1.1 ENGLISH AND COMMUNICATION SKILLS - I

L	T	P
3	-	2

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 Maupassantt
      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

L	T	P
5	-	-

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-movier's theorem, its application in solving algebric 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 application in solving engineering problems..

INSTRUCTIONAL STATREGY

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

L	T	P
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 STATREGY

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 Sheeetal 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

L	T	P
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, ^{o}Cl, ^{o}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, LiI 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 {$(COOH)_2.2H_2O$} 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 spectrophotometeric 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	12	20

	Bonding		
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 ENGINEERING DRAWING - I

L	T	P
-	-	7

RATIONALE

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

Note:

i) First angle projection is to be followed

ii) Minimum of 16 sheets to be prepared

iii) Instructions relevant to various drawings may be given along with appropriate demonstrations, before assigning drawing practice to students

DETAILED CONTENTS

1. Introduction to Engineering Drawing

   1.1 Introduction to drawing instruments, materials and layout of drawing sheets.

2. Free Hand Sketching and Lettering (03 sheets)

   2.1 Different types of lines in Engineering drawing as per BIS specifications

   2.2 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.

   2.3. Free hand lettering (Alphabet and numerals) – lower case and upper case, single stroke, vertical and inclined at 75 degree in different standards, series of 3,5,8 and 12 mm heights in the ratio of 7:4

3 Dimensioning Technique (01 sheet)

   3.1 Necessity of dimensioning, method and principles of dimensioning (mainly theoretical instructions)

   3.2 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

4. Scales 02 sheets)
   4.1 Scales - their need and importance (Theoretical instructions).
   4.2 Drawing of plain and diagonal scales

5. Projection (05 sheets)

   5.1 Theory of projections (Elaborate theoretical instructions)

   5.2 Projection of Points
      5.2.1. Production of a point in the first quadrant.
      5.2.2. Projection of a point in the third quadrant.

   5.3 Projection of Straight Line
      5.3.1. Line parallel to both the planes
      5.3.2. Line perpendicular to any one of the reference plane
      5.3.3. Line inclined to any one of the reference plane.

   5.4 Drawing 3 views of given objects(Non-symmetrical objects may be selected for this exercise)

   5.5. Drawing 6 views of given objects(Non-symmetrical objects may be selected for this exercise)

   5.6. Identification of surfaces on drawn views and objects drawn

   5.7. Exercises on missing lines and views

   Note: At least one sheet in third angle projection

6. Sections (02 sheets)

   6.1 Importance and salient features, Methods of representing sections,conventional sections of various materials, classification of sections, conventions in sectioning

   6.2 Drawing of full section, half section, partial or broken out sections, Offset sections, revolved sections and removed sections.

   6.3 Drawing of different conventions for materials in section, conventional breaks for shafts, pipes, rectangular, square, angle, channel, rolled sections

   6.4 Exercises on sectional views of different objects.

7. Isometric Views (03 sheets)

   7.1 Fundamentals of isometric projections (Theoretical instructions)

   7.2 Isometric views of combination of regular solids like cylinder, cone, cube and prism..

RECOMMENDED BOOKS

1. A Text Book of Engineering Drawing by Surjit Singh, Dhanpat Rai & Co., Delhi
2. Engineering Drawing by PS Gill, SK Kataria & Sons, New Delhi
3. Elementary Engineering Drawing in First Angle Projection by ND Bhatt, Charotar Publishing House
4. Engineering Drawing I & II by JS Layall, Eagle Parkashan, Jalandhar

1.6 GENERAL WORKSHOP PRACTICE - I

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RATIONALE

In order to have a balanced overall development of diploma engineers, it is necessary to integrate theory with practice. General workshop practices are included in the curriculum in order to provide hand on experience about use of different tools and basic manufacturing practices.

This course aims at developing general manual and machining skills in the students. Besides above, the development of dignity of labour, precision, safety at work place, team working and development of right attitude are the other objectives.

DETAILED CONTENTS (PRACTICALS)

The following shops are included in the syllabus:

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

Note:

1. The branches e.g. Civil Engineering, Electrical Engineering, Mechanical Engineering, Mechanical (RAC), Production and Industrial Engineering will do **Smithy Shop - I** instead of Electronic shop- I

2. The branches e.g. Electronics and Communication Engineering, ECE (Spl. in Microprocessor), Electronics and Telecommunication Engineering, Instrumentation and Control, Computer Engineering and Information Technology will do **Electronic shop-I** instead of Smithy Shop-I.

3. The branches e.g Computer Engineering and Information Technology will do ONLY Workshop Practice –I. The details are given in their respective curricula.

4. The instructor is to first explain the introductory part given at the beginning under each shop followed by demonstration and practice by students.

1. Carpentry and Painting Shop – I

1.1 Introduction to various types of wood such as Deodar, Kail, Partal, Teak, Hollack, Sheesham, Champ, etc. (Demonstration and their identification).

1.2 Demonstration, function and use of commonly used hand tools. Care, maintenance of tools and safety measures to be observed.

Job I Marking, sawing, planning and chiseling & their practice

1.3 Introduction to various types of wooden joints, their relative advantages and uses.

Job II Preparation of half lap joint

Job III Preparation of Mortise and Tenon Joint

1.4 Demonstration of various methods of painting wooden items.

Job IV Preparation of surface before painting including primar coat

Job V Painting Practice by brush/roller/spray

2. Fitting Shop – I

2.1 Introduction to fitting shop tools, common materials used in fitting shop, Identification of materials. (e.g. Steel, Brass, Copper, Aluminium etc.).Identification of various sections of steel such as Flat, Angle, Tee, Channel, Bar Girder, Square, Z-Section, etc.

2.2 Description and demonstration of various types of work benches. holding devices and files. Precautions while filling.

Job I Marking of job, use of marking tools and measuring instruments.

Job II Filing a dimensioned rectangular or Square piece of an accuracy of ± 0.25mm

Job III Filing practice (Production of flat surfaces) Checking by straight edge.

2.3 Description and demonstration of simple operation of hack-sawing, demonstration and description of various types of blades and their specifications, uses and method of fitting the blade.

Job IV Making a cutout from a square piece of MS Flat using Hand hacksaw.

3. Welding Shop – I

3.1 Introduction to welding and its importance in engineering practice; types of welding; common materials that can be welded, introduction to welding equipment e.g. a.c. welding set, d.c. rectifier, Electrode holder, electrodes and their specifications, welding screens and other welding related equipment and accessories.

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

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

Job II Welding practice on electric arc welding for making uniform and Straight weld beads

3.3 Various types of joints and end preparation.

Job III Preparation of butt joint by electric arc welding.

Job IV Preparation of lap joint by electric arc welding.

Job V Preparation of corner joint by using electric arc welding.

Job VI Preparation of Tee joint by electric arc welding.

4. Electric Shop – I

4.1 Study, demonstration and identification of common electrical materials such as wires, cables, switches, fuses, ceiling roses, battens, cleats and allied items, tools and accessories.

4.2 Study of electrical safety measures and demonstration about use of protective devices.

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

Job II Preparation of a house wiring circuit using fuse, switches, socket, holder, ceiling rose etc. by batten wiring and PVC casing and capping

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

4.4 Introduction to the construction of a Lead-acid battery and its working.

Job III Installation of a battery and to connect two or more batteries in series and in parallel

Job IV Charging of a battery and testing it with the help of hydrometer and Cell Tester

5. Smithy Shop – I

5.1 Demonstration and detailed explanation of tools and equipment used. Forging operations in Smithy shop. Safety measures to be observed in the smithy shop.

5.2 Demonstration and description of bending operation, upsetting operation, description and specification of anvils, swage blocks, hammers etc.

5.3 Demonstration and description of tongs, fullers, swages etc.

Job I To forge a L-Hook.

Job II To prepare a job involving upsetting process

Job III To forge a chisel

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

OR

5. Electronic Shop - I

5.1 Identification and familiarization with the following tools used in electronic shop:

Tweezers, Screw drivers (different sizes), Insulated Pliers, Cutter, Sniper, Philips Screw Driver (Star Screw Driver), L- Keys, Soldering Iron and their demonstration and uses.

5.2 Identification and familiarization with the following electronic instruments:

a)Multimeter analog and digital (Three and half digit)

b)Single beam simple CRO, Signal Generator and Function Generator; function of every knob on the front panel

c) Audio-oscillator having sine and square wave output

d) Regulated Power supply -- fixed voltage and variable voltage, single output as well as dual output.

Job I Practice in the use of above-mentioned equipment. For this small experimental as set up may be done

5.3 Various types of protective devices such as : Wire fuse, cartridge fuse etc. ,

5.4 Identification and familiarization with ear phone speaker connector, telephone jacks and similar male and female connectors

5.5 Safety precautions to be observed in the electronic shop

NOTE:

Demonstration Boards for the above components should be made.

Job II Cut, strip, join and insulate two lengths of wires/ cables (repeat with different types of cables/wires)

Job III Cut, strip, connect/solder/crimp different kinds of wires/ cables (including co-axial and shielded cable) to different types of power/general purpose/Audio Video/Telephone plugs, sockets, jacks, terminals, binding posts, terminal strips, connectors. The tasks should include making complete recording/ playback/ antenna/ speaker leads for common electronic products such as Radio, TV, CD Players, VCD/DVD Players, Cassette Recorder and Players, Hi-Fi equipment, Hand- set, microphone

Job IV-Cut, bend, tin component, Leeds, inserts and solder components (resistor, capacitor, diodes, transistors, FETs, IFT coils, ICs etc) on a PCB

6. Sheet Metal Shop –I

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.

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

6.2 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.

6.3 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 sheets etc.

6.4 Study of various types of Nuts, Bolts, Rivets, Steel Screws etc.

Job I Shearing practice on a sheet using hand shears.

a) Practice on making Single riveted lap joint/Double riveted lap Joint.

b) Practice on making Single cover plate chain type, zig-zag type and single rivetted Butt Joint

RECOMMENDED BOOKS

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