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 practical 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

1.2 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

1.3 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

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 Using a word as different parts of speech

2.2 Pair of words (Words commonly confused and misused)

2.3 Tenses

2.4 Correction of incorrect sentences

2.5 One word substitution

2.6. Forms of verbs (100 words)

3. Translation (04 hrs)

3.1 Glossary of Administrative Terms (English/ Hindi/Urdu)
3.2 Translation from Urdu 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 Essentials of Communication

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 (Making an oral presentation with stress on body language and voice modulation)
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. Rich Vocabulary Made Easy by Kuldip Jaidka , Mohindra Capital Publishers, Chandigarh
3. Spoken English (2nd Edition) by V Sasikumar & PV Dhamija; Published by Tata MC Graw Hills, New Delhi.
4. Spoken English by MC Sreevalsan; Published by M/S Vikas Publishing House Pvt. Ltd; New Delhi.
5. Spoken English –A foundation course (Part-I & Part-II) By Kamlesh Sdanand & Susheela Punitha; Published by Orient BlackSwan, Hyderabad
6. Practical Course in English Pronunciation by J Sethi, Kamlesh Sadanand & DV Jindal; Published by PHI Learning Pvt. Ltd; New Delhi.
7. A Practical Course in Spoken English by JK Gangal; Published by PHI Learning Pvt. Ltd; New Delhi.
8. English Grammar, Composition and Usage by NK Aggarwal and FT Wood; Published by Macmillan Publishers India Ltd; New Delhi.
9. Business Correspondence & Report writing (4th Edition) by RC Sharma and Krishna Mohan; Published by Tata MC Graw Hills, New Delhi.
10. Business Communication by Urmila Rani & SM Rai; Published by Himalaya Publishing House, Mumbai.
11. Business Communication Skills by Varinder Kumar, Bodh Raj & NP Manocha; Published by Kalyani Publisher, New Delhi.
12. Professional Communication by Kavita Tyagi & Padma Misra; Published by PHI Learning Pvt. Ltd; New Delhi.
13. Business Communication and Personality Development by Bsiwajit Das and Ipseeta Satpathy; Published by Excel Books, Delhi
14. Succeeding Through Communication by Subhash Jagota; Published by Excel Books, Delhi
15. Communication Skills for professionals by Nira Konar; Published by PHI Learning Pvt. Ltd; New Delhi.
16. Developing Communication Skills (2nd Edition) by Krishna Mohan & Meera Banerji; Published by Macmillan Publishers India Ltd; New Delhi.
17. Effective Technical Communication By M .Ashraf Rizwi; Published by Tata MC Graw Hills, New Delhi.
18. Basic Communication Skills for Technology by Andrea J Rutherfoord; Published by Pearson Education, New Delhi
19. English & Communication Skills for students of Science & Engineering by SP Dhanavel; Published by Orient BlackSwan, Hyderabad.
20. Technical Communication- Principles & Practices by Meenakshi Raman & Sangeetha Sharma; Published by Oxford University Press, New Delhi.
21. Technical English by S. Devaki Reddy & Shreesh Chaudhary; Published by Macmillan Publishers India Ltd; New Delhi.
22. Advanced Technical Communication, by Kavita Tyagi & Padma Misra; Published by PHI Learning Pvt. Ltd; New Delhi.
23. Communication Skills for Engineer & Scientist by Sangeeta Sharma & Binod Mishra; Published by PHI Learning Pvt. Ltd; New Delhi.

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 CHEMISTRY-I

L	T	P
3	-	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 on conventional qualitative and quantitative testing of their chemical composition and behavior under service conditions, but also based on environmental and eco-friendly factors. To achieve such objectives it is essential to know applied aspects of chemistry. Applied chemistry for diploma students in various engineering and technology courses is designed to develop scientific temper and appreciation of physical and chemical properties of engineering materials, which are used in their professional career. Best efforts should be made to teach and train the engineers by imparting essential knowledge required from this subject through demonstrations, and minor projects.

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

DETAILED CONTENTS

1. Basic Concepts of Chemistry (06 hrs)

   1.1 S.I. Units of pressure, volume, density, specific gravity, surface tension, viscosity and conductivity.
   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 Chemical equations, thermo-chemical equations, balancing of chemical equations

2. Atomic Structure, Periodic Table and Chemical Bonding (10 hrs)

   2.1 Fundamental particles- electrons, protons and neutrons
   2.2 Orbit & orbital, electronic configuration of elements (upto Z=30)
   2.3 Modern periodic law and periodic table, groups and periods.
   2.4 Chemical bond and cause of bonding- Ionic bond, covalent bond, and its types

3. Water (10 hrs)

3.1 Sources of water
3.2 Types of water based on dissolved salts.
  3.2.1 Hard water, soft water
  3.2.2 Units to measure water hardness in ppm (mg/l) & simple numericals, degree Clark & degree French
3.3 Disadvantages of use of hard water in domestic and industrial applications (mainly boiler feed water)
3.4 Methods to remove water hardness by
  3.4.1 Ion exchange process
  3.4.2 Lime-soda process
  3.4.3 Reverse Osmosis method
3.5 Quality criteria of drinking water as per BIS. (with special emphasis on hardness, total dissolved solids (TDS), Chloride, alkalinity present in water)

4. Solutions (08 hrs)

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

5. Electrolysis (08 hrs)

5.1 Definition of the terms: Electrolytes, Non-electrolytes with suitable examples
5.2 Faraday's Laws of Electrolysis and simple numericals
5.3 Different industrial applications of 'Electrolysis'
5.4 Applications of redox-reactions in battery technology such as (i) Dry cell (ii) lead acid battery and (iii) Ni-Cd battery

6. Environmental Chemistry (06 hrs)

6.1 Brief introduction to Environmental Chemistry & Pollution
6.2 Causes and effects of air, water & soil pollutions
6.3 Role of chemistry in controlling air, water & soil pollutions

LIST OF PRACTICALS

1. Volumetric analysis and study of apparatus used therein. Simple problems on volumetric analysis equation

2. Preparation of standard solution of oxalic acid or potassium dichromate

3. Determine the strength of solution of HCl with the help of a solution of NaOH and an intermediate solution of standard oxalic acid

4. Find the amount of chlorides in mg per liter in a sample of H_2O with the help of a solution of $AgNO_3$

5. Determine the degree of temporary hardness of water by EDTA titration

6. Estimation of total dissolved solids (TDS) in water sample gravimetrically

7. Estimation of total alkalinity of water volumetrically

8. Determine conductance, pH of water sample using conductance bridge and pH meter

9. Determine the percentage purity of commercial sample like blue vitriol, 12.5 g. of which have been dissolved per litre. Given M/20 $Na_2S_2O_3$.

10. Determination of solubility of a solid at room temperature

11. To verify the first law of electrolysis (electrolysis of copper sulphate solution using copper electrode)

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. Kuriacose and J. Rajaram; Tata McGraw-Hill Publishing Company Limited, New Delhi

2. Engineering Chemistry by Dr. S. Rabindra and Prof. B.K. Mishra ; Kumar and Kumar Publishers (P) Ltd. Bangalore-40

3. A Text Book of Applied Chemistry-I by SS Kumar; Tata McGraw Hill, Delhi

4. Progressive Applied Chemistry –I and II by Dr. G.H. Hugar; Eagle Prakashan, Jalandhar

5. Engineering Chemistry by Jain PC and Jain M, Dhanpat Rai Publishers, Delhi

6. Chemistry of Engineering by Aggarwal CV

7. Chemistry for Environmental Engineers by Swayer and McCarty, McGraw Hill, Delhi

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

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	06	14
2	10	20
3	10	20
4	08	16
5	08	16
6	06	14
Total	**48**	**100**

1.3 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.

DETAILED CONTENTS

1. Algebra (35 hrs)

   1.1 Complex numbers: Complex numbers, representation, modulus and amplitude, Demovier's theorem and its applications in solving algebraic equation.

   1.2 Geometrical progression, its nth term and sum of n terms and to infinity with application to engineering problems.

   1.3. Partial fractions (linear factors, repeated linear factors, non-reducible quadratic factors excluding repeated factors)

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

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

2. Trigonometry (20 hrs)

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

3. Co-Ordinate Geometry (25 hrs)

   3.1 Equation of straight line in various standard forms (without proof), inter section of two straight lines, angle between two lines, perpendicular distance formula (without proof)

   3.2 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

3.3. Equations of conics (ellipse, parabola and hyperbola), simple problems related to engineering (standards forms only)

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

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	35	45
2	20	25
3	25	30
Total	**80**	**100**

1.4. 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, types of errors, propagation of errors, significant figures

2. Force and Motion (12 hrs)

2.1 Concept of Scalar and Vector quantities – examples, types of vectors.
2.2 Resolution and Composition of vectors, Vector multiplication (scalar product and vector product of vectors), addition of vectors (Parallelogram law)
2.3 Force: Newton's laws of motion, linear momentum and conservation of linear momentum, impulse and its application, simple numerical problem in brake system of vehicles and trains etc.
2.4 Friction: Types of friction and its application.
2.5 Circular motion: Angular displacement, angular velocity and angular acceleration
2.6 Relation between linear and angular variables (velocity and acceleration)

2.7 Centripetal force (derivation) and centrifugal force with application such as banking of roads and bending of cyclists

2.8 Application of various forces in lifts

3 Rotational Motion (6 hrs)

3.1 Concept of translatory and rotating motion with examples

3.2 Definitions of torque, angular momentum and their relationship

3.3 Conservation of angular momentum (qualitative) and its examples

3.4 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).

3.5 Application of rotational motions in transport vehicles, trains and aero plane turbine/engine.

4 Work, Power and Energy (8 hrs)

4.1 Work: definition and its SI units

4.2 Work done in moving an object on horizontal and inclined plane (incorporating frictional forces) with its application

4.3 Power: definition and its SI units, calculation of power with numerical problems

4.4 Energy: Definition and its SI units: Kinetic energy and Potential energy with examples and their derivation

4.5 Principle of conservation of mechanical energy (for freely falling bodies), transformation of energy from one form to another with its application

5 Properties of Matter (10 hrs)

5.1 Elasticity: definition of stress and strain, different types of modulus of elasticity, stress – strain diagram, Hooke's law with its applications

5.2 Pressure: definition, its units, atmospheric pressure, gauge pressure, absolute pressure, Fortin's Barometer and its applications

5.3 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

5.4 Viscosity and coefficient of viscosity: Stoke's Law and derivation of terminal velocity, effect of temperature on viscosity.

6 Thermometry (10 hrs)

6.1 Difference between heat and temperature

6.2 Principles of measurement of temperature and different scales of temperature and their relationship

6.3 Types of thermometers (Concept only)

6.4 Expansion of solids, liquids and gases, coefficient of linear, surface and cubical expansions and relation amongst them

6.5 Modes of transfer of heat (Conduction, convection and radiation with examples)

6.6 Co-efficient of thermal conductivity

6.7 Engineering Application of conduction, convection and radiations

7. Waves and Vibrations (10 hrs)

7.1 Simple Harmonic Motion(SHM): definition, expression for displacement, velocity, acceleration, time period, frequency in S.H.M. Equation of simple harmonic progressive wave

7.2 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

7.3 Free, forced and resonant vibrations with examples

7.4 Acoustics of buildings – reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time and their applications

7.5 Ultrasonics – production (magnetostriction and piezoelectric methods) and their engineering and medical applications

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

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. Berkeley Physics Course, Vol. I, II &III, Tata McGraw Hill, Delhi
6. Comprehensive Practical Physics, Vol. I & II, JN Jaiswal, Laxmi Publishers
7. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
8. Applied Physics I & II by RA Banwait & R Dogra, Eagle Parkashan, Jalandhar

9. Applied Physics by Jasmer Kaur and Bhupinder Singh, Lords Publications, Jalandhar City

10. Engineering Physics by Vanchna Singh and Sheeetal Kumar, Cengage Learning India Pvt. Ltd. Patparganj, Delhi (year 2008)

SUGGESTED DISTRIBUTION OF MARKS

Sr No	Topic	Time Allotted (Hrs)	Marks Allotted (%)
1	Units and Dimensions	08	15
2	Force and Motion	12	20
3	Rotational Motion	06	10
4	Work, Power and Energy	08	10
5	Properties of Matter	10	15
6	Thermometry	10	15
7	Waves and Vibrations	10	15
	Total	**64**	**100**

1.5 ENGINEERING DRAWING – I

L	T	P
-	-	8

RATIONALE

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

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

DETAILED CONTENTS

1. Drawing Office Practice, Lines & Lettering (2 Sheets)

1.1 Drawing instruments
1.2 Sizes and layout of standard drawing sheets and drawing boards

1.3 Different types of lines in engineering drawing as per BIS specifications

1.4 Free hand lettering (alphabet and numerals) lower case and upper case, single stroke vertical and inclined at 75 degree in different standard series of 2.5, 3, 5, 7, 10, and 15 mm heights in the ratio of 7:4

2. Dimensioning (2 Sheets)

2.1 Necessity of dimensioning, Types of dimensioning (chain, parallel and progressive dimensioning, size and location dimensioning)

Methods of placing dimensioning (Aligned and unidirectional system), use of leader lines. General principles of dimensioning.

2.2 Dimensioning of overall sizes, circles, thread holes, chamfered surfaces, angles, tapered surface holes equally spaced on PCD, counter sunk hole counter bored holes, cylindrical parts, narrow space and gaps, radii, curves and arches.

3. Simple Geometrical Constructions used in Engineering Practice (2 Sheets)

3.1 Construction of regular polygons (triangle, square, pentagon, hexagon) and circles

3.2 Ellipses (concentric circle method and Intersecting Arcs method)

3.3 Parabola (rectangle and tangent method), cycloid

4. Scale (2 sheets)

4.1 Scale – their need and importance, Definition of representative fraction (R.F), find RF of given scale

4.2 Construction of plain and diagonal scales

5. Principle of Projections (7 sheets)

5.1 Principle of orthographic projection and introduction to first angle projection and third angle projection

5.2 Projection of points situated in different quadrants (1 Sheet)

5.3 Projection of lines, Lines inclined to one plane and parallel to the other and vice versa (1^{st} &3^{rd} quadrants) (1 Sheet)

5.4 Projection of Planes: Planes perpendicular and parallel to either of the planes; planes perpendicular to one plane and parallel to the other or vice versa (1^{st} & 3^{rd} quadrants) (1 Sheet)

5.5 Drawing 3 orthographic views of given objects (3 sheets, at least one sheet in 3^{rd} Angle Projection)

5.6 Identification of surfaces on drawn orthographic views from isometric object drawn (1Sheet)

6. Sectional Views (1 sheet)

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

7. Isometric Views (2 sheets)

7.1 Fundamentals of isometric projections (theoretical instructions) and isometric scales

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

8. Development of Surfaces (2 sheets)

8.1 Parallel line method (Prism and cylinder)

8.2 Radial line method (Pyramid and Cone)

RECOMMENDED BOOKS

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

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

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

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

1.6 GENERAL WORKSHOP PRACTICE - I

L	T	P
-	-	8

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)

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

The following shops are included in the syllabus:

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

Note:

1. The branches e.g. Civil Engineering, Electrical Engineering, Mechanical Engineering, Automobile Engineering, Wood Technology, Leather Technology, Food Technology, Quantity Surveying and Public Health Engineering will do **Smithy Shop** instead of Electronic Shop- I

2. The branches e.g. Electronics and Communication Engineering, Instrumentation and Control, Computer Engineering, Information Technology, and Medical Electronics will do **Electronic Shop-I** instead of Smithy Shop.

1. Carpentry and Painting Shop

1.1 Introduction to various types of wood such as Deodar, Kail, Partal, Teak, Mango, Sheesham, 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

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.

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

Job II Filing a dimensioned rectangular or Square piece of an accuracy of ± 0.5mm

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

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

2.4 Care and maintenance of measuring tools like calipers, steel rule, try square, vernier calipers, micrometer, height gauge, combination set. Handling of measuring instruments, checking of zero error, finding of least count.

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, PVC Conduits, PVC Channels and allied items, tools and accessories.

4.2 Study of electrical safety measures and demonstration about use of protective devices. Such as fuses, MCBs and relays

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 on wooden board using fuse, Switches, socket, holder, ceiling rose etc. by PVC Conduit 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, gas geyser, desert cooler, refrigerator, water purifier

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

Job III Installation of inverter with 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

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, soldering wire, flux and their demonstration and uses.

5.2 Identification and familiarization with Multimeter analog and digital (Three and half digit)
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 (Audio, Video)

5.5 Safety precautions to be observed in the electronic shop

5.6 Identification and familiarization with soldering and desoldering practice.

NOTE: Demonstration boards for the electronics components such as resistor, capacitor, diodes, transistors, FETs, IFT Coils, ICs should be made.

Job II Cut, strip, join an insulated wire with the help of soldering iron (repeat with different types of 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

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, power press, sheet bending machine.

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

6.4 Study of various types of Rivets, Steel Screw 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, 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