

.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*

DETAILED CONTENTS FOR FIRST SEMESTER

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

Unit 1 Communication Skills

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Unit 3 Pronunciation 29

Section II

Oral Communication Skills

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Writing Skills

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Section V

Grammar and Usage

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Unit 7 Phrasal Verbs	219
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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 subtraction 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 SCIENCES

L T P
4 - 2

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. 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 behaviour 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

Part-1 (APPLIED PHYSICS)

- | | | |
|-----------|--|---------|
| 1. | Units and Dimensions | (4 hrs) |
| 1.1 | Physical quantities | |
| 1.2 | Fundamental and derived units | |
| 1.3 | Systems of units (FPS, 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 applications, conversion from one unit to another unit for density, force, pressure, work, power, energy, velocity, acceleration | |
| 2. | Force and Motion | (3 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
 - 2.3 Equilibrium of forces, Lami's theorem
 - 2.4 Newton's Laws of motion – concept of momentum, Newton's laws of motion and their applications, determination of force equation from Newton's second law of motion; Newton's third law of motion conversion of momentum, impulse and impulsive forces, simple numerical problems based on third law.
 - 2.5 Projectile, horizontal and oblique projections and equation of trajectory
 - 2.6 Derivation of time of flight, maximum height and horizontal range
 - 2.7 Circular motion
 - 2.8 Relation between linear and angular velocity and linear acceleration and angular acceleration
 - 2.9 Centripetal force (derivation) and centrifugal force
- 3. Work, Power and Energy** (6 hrs)
- 3.1 Work: definitions and its SI units
 - 3.2 Work done in moving an object on horizontal and inclined plane (incorporating frictional forces)
 - 3.3 Power: definitions and its SI units, calculation of power in simple cases
 - 3.4 Energy: Definitions and its SI 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
- 4. Properties of Matter** (4 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, Bourdon's pressure, manometers and barometer gauges

- 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 Viscosity and coefficient of viscosity
- 5. Temperature and its measurement (2 hrs)**
 - 5.1 Principles of measurement of temperature and different scales of temperature
 - 5.2 Difference between heat and temperature on the basis of K.E. of molecules
 - 5.3 Bimetallic and Platinum resistance thermometer: their merits and demerits
- 6. Transfer of Heat (3 hrs)**
 - 6.1 Modes of transfer of heat (conduction, convection and radiation with examples)
 - 6.2 Coefficient of thermal conductivity, determination of thermal conductivity of good conductor (Searle's method) and bad conductor (Lee's disc method)
- 7. Applications of sound waves (2 hrs)**
 - 7.1 Acoustics of buildings – reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time.
- 8. Principle of optics (4 hrs)**
 - 8.1 Introduction: reflection of light, image formation in mirrors (convex and concave), refraction and refractive index, image formation in lenses, lens formulae (thin lens only), power of lens, total internal reflection
 - 8.2 Simple and compound microscope, astronomical and Galileo telescope, magnifying power and its calculation (in each case)
 - 8.3 Overhead projector and slide projector
- 9. Electricity (2 hrs)**
 - 9.1 Ohm's law
 - 9.2 Resistance of a conductor, specific resistance, series and parallel combination of resistors, effect of temperature on resistance

9.3 Heating effect of current and concept of electric power

10. Modern Physics (2 hrs)

10.1 Lasers: concept of energy levels, ionizations and excitation potentials;

10.2 Fibre optics: Introduction, optical fiber materials

10.3 Super conductivity: Phenomenon of super conductivity

10.4 Energy sources – conventional and non-conventional (wind, water, solar, bio, nuclear energy), only elementary idea

Part- B APPLIED CHEMISTRY

1. Language of Chemistry (4 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. Water (6 hrs)

2.1 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.

2.2 Methods to remove hardness of water (i) Clark's Process (ii) Permutit Process (iii) Soda Lime process (iv) Ion-Exchange process. Simple numerical problems related to soda lime process.

2.3 Definition of degree of hardness of water and the systems to express the degree of hardness of water.

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

3. Solutions (4 hrs)

3.1 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

- 3.2 Strength of a solution (i) Normality (ii) Molarity (iii) Molality as applied in relation to a solution.
- 3.3 Definition of pH, and different industrial applications of pH
4. **Electrolysis** (4 hrs)
- 4.1 Definition of the terms: Electrolytes, Non-electrolytes conductors and non-conductors with suitable examples
- 4.2 Faraday's Laws of Electrolysis
- 4.3 Different industrial applications of 'Electrolysis'
- 4.4 Elementary account of (i) lead acid battery and (ii) Ni-Cd battery with special reference to their reaction mechanisms.
5. **Fuels** (4 hrs)
- 5.1 Definition of a 'Fuel', characteristics of a good fuel and classification of fuels with suitable examples
- 5.2 Definition of Calorific value of a fuel and determination of calorific value of a liquid fuel with the help of Bomb calorimeter.
- 5.3 Qualities of a good fuel and merits of gaseous fuels over those of other varieties of fuels
- 5.4 Manufacture, composition, properties and uses of (i) Water gas (ii) Oil gas (iii) Biogas
6. **Corrosion** (3 hrs)
- 6.1 Meaning of the term 'corrosion' and its definition
- 6.2 Theories of corrosion i.e. (i) direct chemical action theory and (ii) electro chemical theory
- 6.3 Prevention of corrosion by
1. (a) Alloying
(b) Providing metallic coatings
 2. Cathodic protections:
(a) Sacrificial
(b) Impressed voltage method

7. Lubricants (4 hrs)

- 7.1 Definition of (i) lubricant (ii) lubrication
- 7.2 Classification of lubricants
- 7.3 Principles of lubrication
 - (i) fluid film lubrication
 - (ii) boundary lubrication
 - (iii) extreme pressure lubrication
- 7.4 Characteristics of a lubricant such as viscosity, viscosity index, volatility oiliness, acidity, emulsification, flash point and fire point and pour point.

8. Classification and Nomenclature of Organic Compounds (3 hrs)

Classification of Organic Compounds, functional group, Homologous Series, Nomenclature, Physical and Chemical properties, and industrial use of Organic Compounds

LIST OF PRACTICALS (For Applied Physics)

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
6. To determine the atmospheric pressure at a place using Fortin's Barometer
7. To determine the coefficient of linear expansion of a metal rod
8. To find the coefficient of thermal conductivity of copper using Searle's conductivity apparatus
9. To find the coefficient of thermal conductivity of bakelite sheet (bad conductor) by Lee's Disc Method
10. To verify Ohm's law
11. To verify law of resistances in series and in parallel

LIST OF PRACTICALS (For Applied Chemistry)

1. Gravimetric analysis and study of apparatus used there in
2. Estimate the amount of moisture in the given sample of coal
3. Estimate the amount of ash in the given sample of coal
4. Volumetric analysis and study of apparatus used therein. Simple problems on volumetric analysis equation
5. Find the amount of chlorides in mg per liter in a sample of H₂O with the help of a solution of AgNO₃
6. Determine the degree of temporary hardness of water by O'Hehner's method
7. Estimate the amount of Cu in a sample of CuSO₄ using a standard solution of Na₂S₂O₃
8. Estimation of total alkalinity of water volumetrically
9. Determine conductance, pH of water sample using conductance bridge and pH meter

RECOMMENDED BOOKS**A. FOR APPLIED PHYSICS**

1. Applied Physics Vol. I, TTTI Publication Tata McGraw Hill, Delhi
2. Basic Applied Physics by RK Gaur; Dhanpat Rai Publications
3. Comprehensive Practical Physics - Volume I and II by JN Jaiswal; Laxmi Publishers
4. Numerical Problems in Physics - Volume I and II by RS Bharaj; Tata McGraw Hill
5. Simple Course in Electricity and Magnetism by CL Arora; S Chand and Co, New Delhi
6. Fundamental Physics - Volume I and II by Gomber and Gogia; Pardeep Publications, Jalandhar
7. A Text Book of Optics by Subramanian and Brij Lal

8. Physics Laboratory Manual by PK Palanisamy, Scitech Publications
9. Fundamentals of Physics by Resnick and Halliday, Asian Books Pvt. Ltd., New Delhi
10. Concepts in Physics by HC Verma; Bharti Bhawan Ltd., New Delhi

B. FOR APPLIED CHEMISTRY

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. “A Text Book of Applied Chemistry-I” by Sharma and Others; Technical Bureau of India, Jalandhar
5. Engineering Chemistry by Jain PC and Jain M
6. Chemistry of Engineering by Aggarwal CV
7. Chemistry for Environmental Engineers by Swayer and McCarty, McGraw Hill, Delhi
8. Progressive Applied Chemistry –I and II by Dr. G.H. Hugar; Eagle Prakashan, Jalandhar

1.4 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

1.5 TEXTILE RAW MATERIALS

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5 - 2

RATIONALE

The student of Textile Technology after completion of their diploma have to work in Textile Mills/Houses/Quality Control Centres and have to supervise various units in the manufacture of textiles for which knowledge of textile raw materials is essential. Hence this subject is essential for primary and elementary knowledge of the textile fibres.

DETAILED CONTENTS

1. Introduction to language/terminology of textile (2 hrs)
2. Definition of textile fibre, Classification of textile fibres (10 hrs)
3. Important varieties of cotton for coarse, medium and fine yarns (available in India). Important varieties of wool and silk. Grading of cotton, wool and silk (12 hrs)
4. Physical and Chemical identification of textile fibres (12 hrs)
5. Manufacturing of different fibres i.e. viscose rayon, nylon, polyester polypropylene, spandex, and acrylic (12 hrs)
6. Basic knowledge of process flow of cotton, woollen and worsted spinning systems. Also the flow process of silk yarn manufacturing: name of various types of silk (10 hrs)
7. Introduction of fibre and yarn properties: Properties of Textile Fibres, cotton wool, silk, nylon, acrylic, polyester, viscose rayon (12 hrs)
8. Characteristics of fibre properties and their effect on yarn properties. (10 hrs)

LIST OF PRACTICALS

1. Physical identification of Natural fibres (Cotton, wool, silk, jute)
2. Physical identification of Manmade fibres. (viscose rayon, Polyester, nylon and acrylic)
3. Chemical identification of Natural fibres (cotton, wool, silk)
4. Chemical identification of Manmade fibres. (Viscose rayon, polyester, nylon, acrylic).

RECOMMEND BOOKS

1. Textile Science by Gohl and Vilensky or EPS Gohl
2. Textile Fibres by Atira
3. Fibre Science by JM Preston
4. Fibre Science by Gopalakrishnan et. al
5. Stains Removing Techniques-by S.S.Satsangi, Usha publishers 53B/AC-IV
Shalimar Bagh, Delhi-110088
6. Textile Fibres by V.A. Shenai

1.6 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 mm² from MS flat

Job: Angular cutting practice of 45° (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 Spelter (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 tray 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/wires by 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.