmund Blunden
2. Grammar and Usage (10 hrs)
 - 2.1 Parts of speech
 - 2.1.1 Nouns
 - 2.1.2 Pronouns
 - 2.1.3 Adjectives
 - 2.1.4 Articles
 - 2.1.5 Verbs
 - 2.1.6 Adverbs
 - 2.1.7 Prepositions
 - 2.1.8 Conjunction
 - 2.1.9 Interjection

- 2.1.10 Identifying parts of speech
- 2.1.11 Structures: Verb patterns, Question tags,
- 2.1.12 Subject – Verb agreement (concord)

- 2.2 Pair of words (Words commonly confused and misused)
- 2.3 Tenses
- 2.4 Correction of incorrect sentences
- 2.5 One word substitution

- 3. Translation (04 hrs)
 - 3.1 Glossary of Administrative Terms (English and Hindi)
 - 3.2 Translation from Hindi into English

- 4. Paragraph of 100-150 words from outlines (08 hrs)

- 5. Comprehension (04 hrs)

Unseen passages of literature, scientific data/graph based for comprehension exercises

- 6. Communication (08 hrs)
 - 6.1 Definition, Introduction and Process of Communication
 - 6.2 Objectives of Communication
 - 6.3 Notices

LIST OF PRACTICALS

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

Note:

1. The Text Book on “English and Communication Skills, Book-I By Kuldip Jaidka et. al. developed by NITTTR, Chandigarh is recommended to be used for teaching and setting-up the question papers.
2. A communication laboratory may be set up consisting of appropriate audio-video system with facility of playing CDs/DVDs and a video camera for recording the performance of each student with play back facility. A set of CDs from any language training organization e.g. British Council etc. may be procured for use of students.

3. Elements of body language will be incorporated in all the practicals
4. The practical exercises involving writing may also be included in Theory Examination.

INSTRUCTIONAL STATREGY

Looking into the present day needs of effective communication in every field, it is imperative to develop necessary competencies in students by giving practical tips and emphasis on grammar, vocabulary and its usage in addition to practical exercises. The teacher should give report writing assignments, projects etc. while teaching this subject.

RECOMMENDED BOOKS

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

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	14	30
2	10	20
3	4	10
4	8	15
5	4	10
6	8	15
Total	48	100

1.2 APPLIED MATHEMATICS - I

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RATIONALE

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

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

DETAILED CONTENTS

- | | | |
|------|---|----------|
| 1. | Algebra | (30 hrs) |
| 1.1 | Complex Numbers: Complex number, representation, modulus and amplitude. De-moivre's theorem, its application in solving algebraic equation. | |
| 1.2 | Basics and properties of logarithms and its applications in solving problems related to basic logarithmic formulas. | |
| 1.3 | 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. | |
| 1.4. | Partial fractions (linear factors, repeated linear factors, non-reducible quadratic factors excluding repeated factors) | |
| 1.5 | 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. | |
| 1.6 | 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 | |

2. Trigonometry (25 hrs)
- 2.1 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.
- 2.2 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 ($2A$, $3A$, $A/2$).
- 2.3 Graphs of $\sin x$, $\cos x$, $\tan x$ and e^x
- 2.4 Applications of Trigonometric terms in engineering problems such as to find an angle of elevation, height, distance etc.
3. Co-ordinate Geometry (25 hrs)
- 3.1 Cartesian and Polar coordinates (two dimensional), conversion from cartesian to polar coordinates and vice-versa, distance between two points (cartesian co-ordinates), section formulae
- 3.2 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.
- 3.3 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
- 3.4 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
- 3.5 Equation(s) of a straight line, circle, and conics (ellipse, parabola and hyperbola) and their applications in engineering problems..

INSTRUCTIONAL STRATEGY

Basic elements of algebra, trigonometry and coordinate geometry can be taught in the light of their applications in the field of engineering and technology. By laying more emphasis on applied part, teacher can also help in providing a good continuing education base to the students.

RECOMMENDED BOOKS

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 RD Sharma
4. Applied Mathematics, Vol. I & II by SS Sabharwal & Sunita Jain, Eagle Parkashan, Jalandhar
5. Comprehensive Mathematics, Vol. I & II by Luxmi Publications
6. Engineering Mathematics by Dass Gupta
7. Engineering Mathematics by C Dass Chawla, Asian Publishers, New Delhi
8. Engineering Mathematics, Vol I, II & III by V Sundaram et al, Vikas Publishing House (P) Ltd., New Delhi
9. Engineering Mathematics by S.N Iyengar et.al, Vikas Publishing House (P) Ltd., New Delhi
10. Engineering Mathematics, Vol I & II by SS Sastry, Prentice Hall of India Pvt. Ltd.,
11. Engineering Mathematics, Vol I & II by AK Gupta, MacMillan India Ltd., New Delhi
12. Applied Mathematics I, Archana Sharma, Lords Publications, Jalandhar
13. Advanced Engineering Mathematics by Peter V.Oneil, University of Albama, 2007 edition, Cengage Learning India Pvt. Ltd. Patparganj, New Delhi

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING PAPER SETTER

Sr. No.	Topic	Time Allotted (Hrs)	Marks Allotted (%)
1	Algebra	30	35
2	Trigonometry	25	35
3	Co ordinate Geometry	25	30
Total		80	100

1.3 APPLIED PHYSICS – I

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4 - 2

RATIONALE

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

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

DETAILED CONTENTS

1. Units and Dimensions (8 hrs)
 - 1.1 Physical quantities
 - 1.2 Units - fundamental and derived units, systems of units (FPS, CGS, MKS and SI units)
 - 1.3 Dimensions and dimensional formulae of physical quantities
 - 1.4 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, limitations of dimensional analysis
 - 1.5 Error in measurement, random and systematic errors
 - 1.6 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).

2. Force and Motion (10 hrs)
 - 2.1 Scalar and vector quantities – examples, addition and multiplication (scalar product and vector product) of vectors
 - 2.2 Force, resolution and composition of forces: resultant, parallelogram law of forces, equilibrium of forces
 - 2.3 Newton's Laws of motion: concept of momentum, 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
 - 2.4 Circular motion: angular displacement, angular velocity and angular acceleration
 - 2.5 Relation between linear and angular variables (velocity and acceleration)
 - 2.6 Centripetal force (derivation) and centrifugal force with its application such as banking of roads, bending of cyclist, motion in vertical circle etc
 - 2.7 Application of various forces in lifts, cranes, large steam engines and turbines,

3. Waves and Vibrations (10 hrs)
- 3.1. Wave motion: transverse and longitudinal wave motion with examples, sound and light waves, velocity, frequency and wave length of a wave (relationship $v = n\lambda$) and their applications
 - 3.2. Wave equation, $y = r \sin \omega t$, phase, phase difference, superposition of waves and their applications.
 - 3.3. Simple Harmonic Motion(SHM): definition, expression for displacement, velocity, acceleration, time period, frequency in S.H.M.
 - 3.4. Free, forced and resonant vibrations with examples
 - 3.5. Acoustics of buildings – reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time and their applications
 - 3.6. Ultrasonics – production (magnetostriction and piezoelectric methods) and their engineering and medical applications
4. Rotational Motion (6 hrs)
- 4.1. Concept of translatory and rotating motion with examples
 - 4.2. Definitions of torque, angular momentum and their relationship
 - 4.3. Conservation of angular momentum (qualitative) and its examples
 - 4.4. 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).
 - 4.5. Application of rotational motions in transport vehicles, trains and aero plane turbine/engine.
5. Work, Power and Energy (10 hrs)
- 5.1. Work: definition and its SI units
 - 5.2. Work done in moving an object on horizontal and inclined plane (incorporating frictional forces) with its application
 - 5.3. Power: definition and its SI units, calculation of power with numerical problems
 - 5.4. Energy: Definition and its SI units: Kinetic energy and Potential energy with examples and their derivation

- 5.5 Principle of conservation of mechanical energy (for freely falling bodies), transformation of energy from one form to another with its application
 - 5.6 Friction: concept, types and its engineering applications.
 - 5.7 Application of Friction in brake system of moving vehicles, trains, aero planes and other objects.
- 6 Properties of Matter (10 hrs)
- 6.1 Elasticity: definition of stress and strain, different types of modulus of elasticity, stress – strain diagram, Hooke's law with its applications
 - 6.2 Pressure: definition, its units, atmospheric pressure, gauge pressure, absolute pressure, U-tube, manometers and barometer gauges and their applications
 - 6.3 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
 - 6.4 Fluid motion, stream line and turbulent flow, Equation of Continuity, Bernauli's Theorem and their applications.
 - 6.5 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.
- 7 Thermometry (10 hrs)
- 7.1 Difference between heat and temperature on the basis of K.E. of molecules
 - 7.2 Principles of measurement of temperature and different scales of temperature and their relationship
 - 7.3 Resistance thermometers and Pyrometers with their field applications such as Thermocouple, Bi-metallic thermometer.
 - 7.4 Expansion of solids, liquids and gases, coefficient of linear, surface and cubical expansions and relation amongst them
 - 7.5 Modes of transfer of heat (Conduction, convection and radiation with examples)
 - 7.6 Co-efficient of thermal conductivity, determination of thermal conductivity of good conductor (Searle's method) and bad conductor (Lee's disc method)
 - 7.7 Application of various systems of thermometry in refrigeration and air-conditioning etc.

LIST OF PRACTICALS (to perform minimum ten experiments)

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.

INSTRUCTIONAL STRATEGY

Teacher may use various teaching aids like models, charts, graphs and experimental kits etc. for imparting effective instructions in the subject. The teacher should explain about field applications before teaching the basics of mechanics, work power and energy, rotational motion, properties of matter etc. to develop proper understanding of the physical phenomenon. **Use of demonstration can make the subject interesting and develop scientific temper in the students.**

RECOMMENDED BOOKS

1. Text Book of Physics for Class XI (Part-I, Part-II) N.C.E.R.T
2. Text Book of Physics for Class XII (Part-I, Part-II) N.C.E.R.T
3. Applied Physics Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, New Delhi
4. Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
5. Fundamentals of Physics by Resnick and Halliday & Walker, Asian Book Pvt. Ltd., New Delhi
6. Berkeley Physics Course, Vol. I, II & III, Tata McGraw Hill, Delhi

7. The Feynman Lectures on Physics by Feynman, Leighton and Sands, Vol. I & II, Narosa Publishing House, Delhi
8. Comprehensive Practical Physics, Vol. I & II, JN Jaiswal, Laxmi Publishers
9. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
10. Applied Physics I & II by RA Banwait & R Dogra, Eagle Parkashan, Jalandhar
11. Applied Physics by Jasmer Kaur and Bhupinder Singh, Lords Publications, Jalandhar City
12. Physics by Nelcon and Parker Publishers UK
13. Engineering Physics by Vanchna Singh and Sheetal Kumar, Cengage Learning India Pvt. Ltd. Patparganj, Delhi (year 2008)

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING PAPER SETTER

Sr No	Topic	Time Allotted (Hrs)	Marks Allotted (%)
1	Units and Dimensions	08	10
2	Force and Motion	10	15
3	Waves and Vibrations	10	15
4	Rotational Motion	06	10
5	Work, Power and Energy	10	20
6	Properties of Matter	10	15
7	Thermometry	10	15
	Total	64	100

1.4 APPLIED CHEMISTRY-I

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4 - 2

RATIONALE

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

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

DETAILED CONTENTS

1. Basic Concepts of Chemistry (10 hrs)
 - 1.1 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)
 - 1.2 Matter, element, compound and mixtures, atoms, molecules, ions, symbols and formulae, Atomic mass (A), atomic number (Z) isotopes, isobars, isotone (recapitulation only)
 - 1.3 Mole concept, solution, standard solution, methods to express concentration of solution
 - 1.3.1 molar mass, molar volume of gases, strength of solutions in grams per liter, molarity (M), molality (m), mass and volume percentages and mole fraction
 - 1.4. Chemical equations, thermo-chemical equations, balancing of chemical equations and simple stoichiometric calculations.
 - 1.5 Numerical problems based on mole concept and molarity.

2. Atomic Structure, Periodic Table and Chemical Bonding (12 hrs)
 - 2.1 Fundamental particles- electrons, protons and neutrons
 - 2.2 Bohr's model of atom and its limitations (qualitative treatment only).
 - 2.3 Wave particle duality and Heisenberg's uncertainty principle (elementary idea only)

- 2.4 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
- 2.5 Modern periodic law and periodic table, groups and periods.
- 2.6 Classification of elements into s, p, d, and f blocks (periodicity in properties are excluded)
- 2.7 Chemical bond and cause of bonding.
- 2.8 Ionic bond, valence bond approach of covalent bond, hybridization (sp^3 , sp^2 and sp) sigma (σ) and pi (π) bonds.
- 2.9 Metallic bonding – electric, magnetic and dielectric properties based on Band model
3. Water (10 hrs)
- 3.1 Sources of water, impurities in water (dissolved –gases, salts and suspended),
- 3.2 Hardness of water, types of hardness, degree of hardness, units of hardness-ppm, $^{\circ}Cl$, $^{\circ}Fr$ – numerical problems
- 3.3 Disadvantages of using hard water in domestic and in industries: Laundry work (action of soap on water), paper, textile and beverage industries.
- 3.4 Boiler feed water and its quality - causes and prevention of
- 3.4.1 Scale and sludge formation,
- 3.4.2 Priming and foaming
- 3.4.3 Boiler corrosion,
- 3.4.4 Caustic embitterment
- 3.5 Softening of hard water by
- 3.5.1 Ion exchange process- dematerialized water advantages and limitations of this method
- 3.5.2 Desalting of sea water by reverse osmosis (RO) method
- 3.5.3 Calgon process
- 3.6 Characteristics of drinking water and ICMR, ISI –quality criteria
- 3.7 Water analysis: Quantitative analysis of hardness by EDTA method, alkalinity, and estimation of total dissolved solids (TDS)-numerical problems
- 3.8 Enlist applications of various kinds of water in engineering and chemical industry.
4. Gas laws, Terminology of Thermodynamics and Equilibrium (14 hrs)
- 4.1 Definition of gas and perfect gas, gas laws- Boyle's Law, Charles law & Avagadro's law, Gas constant (R).
- 4.2 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)
- 4.3 Elementary idea of zeroth, 1st, 2nd, and 3rd laws of thermodynamics (without mathematical derivation)
- 4.4 Applications of free energy change (ΔG) criteria (in metallurgy and electric work without any mathematical derivation)
- 4.5 Equilibrium state and its significance statement of Le-Chatelier's principle, equilibrium constant (K) and its applications..

- 4.6 Electrolytes, non electrolytes, ionization in aqueous solutions, degree of ionization, ionic product of water (K_w)
- 4.7 Concept of pH, pH- scale and industrial applications of pH
- 4.8 Definitions - acids, bases, neutralization and acid base titrations, indicators and choice of indicators for acid base titration.
- 4.9 Buffer (acidic, basic and neutral) solutions, enlist applications of buffer solution
- 4.10 Simple numerical problems (only on 4.1, 4.5. 4.6 and 4.7 sections)
5. Electrochemistry (10 hrs)
- 5.1 Electronic concept of oxidation and reduction, redox reactions
- 5.2 Electrolytes, non-electrolytes and electrolysis,
- 5.3 Faraday's Laws of electrolysis and applications in electrometallurgy and electroplating in automobile
- 5.4 Standard reduction potential (SRP), activity series, electrochemical cell and their e.m.f
- 5.5 Chemistry of commercial electrochemical cells
- 5.5.1 primary cells - Daniel cell and dry cell
- 5.5.2 secondary cell - lead acid storage cell, Wetson-cadmium cell, nicad battery, Lil battery, Hg – button cell and Ag- button cell
- 5.5.3 Fuel cells
- 5.6 Simple numerical problems related (to only 5.1, 5.3 and 5.4 sections).
6. Organic Chemistry (06 hrs)
- 6.1 Tetra covalency of carbon in carbon compounds, catenation (definition only)
- 6.2 Classification of organic compounds on the bases of functional group
- 6.3 IUPAC nomenclature of simple organic compounds (containing one functional group only) and their common names (if any)

LIST OF PRACTICALS

1. Introduction to volumetric analysis, apparatus used in volumetric analysis and molarity based calculations.
2. Preparation of standard solution of oxalic acid $\{(COOH)_2 \cdot 2H_2O\}$ or potassium permanganate ($KMnO_4$) or potassium dichromate ($K_2Cr_2O_7$)
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 cuprammonium $\{Cu(NH_3)_4SO_4\}$ 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 sulfuric acid
14. Determination of pH of given solution using pH meter.

INSTRUCTIONAL STATREGY

Teacher may take help of various models and charts while imparting instructions to make the concepts clear. More emphasis may be laid on discussing and explaining practical applications of various chemical processes and reactions. In addition, students should be encouraged/motivated to study those processes in more details, which may find practical applications in their future professional life.

RECOMMENDED BOOKS

1. Chemistry in Engineering by J.C. Kuricose and J. Rajaram, Tata McGraw Hill, Publishing Company Limited, New Delhi.
2. Engineering Chemistry by P.C.Jain and Monika Jain, Dhanapat Rai Publishing Company, New Delhi.
3. Engineering Chemistry by Shashi Chawla.
4. Progressive Applied Chemistry – I by Dr. G.H. Hugar Eagle Prakashan, Jalandhar
5. Engineering Chemistry – A text Book by H. K. Chopra and A Parmer- Narosa Publishing House New Delhi.
6. Applied Chemistry-I by Dr.P.K. Vij & Shiksha Vij, Lords Publications, Jalandhar
7. Engineering Chemistry by Dr. Himanshu Pandey, Goel Publishing House, a unit of Krishna Prakashan Pvt. Ltd. Meerut, India, (year 2008)
8. Rapid Chemistry for peak performance by Anil Ahlawat, MTE books, 503, Taj Apartments, Ring Road, New Delhi (year 2008)
9. Applied Chemistry (Theory and Practice) by Vermani OP and Narula A.K., Cengage International Pvt. Ltd. New Delhi (year 2008)
10. Engineering Chemistry by Shelli Oberoi and Monica Malik, Cengage International Pvt. Ltd. New Delhi (year 2008)

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING PAPER SETTER

Sr No	Topic	Time Allotted (Hrs)	Marks Allotted (%)
1	Basic Concepts of Chemistry	10	15
2	Atomic Structure Periodic Table and Chemical Bonding	12	20
3	Water	10	15

4	Gas laws, Language of Thermodynamics and Equilibrium	14	20
5	Electrochemistry	12	20
6	Organic Chemistry	06	10
Total		64	100

1.5 ARCHITECTURAL DRAWING – I

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- - 6

RATIONALE

Architectural Drawing forms a core subject for preparing scale drawings, three dimensional views, furniture drawings and layouts.

Teachers are expected to lay considerable stress on practical work so that students attain sufficient skills in lettering, printing and desired competencies for preparing good quality architectural drawings.

Teachers are also expected to stress upon appropriate line work, dimensioning and lettering.

DETAILED CONTENTS

1. Introduction and relevance (need and importance) of the architectural drawing
2. Introduction to the Studio Environment
 - 2.1 Basics of drafting board, instruments, starting off
 - 2.2 Basics of stationery (Pencils, sharpening, types of sheets, erasers, cutter etc)
 - 2.3 Demonstration by the teacher on holding pencils, fixing parallel bar and handling other tools and equipment used in Architectural Drawing
(Demonstration sheet to be put up for absorbing)
3. Line Work (02 sheets)
 - 3.1 Basic line work, with different intensities H, F, HB, 2B, 4B, 6B
 - * Horizontal lines
 - * Vertical lines
 - * Grid
 - * Diagonal lines
 - * Composition, pattern making in line work
 (Using different grades of pencils to understand the tonal variation)
4. Lettering using different pencils, pens and stenciling (02 sheets)
 - 4.1 Different styles, heights
 - 4.2 Different intensities
5. Introduction to Scale (02 sheets)

Use of the modular scale - both metric system and FPS
6. Geometric Shapes (Plan, elevation, side elevation, section) (02 sheets)

- 6.1 Simple geometric (cubes, cylinder, cones etc)
- 6.2 Complex (fusion of the basic shapes)
(Incorporating the use of scale both Feet and Metric)
- 7. Orthographic Projections (Introduction to Planes) (06 sheets)
 - 7.1 Projections of points
 - 7.2 Projections of lines
 - 7.3 Projection of solids (Only simple positions of cubes, cylinders, cone and pyramids)

Number of sheets = 14

INSTRUCTIONAL STRATEGY

This subject is one of the most important, fundamental and practical subject for diploma in Architectural Assistantship. Teachers should lay emphasis on practical work by the students and give repetitive exercises in free hand sketching, colouring and rendering like sketching, shades and shadows, lettering, printing forms and other important component of architecture. Teachers should lay stress upon perfect line work, properties, dimensioning, lettering and printing by the students in the classroom. Students should maintain portfolio of the work done by them throughout the session. Viva voce examination may be conducted by the teacher on completion of each assignment

RECOMMENDED BOOKS

1. Engineering Drawing by N.D. Bhatt
2. Engineering Drawing by G.S. Virdhi

1.6. FREE HAND SKETCHING

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RATIONALE

Free hand sketching plays a very important role to inculcate interest among the students in the field of drawing. It also helps in developing the skills required for preparing various types of drawings and design. Considerable emphasis on outdoor sketching should be given to attain the required skills in the subject.

DETAILED CONTENTS

Free Hand Sketching Exercises

- Free-hand line exercises of different types of lines (horizontal, vertical, diagonal grid) (01 Sheet)
- Free hand sketching of two-dimensional geometrical figures. (Square, circle, Triangles and Ellipses etc.) (02 Sheets)
- Free hand sketching of three – dimensional geometrical objects. (Cube, Cones, Prisms, Pyramids, Spheres Cylinders etc). (02 Sheets)
- Introduction and study of anthropometrics (02 Sheets)
- Free hand sketching of human figures, trees furniture and vehicles etc. one indoor and one outdoor exercise (02 Sheets)
- Free hand sketching of small buildings with shade and shadow sheets. One indoor and one outdoor exercise (02 Sheets)
- Free-hand sketching of buildings with trees, human figures, sky, clouds and birds and other land-scape elements, using various mediums like pencil, ink and colours (water colours and pencil colours etc) (02 Sheets)
- Free-hand sketches of various scenes such as railway-station, parking places, bus stand, market scene, village scene etc. (water colours and pencil colours etc) (01 Sheet)

Note: Students are also required to maintain sketchbooks for outdoor sketching.

Number of Sheets: 14

INSTRUCTIONAL STRATEGY

This subject is one of the most important, fundamental and practical subject for diploma in Architectural Assistantship. Teachers should lay emphasis on practical work by the students and give repetitive exercises in free hand sketching, colouring and rendering like sketching, shades and shadows, lettering, printing forms and other important component of architecture. Teachers should lay stress upon perfect line work, properties, dimensioning, lettering and printing by the students in the classroom. Students should maintain portfolio of the work done by them throughout the session. Viva voce examination may be conducted by the teacher on completion of each assignment

RECOMMENDED BOOKS

1. Time Saver Standards for Building Types by Joseph De Chiara and John Callendera
2. Architects Data by Neufert
3. Space, Time and Order by DK Ching
4. Rendering with Pencil and Ink
5. Manual of Rendering with Pen and Ink by Thames and Hudson

1.7 MODEL MAKING -I

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RATIONALE

Students of Architectural Assistantship at diploma level are expected to assist in the preparation of architectural models of various kinds in their professional career. This skill can also form a basis of self-employment. Architecture models as three-dimensional representations are made in different mediums. The students should be acquainted with all of these mediums/materials

DETAILED CONTENTS

1. Introduction and Demonstration of model making materials and techniques.
2. Block models of basic geometrical shapes like prisms, pyramids, cubes, cylinders etc., using the following materials:
 - 2.1 Hand made and ivory sheet (1 Exercise)
 - 2.2 Thermo coal (1 Exercise)
 - 2.3 Mount Board/Sun Board/Balsa Wood strips (1 Exercise)
3. Composition of various geometrical shapes in different materials. (2 Exercises)
4. Sculpture Making (3 Exercises in all)
 - 4.1 Thermocol (Styropor)
 - 4.2 Mount Board/ sun board/Balsa wood strips
 - 4.3 Clay modeling
 - 4.4 Miscellaneous materials such as copper wire, board, toothpicks, broken ceramics, leather etc.
5. Introduction to carpentry (1 Exercise)
 - 5.1 Introduction and Demonstration of materials, tools, machines and techniques such as sawing, chiseling and planing etc.
 - 5.2 Demonstration of preparation of joints such as lap joint, tongue and groove, dove tail, mortise and tenon joint.
 - 5.3 Exercise in joint preparation under close supervision
6. Brick Masonary (1 Exercise)

Laying of bricks in different bonds

Total Number of Exercise: 10

INSTRUCTIONAL STRATEGY

This is a practical oriented subject. Teacher should arrange visits to some of Model rooms of important buildings. Each student should be given independent exercises to make models. Teacher may procure some models of some residential, group housing commercial and public buildings, made from different materials and demonstrate to the students

Note: Institute must develop a construction yard where students can use the building materials and make the various brick bonds under the supervision of a teacher. The construction yard can also be used during building construction classes.