I.I SEMESTER SYLLABUS

COMMUNICATING EFFECTIVELY IN ENGLISH

Rationale

Interpersonal communication is a natural and necessary part of organizational life. Yet, communicating effectively can be challenging because of our inherent nature to assume, overreact to and misperceive what actually is happening. Poor communication or lack of communication is often cited as the cause of conflict and poor teamwork. In today's team-oriented workplace, managing communication and developing strategies for creating shared meaning are crucial to achieving results and creating successful organizations. The goal of the **Communicating Effectively in English** course is to produce civic-minded, competent communicators. To that end, students must demonstrate oral as well as written communication proficiency. These include organizational and interpersonal communication, public address and performance.

Objectives of Course in Communicating Effectively in English for the First Year (I & II Semesters) are:

* Understanding how communication works
* Gaining active listening and responding skills
* Understanding the importance of body language
* Acquiring different strategies of reading texts
* Increasing confidence by providing opportunities for oral and written expressions

I SEMESTER   48 HRS

1. COMMUNICATION SKILLS   6 hrs

1.1   Verbal and Non-verbal Communication

1.2   Process of Communication

1.3   Barriers to Communication; Overcoming Strategies

1.4   Listening and Speaking Skills and Sub-Skills

2. Spoken English-Introduction, Features of Spoken English

(Note: This module is only for practice. This should not be included in the final examination)

2. DEVELOPING ORAL COMMUNICATION SKILLS   8 hrs

2.1   Greeting, Starting a Conversation

2.3   Introducing Oneself

2.4   Introducing Others

2.5   Leave Taking

2.6   Thanking, Wishing Well

2.7   Talking about Oneself

2.8   Talking about Likes and Dislikes

3. GRAMMAR AND USAGE   12 hrs

3.1   Punctuation

3.2   Articles-a, an, the

3.3   Framing Questions

3.4   Verbs-Classification: Main Verb, Auxiliary Verb, Transitive & Intransitive Verbs, Phrasal Verbs

3.5   Word Formation

4. WRITING SKILLS   10 hrs

4.1   Writing Paragraphs

4.2   Picture Composition

5. READING SKILLS   **12 hrs**

5.1   Vocabulary Enhancement

5.2   Techniques of Reading: Skimming, Scanning, Intensive and Extensive Reading

NOTE: The Reading Skills of the learners (along with vocabulary enhancement) will be through reading thematic articles/essays and/or stories.

Section I

Theoretical Concepts of Communication Skills

Section II

Oral Communication Skills

Section III Reading Skills

Section IV

Writing Skills

Section V

Grammar and Usage

1.2   APPLIED MATHEMATICS – I

RETIONALE

Applied Mathematics forms the backbone of engineering discipline. Basic elements of permutations and combinations, trigonometry, vector, complex number and statistics have been included in the curriculum as foundation course and to provide base for continuing education to the students

DETAILED CONTENTS

1.   Algebra   (20 hrs)

   1.1   Permutations and Combinations, Value of $^{n}p_{r}$ and $^{n}c_{r}$, its properties and simple problems

   1.2   Binomial theorem (without proof) for positive integral index (expansion and general term); Binomial theorem for any index (expansion only) first and second binomial approximation with application to engineering problems

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

   1.4   Determinants and Matrices – expansion of determinants (upto third order) using sarrus rule, expansion method and pivotal's condensation method. Properties of determinants, solution of equations (upto 3 unknowns) by Cramer's rule. Definition of matrix, addition, subtraction and multiplication of matrices (upto third order). Inverse of a matrix by adjoint method and elementary row transformations. Solution of

equations (up to 3 unknowns) by Matrix method

1.5 Logarithm: general properties of logarithms, calculations of engineering problems using log tables

2. Trigonometry (11 hrs)

2.1 Addition and subtraction formulae, product formulae and their application in engineering problems. Transformation from product to sum or difference of two angles or vice versa, multiple and sub- multiple angles

2.2 Conditional identities, solution of triangles (excluding ambiguous cases).

2.3 Graphs of sin x, cos x, and tan x, e^x

3. Vectors (11 hrs)

Definition of vector and scalar quantities. Addition and substraction of vectors. Dot product and cross product of two vectors. Thumb rule. Angle between two vectors, application of dot and cross product in engineering problems, scalar triple product and vector triple product

4. Complex Numbers (9 hrs) Definition, Real and Imaginary parts of a complex number, Polar and Cartesian representation of a complex number and conversion from one form to the other, conjugate of a complex number, modulus and argument of a complex number, addition, subtraction, multiplication and division of a complex number.

5. Statistics and Probability (13 hrs)

Evaluation of standard deviation and process capabilities. Rank, Rank correlation, probability: definition and laws on probability, concept of random variable, probability distribution (Binomial, Poisson and Normal) and their applications. Drawing control charts for average $(\bar{x})$ and range (R)

RECOMMENDED BOOKS

1.   Applied Mathematics Vol. I by SS Sabharwal and Others by Eagle Prakashan, Jalandhar

2.   Applied Mathematics Vol. II by SS Sabharwal and Others by Eagle Prakashan, Jalandhar

3.   Engineering Mathematics Vol. I by Ishan Publishing House

4.   Engineering Mathematics Vol. I by S Kohli and Others; IPH, Jalandhar

5.   Applied Mathematics Vol. I by RD Sharma

6.   Engineering Mathematics by Dass Gupta
7.   Advanced Engineering Mathematics by AB Mathur and VP Jagi; Khanna Publishers, Delhi

8.   Higher Engineering Mathematics by BS Grewal; Khanna Publishers, Delhi

9.   Engineering Mathematics by C Dass Chawla; Asian Publishers, New Delhi

1.3 APPLIED PHYSICS - I

RATIONALE

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

DETAILED
CONTENTS

1. Unit and Dimensions.   (8 hrs)

1.1 Physical quantities

1.2 Fundamental and derived units

1.3 Systems of unit (CGS, MKS and SI units)

1.4 Dimensions and dimensional formulae of physical quantities (area, volume, velocity, acceleration, momentum, force, impulse, work, power, energy, surface tension, coefficient of viscosity and strain)

1.5 Principle of homogeneity

1.6 Dimensional equations and their uses with examples.

1.7 Limitations of dimensional analysis.

2. Force and Motion   (9 hrs + 6 hrs + 8 hrs)

2.1 Scalar and vector quantities - examples, addition and multiplication of vectors, scalar product and vector product of vectors

2.2 Force, resolution and composition of forces – resultant, parallelogram law of forces, friction, law of friction and type of friction.

2.3 Equilibrium of forces, Lami's theorem

2.4 Newton's Laws of motion – concept of momentum, determination of force equation from Newton's second law of motion, Newton's third law of motion Conservation of momentum, impulse and impulsive forces, simple numerical problems.

2.5 Projectile, horizontal and oblique projections and equation of Trajectory (Derivation) Derivation of time of flight, maximum height and horizontal range

2.6 Circular motion (Definition)

Relation between linear and angular velocity and linear acceleration and angular acceleration

2.7 Centripetal force (derivation) and centrifugal force Banking of roads.

2.8 Rotational Motion   6 hrs

Definition of torque, moment of inertia, radius of gyration, Derivation of rotational kinetic energy and angular momentum, Conservation of angular momentum (qualitative) related problems.

2.9 Planatary Motion   8 hrs

Newton's law of gravitation, Kepler's law of planetary motion, Escape velocity (derivation), Artifical satellites and related problems.

3. Work, Power and Energy   (8 hrs)

3.1 Work: definition and its units.

3.2 Work done against friction in moving an object on horizontal and inclined plane (incorporating frictional forces)

3.3 Power: definitions and its units, calculation of power in simple cases.

3.4 Energy: Definitions and its units: Types: Kinetic energy and Potential energy, with examples and their derivation.

3.5 Principle of conservation of mechanical energy (for freely falling bodies), transformation of energy from one form to another and related problems.

4. Properties of Matter (9 hrs)

4.1 Elasticity, definition of stress and strain

4.2 Different types of modulus of elasticity

4.3 Pressure- its units, gauge pressure, absolute pressure, atmospheric pressure (Relation between them), Bourdon's pressure gauge, Fortin's barometer

4.4 Surface tension- its units, measurement of surface tension by capillary tube method, applications of surface tension, effect of temperature and impurity on surface tension.

4.5 Fluid motion, stream line and turbulent flow.

4.6 Viscosity and coefficient of viscosity, Effect of temperature on viscosity

5. Temperature and its measurement (8 hrs)

5.1 Difference between heat and temperature on the basis of K.E. of Molecules.

5.2 Principles of measurement of temperature and different scales of temperature.

5.3 Bimetallic and Platinum resistance thermometer: their merits and demerits

5.4 Pyrometers – Disappearing filament optical pyrometer

6. Transfer of Heat (8 hrs)

6.1 Modes of transfer of heat (conduction, convection and radiation with examples)

6.2 Coefficient of thermal conductivity

6.3 Properties of heat radiation. Prevost's theory of heat exchange

6.4 Laws of black body radiations: Stefan's law, Kirchoff's law, Wien's law

LIST OF PRACTICALS

1. To find the thickness of wire using a screw gauge
2. To find volume of solid cylinder and hollow cylinder using a vernier caliper
3. To determine the thickness of glass strip and radius of curvature of a concave surface using a spherometer
4. To find the surface tension of a liquid by capillary rise method.
5. To determine the atmospheric pressure at a place using Fortin's Barometer.

6. To determine the time period of simple pendulum and plot a graph between l & t
7. Verify parallelogram Law of forces.

RECOMMENDED BOOKS

1. Concept of Physics, Prof. H.C. Verma, Part-1 (Bharti Bhawan)
2. Concept of Physics, Prof. H.C. Verma, Part-2 (Bharti Bhawan)
3. A Text Book of Applied Physics : Egale Parkashan, Jullandhar

1.4 APPLIED CHEMISTRY-I

RATIONALE

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

DETAILED CONTENTS

1. **Language of Chemistry**   (6 hrs)

1.1 Definition of symbol, formula, valency and chemical equation.

1.2 Writing of the chemical formula of a simple chemical compound. Calculation of percentage composition of a chemical compound

1.3 Essentials of a chemical equation, balancing of a chemical equation by Hit and Trial method

2.**Atomic Structure (6 hrs)**

Introduction to atom and its constituent particle, Dalton's , Rutherford's model.

Bohr's model (postulates only), atomic number, mass number, isotopes, isobars, concept of atomic orbitals, shapes of S and P orbitals, quantum numbers, electronic configuration-Aufbau Principle, Hund's rule and Pauli's exclusion Principle, Hybridization ($sp3$, $sp2$ and sp).

3. **Chemical Bonding   (4 hrs)**

3.1 Electronic concept of binding.

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

3.3 Orbital concept of covalent bond, Sigma and Pi bond.

4. **Water (10 hrs)**

4.1 Hard and soft water, types of hardness and its causes, disadvantages of hardness of water (i) in industrial use (ii) in boilers for steam generation.

4.2 Methods to remove hardness of water (i) Soda Lime process (ii) Ion-Exchange process. Simple numerical problems related to soda lime process.

4.3 Definition of degree of hardness of water and the systems to express the degree of hardness of water, (Estimations method not included)

4.4 Qualities of water used for drinking purposes, treatment of river water to make it fit for town supply.

 5. **Solutions (8 hrs.)**

5.1 Concept of homogeneous solution (i) Colloids (ii) Suspensions (iii) Brownian Movement (iv) Osmosis (v) Acidity (vi) Basicity (vii) Equivalent weight and gram equivalent weight with suitable examples (viii) Mole (ix) Avogadro number (x) pH (xi) Industrial application of pH

5.2 Strength of a solution (i) Normality (ii) Molarity (iii) Molality as applied in relation to a solution.

5.3 Simple numerical problems related to volumetric analysis.

6. **Electrolysis (6 hrs)**

6.1 Definition of the terms: Electrolytes, Non-electrolytes conductors and non-conductors with suitable examples

6.2 Faraday's Laws of Electrolysis

6.3 Simple numerical problems based upon the laws of electrolysis

6.4 Different industrial applications of 'Electrolysis'

6.5 Elementary account of (i) lead acid battery and (ii) Ni-Cd battery

LIST OF PRACTICALS

1. Volumetric analysis and study of apparatus used therein.

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

3. Determine the strength of a given solution of sodium hydroxide with the help of a standard solution of oxalic acid

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

5. Estimation of total alkalinity of water volumetrically

6. Determine, pH of water sample using pH meter

RECOMMENDED BOOKS

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

2. Chemistry in Engineering by J.C. Kuriacose and J. Rajaram; Tata McGraw-Hill Publishing Company Limited, New Delhi

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

Other additional Books for Reading

1. Engineering Chemistry by Jain PC and Jain M

2. Chemistry of Engineering by Aggarwal CV

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

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

1.5   BASICS OF INFORMATION TECHNOLOGY

RATIONAL

Information technology has great influence on all aspects of life. Almost all work places and living environment are being computerized. In order to prepare diploma holders to work in these environments, it is essential that they are exposed to various aspects of information technology such as understanding the concept of information technology and its scope; operating a computer; use of various tools of MS office; using internet etc. form the broad competency profile of diploma holders. This exposure will enable the students to enter their professions with confidence, live in a harmonious way and contribute to the productivity.

Note:

1. *Teaching of theory should be dovetailed with practical work*
2. *The following topics may be taught in the laboratory along with the practical exercises.*

DETAILED CONTENTS

1. Information Technology – its concept and scope
2. Computers for information storage, information seeking, information processing and information transmission
3. Elements of computer system, computer hardware and software; data – numeric data, alpha numeric data; contents of a program, processing
4. Computer organization, block diagram of a computer, CPU, memory
5. Input devices; keyboard, mouse etc; output devices; VDU and Printer, Scanner, Plotter

6. Electrical requirements, inter-connections between units, connectors and cables

7. Secondary storage; magnetic disks – tracks and sectors, optical disk (CD and DVD Memory), primary and secondary memory: RAM, ROM, PROM etc., Capacity; device controllers, serial port, parallel port, system bus

8. Exercises on file opening and closing; memory management; device management and input – output (I/O) management with respect of windows

9. Installation concept and precautions to be observed while installing the system and software

10. Introduction about Operating Systems such as MS-DOS and Windows

11. Special features, various commands of MS word and MS-Excel

12. About the internet – server types, connectivity (TCP/IP, shell); applications of internet like: e-mail and browsing

13. Various Browsers like WWW (World wide web); hyperlinks; HTTP (Hyper Text Transfer Protocol); FTP (File Transfer Protocol)

14. Basics of Networking – LAN,WAN, Topologies

LIST OF PRACTICALS

1. Given a PC, name its various components and list their functions

2. Identification of various parts of a computer and peripherals

3. Practice in installing a computer system by giving connection and loading the system software and application software

4. Installation of DOS and simple exercises on TYPE, REN, DEL, CD, MD, COPY, TREE, BACKUP commands

5. Exercises on entering text and data (Typing Practice)

6. Installation of Windows 98 or 2000 etc.

    (1) Features of Windows as an operating system

        - Start

- Shutdown and restore
- Creating and operating on the icons
- Opening closing and sizing the windows
- Using elementary job commands like – creating, saving, modifying, renaming, finding and deleting a file
- Creating and operating on a folder
- Changing setting like, date, time color   (back ground and fore ground)
- Using short cuts
- Using on line help

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

- Tables and Borders:

  Creating a table, formatting cells, use of different border styles, shading in tables, merging of cells, partition of cells, inserting and deleting a row in a table
- Print preview, zoom, page set up, printing options
- Using Find, Replace options
- Using Tools like:

  Spell checker, help, use of macros, mail merge, thesaurus word content and statistics, printing envelops and lables
- Using shapes and drawing toolbar,
- Working with more than one window in MS Word,
- How to change the version of the document from one window OS to another
- Conversion between different text editors, software and MS word

8. MS-EXCEL
- Starting excel, open worksheet, enter, edit, data, formulas to calculate values, format data, create chart, printing chart, save worksheet, switching from another spread sheet
- Menu commands:

  create, format charts, organise, manage data, solving problem by analyzing data, exchange with other applications. Programming with MS-Excel, getting information while working
- Work books:

  Managing workbooks (create, open, close, save), working in work books, selecting the cells, choosing commands, data entry techniques, formula creation and links, controlling calculations, working with arrays
- Editing a worksheet, copying, moving cells, pasting, inserting, deletion cells,

rows, columns, find and replace text, numbers of cells, formatting worksheet

- Creating a chart:

   Working with chart types, changing data in chart, formatting a chart, use chart to analyze data

- Using a list to organize data, sorting and filtering data in list

- Retrieve data with MS – query: Create a pivot table, customising a pivot table. Statistical analysis of data

- Customise MS-Excel:

   How to change view of worksheet, outlining a worksheet, customise workspace, using templates to create default workbooks, protecting work book

- Exchange data with other application: linking and embedding, embedding objects, linking to other applications, import, export document.

9. Internet and its Applications

   a) Log-in to internet

   b) Navigation for information seeking on internet

   c) Browsing and down loading of information from internet d)
   Sending and receiving e-mail

      - Creating a message

      - Creating an address book

      - Attaching a file with e-mail message

      - Receiving a message

      - Deleting a message

RECOMMENDED BOOKS

1.   Fundamentals of Computer by V Rajaraman; Prentice Hall of India Pvt. Ltd., New Delhi

2.   Computers Today by SK Basandara, Galgotia publication Pvt ltd. Daryaganj, New Delhi

3.   MS-Office 2000 for Everyone by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., New Delhi

4.   Internet for Every One by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi

5.   A First Course in Computer by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., Jungpura,New Delhi

6.   Mastering Windows 95, BPB Publication, New Delhi

7.   Computer Fundamentals by PK Sinha; BPB Publication, New Delhi

8.   Fundamentals of Information Technology by Leon and Leon;Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi

1.6 ENGINEERING DRAWING – I

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

Note: 1. First angle projection is to be followed
2. Minimum of 15 sheets to be prepared by each student
3. SP 46 – 1988 should be followed
4. Instruction relevant to various drawings may be given along appropriate demonstration, before assigning drawing practice Students

DETAILED CONTENTS

1. Drawing Office Practice

    1.1 Drawing instruments

    1.2 Sizes and layout of standard drawing sheets

    1.3 Sizes of drawing boards

    1.4 Drafting table/board

2. Different types of Lines and Free Hand Sketching (1 sheet)

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

    2.2 Practice in free hand sketching of vertical, horizontal and inclined lines, geometrical figures such as triangles, rectangles, small and large circles, parabolas, curves and ellipses

3. Lettering Techniques and Practice (2 sheets)

    3.1 Instrumental single stroke (capital and inclined) lettering of 35 mm height in the ratios of 7:4

3.2 Instrumental double stroke lettering of 35 mm height in the ratio of 7:4, vertical

3.3 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

4. Dimensioning (1 sheet)

4.1 Necessity of dimensioning, terms and notations – methods and principles, dimensioning small components as in 4.2 below (mainly theoretical instructions)

4.2 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 – chain and parallel dimensioning

5. Scale (3 sheets)

5.1 Scales – their need and importance, Definition of representative fraction (RF); Find RF of a given scale

5.2 Types of scales

5.3 Construction of plain and diagonal scales

6. Principle of Projections (strictly in first angle projection) (8 sheets)

6.1 Principle of orthographic projection

6.2 Projection of points situated in different quadrants

6.3 Projection of lines, Lines inclined to one plane and parallel to the other and vice versa

6.4 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

6.5 Projection of solids, such as Prism, Cube, Cylinder and Cones with axis perpendicular to horizontal plane or parallel to horizontal plane/vertical plane or both

6.6   Drawing 3 orthographic views of given objects (at least five objects)

6.7   Drawing 6 views of given objects (non-symmetrical one or two objects may be selected for this exercise)

6.8   Identification of surfaces on drawn orthographic views from isometric object drawn

6.9   Exercises on missing lines, surfaces and views

6.10   Sketching practice of pictorial views from isometric objects

7.   Sectional Views (2 sheets)

Need for sectional views – cutting planes methods of representing sections, conventional sections of various material, classification of sections, conventions in sectioning

Drawing of full section, half section, partial broken out sections, off-set sections, revolved sections and removed sections. Exercises on sectional views of different isometric views

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

8.   Isometric Views (2 sheets)

8.1   Fundamentals of isometric projections (theoretical instructions)

8.2   Isometric views from 2 or 3 given orthographic views

9.   Introduction to Third angle projection (1 sheet)

Note: Minimum 15 drawing sheets will be prepared by the students

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

1.7 GENERAL WORKSHOP PRACTICE – I & II

RATIONAL

Manual abilities to handle engineering materials with hand tools need to be developed in the students. They will be using different types of tools/equipment in different shops for fabrication purposes. Besides developing the necessary skills, the students will appreciate the importance of quality and safety measures.

DETAILED CONTENTS

Note: 1.   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.

      2.   The shops to be offered in I and II semester may be decided at polytechnic level

      3.   The students should be taken to various shops (not included in the curriculum) in the polytechnic in batches and should be given knowledge of the various machines/equipment. Such as machine shop, foundry shop, sheet metal shop, etc.

      4.   Students of Diploma in Chemical Engineering will undergo Shops 1 to 6 only

Following seven shops are being proposed:

1. Carpentry shop

2. Fitting and plumbing shop

3. Welding shop

4. Paint shop

5. Forging and sheet metal shop

6. Electric shop

7. Electronics Shop

1. Carpentry Shop

1.1 Introduction to various types of wood, carpentry tools - their identification with sketches. Different types of wood joints.

1.2 Simple operations viz. hand sawing, marking, planning

1.3 Introduction and sharpening of wood working tools and practice of proper adjustment of tools

1.4 Demonstration and use of wood working machines i.e. band saw, circular saw, rip saw, bow saw and trammels. Universal wood working machine and wood turning lathe

1.5 Making of various joints (Also draw the sketches of various wooden joints in the Practical Note Book)

    a)   Cross lap joint

    b)   T-lap joint

    c)   Corner lap joint

    d)   Mortise and tenon joint

    e)   Dovetail joint

    f)   Prepare a file handle or any utility items by wood turning lathe

2.   Fitting and Plumbing Shop

2.1. Introduction to fitting shop, common materials used in fitting shop, description and demonstration of various types of work-holding devices and surface plate, V-block

2.2 Demonstration and use of simple operation of hack-sawing, demonstration of various types of blades and their uses

2.3 Demonstrate and use of all important fitting shop tools with the help of neat sketches (files, punch, hammer, scraper, taps and dyes etc.)

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

2.5 Description, demonstration and practice of simple operation of hack saw, straight and angular cutting.

2.6 Demonstrations, description and use of various types of blades - their uses and method of fitting the blade.

2.7 Introduction and use of measuring tools used in fitting shop like: Try square, Steel rule, Measuring Tape, Outside micrometer, Vernier Caliper and Vernier Height Gauge

2.8 Description, demonstration and practice of thread cutting using taps and dies

2.9 Plumbing: Descriptions and drawing of various plumbing shop tools, Safety precautions. Introduction and demonstration of pipe dies, Pipe holding devices, Demonstration and practice of Pipe Fittings such as Sockets, Elbow, Tee, Reducer, Nipple, Union coupling, plug, Bend, Float valves and Taps

Job: Cutting and filing practice on a square of 45 X 45 mm^2 from MS flat

Job: Angular cutting practice of 45^0 (on the above job)

Job: Preparation of stud (to cut external threads) with the help of dies (mm or BSW)

Job: Drilling, counter drilling and internal thread cutting with Taps

Job: H-Fitting in Mild steel (ms) square

Job: Pipe cutting practice and thread cutting on GI Pipe with pipe dies

3. Welding Shop

3.1 Introduction to welding, type of welding, common materials that can be welded, introduction to gas welding equipment, types of flame, adjustment of flame, applications of gas welding. Welding tools and safety precautions

3.2 Introduction to electric arc welding (AC and DC), practice in setting current and voltage for striking proper arc, precautions while using electric arc welding. Applications of arc welding. Introduction to polarity and their use

3.3 Introduction to brazing process, filler material and fluxes; applications of brazing. Use of solder. Introduction of soldering materials

3.4 Demonstrate and use of the different tools used in the welding shop with sketches. Hand shield, helmet, clipping hammer, gloves, welding lead, connectors, apron, goggles etc.

3.5 Demonstration of welding defects and Various types of joints and end preparation

Job: Preparation of cap joint by arc welding

Job: Preparation of Tee joint by arc welding

Job: Preparation of single V or double V butt joint by using Electric arc welding

Job: Brazing Practice. Use of Speltor (on MS sheet pieces) Job:
        Gas welding practice on worn-out and broken parts

4.   Paint Shop

Introduction of painting shop and necessity. Different types of paints. Introduction of powder coating plant and their uses.

Job: Preparation of surface before painting such as cleaning, sanding, putty, procedure and application of primer coat, and painting steel item.

Job: Painting practice by brush on MS sheet

Job: Practice of dip painting

Job: Practice of lettering: Name plates / Sign board

Job: Polishing and painting on wooden and metallic surfaces

Job: Practical demonstration of powder coating

5.   Forging and sheet metal shop

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

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

5.2   Forge a chisel and give an idea of hardening and tempering

5.3   Lap joint with forge welding

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

5.5   Making sheet metal joints

5.6   Making sheet metal trey or a funnel or a computer chassis

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

5.8   Prepare a lap riveting joint of sheet metal pieces

6.   Electric Shop

6.1   Demonstration of tools commonly used in Electric Shop

6.2   Safety precautions , electric shock treatment

6.3   Demonstration of Common Electric material like: wires, fuses, ceiling roses, battens, cleats and allied items

6.4   Demonstration of Voltmeter, Ammeter, Multimeter and Energy meter

     Job: Wiring practice in batten wiring, plastic casing-capping and conduit

     Job: Control of one lamp by one switch

     Job: Control of one lamp by two switches Job: Control of one bell by one switch

     Job: Assemble a Tube light

     Job: Dismantle, study, find out fault, repair the fault, assemble and test domestic appliances like electric iron, electric mixer, ceiling and table fan, tube-light, water heater (geyser) and desert cooler

     Job: Laying out of complete wiring of a house (Single-phase and Three- phase)

7.   Electronics Shop

7.1 Identification, familiarization, demonstration and use of the following electronic instruments:

    a) Multi-meter digital

    b) Single beam simple CRO , function of every knob on the front panel

    c) Power supply , fixed voltage and variable voltage, single output as well as dual output.

7.2 Identification , familiarization and uses of commonly used tools; active and passive components; colour code and types of resistor and potentiometers

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

7.4 Demonstrate and practice the skill to remove components/wiresby unsoldering

7.5 Cut, bend, tin component, leads, inserts. Solder components e.g. resistor, capacitor, diodes, transistors on a PCB

7.6 Wiring of a small circuit on a PCB/tag strip involving laying, sleeving and use of identifier tags

7.7 Demonstrate the joining (or connecting) methods/mounting and dismantling method, as well as uses of the items mentioned below:

    a) Various types of plugs, sockets, connectors suitable for general-purpose audio video use. Some of such connectors e.g. 2 and 3 pin mains plug and sockets, Banana plugs, sockets and similar male and female connectors and terminal strips.

    b) Various types of switches such as: normal/miniature toggle, slide, push button piano key, rotary, SPST, SPDT, DPST, DPDT, band selector, multi-way Master Mains Switch.

7.8 Exposure to modern soldering and de-soldering processes (Field visits)

7.9 De-solder pump, remove and clean all the components and wires from a given equipment, a PCB or a tag strip.