

I.I SEMESTER SYLLABUS

COMMUNICATING EFFECTIVELY IN ENGLISH

L T P
3 – 2

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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Section II

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1.2 APPLIED CHEMISTRY-I

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2 - 2

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 (sp^3 , sp^2 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

1.3 ANATOMY AND PHYSIOLOGY - I

L T P
3 - 2

RATIONALE

The students are supposed to have basic knowledge of structure of body, their anatomical parts, physiological functions. After studying this subject, the students shall be able to understand various parts of body and their anatomical positions along with functions.

DETAILED CONTENTS

Theory

1. Introduction to human body, its anatomy and physiology (2 hrs)
2. Elementary tissues of body and their classification along with brief description (6 hrs)
3. Digestive system (14 hrs)
 - 3.1 Organs of digestion, histology of the digestive organs (stomach, small intestine) and accessory organs (liver, pancreas)
 - 3.2 Process of digestion of food
 - 3.3 Absorption and assimilation of food
 - 3.4 Vitamins and minerals
4. Respiratory system (12 hrs)
 - 4.1 Organs of respiration and their histology (lungs and trachea)
 - 4.2 Respiration (definition and mechanism)
 - 4.3 Gas exchange in the lungs
 - 4.4 Regulation of respiration
 - 4.5 Basal metabolic rate
5. The skin (structure and functions) (2 hrs)
6. The excretory system (12 hrs)
 - 6.1 Organs of excretion (kidneys, ureter, bladder)
 - 6.2 Histology of kidney and its functions
 - 6.3 Formation of urine and its composition
 - 6.4 Structure of nephron

LIST OF PRACTICALS

1. Demonstration of various parts of body
2. Demonstration of tissues of body
3. Demonstration of parts of digestive system
4. Demonstration of parts of respiratory system
5. Demonstration of parts of skin
6. Demonstration of parts of excretory system

RECOMMENDED BOOKS

1. Anatomy and Physiology by Pears; JP Brothers, New Delhi
2. Anatomy and Physiology by Sears; ELBS, London
3. Basic Anatomy and Physiology by N Muruges; Sathya Publishers, Madurai
4. Ross and Wilson Anatomy and Physiology by Anne Waugh and Kathleen JW Wilson; Curchill Living Stone; London

1.4 CLINICAL MICROBIOLOGY - I

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3 - 4

RATIONALE

The students undergoing training of medical laboratory technology are given the knowledge of basic morphological features of bacteria, their staining characters, sterilization methods, preparation of culture media, biochemical test for Identification of bacteria and their anti-microbial sensitivity tests. They are also taught safety measures in microbiology.

DETAILED CONTENTS

Theory

1. Introduction to Microbiology (2 hrs)
Definition, history, relationship of micro-organisms to man, and safety guideline in a microbiology laboratory
2. Morphology of bacteria (4 hrs)
Anatomy of a bacterial cell including spores, flagella and capsules
3. Bacterial Growth and Nutrition of bacteria (4 hrs)
Bacterial growth curve and bacterial nutrition
4. Classification of micro-organisms with special reference to bacteria (3 hrs)
- General
- Biological
5. Sterilization (5 hrs)
Definition, sterilization by dry heat, moist heat (below, at and above 100° C), autoclave and hot air oven its structure and functioning, preventive measures, controls and sterilization indicators, sterilization by radiation and filtration (seitz)
6. Antiseptics and Disinfectants (3 hrs)
Definitions, types, properties, use of disinfectants and antiseptics, efficiency testing of disinfectants; use of laminar flow – principle and function
7. Microscopy (5 hrs)
Care, principle, working and preventive maintenance of simple and compound microscope, principle of dark ground, flourescent microscope, phase contrast and electron microscope

8. Staining techniques (5 hrs)
Methods of smear preparation, Gram stain, AFB stain, Albert's stain and special staining for spore, capsule and flagella
9. Culture Media (5 hrs)
Liquid and solid media, defined and synthetic media, routine laboratory media (basal, enriched, selective, enrichment, indicator, and transport media)
10. Bacterial culture and culture techniques (4 hrs)
Inoculations of culture media, aerobic and anaerobic culture, isolation of pure cultures and disposal of cultures
11. Morphological and biochemical identification of bacteria by (6 hrs)
- i) Microscopic examination
 - ii) Colony characteristics
 - iii) Bio-chemicals such as:
 - a) carbohydrate utilization tests
 - b) Catalase, oxidase, coagulase
 - c) Indole
 - d) Citrate
 - e) MR and VP
 - f) Urease
 - g) Motility demonstration methods
12. Antimicrobial susceptibility of bacteria by disc diffusion method (2 hrs)

LIST OF PRACTICALS

1. Demonstration of safety rules (universal precautions) in a microbiology laboratory
2. Preparation of cleaning agents and techniques of cleaning of glass and plastic ware. Disposal of cultures
3. Preparation of material for sterilization in autoclave and hot air oven
4. Use of sterilization by autoclave and hot air oven
5. Use of filtration for sterilization (Seitz)
6. Performance of In use test

7. Handling and use of different types of microscopes
8. Staining techniques: Gram, Albert's, Ziehl – Neelsen's
9. Demonstration of Spore, capsule and flagella staining
10. Demonstration of motility (Hanging drop/Semi solid method)
11. Preparation and sterilization of various solid and liquid culture media (including standardization of pH), nutrient agar, nutrient broth, blood agar, chocolate agar, macconkey agar, lowen jensen and special media
12. Aerobic and anaerobic culture methods (use of anaerobic jars)
13. Biochemical tests for identification of bacteria:
Principle, procedure and interpretation of following biochemical tests – Catalase, coagulase, oxidase, indole, MR, VP, Urease, citrate, carbohydrate utilization test and motility – demonstration of commercial available rapid biochemical test
14. Antimicrobial susceptibility testing by Stokes disc diffusion method

RECOMMENDED BOOKS

1. Medical Laboratory Technology by Kanai Lal Mukherjee; Tata McGraw Hill, New Delhi
2. An Introduction to Medical Laboratory Technology by FJ Baker; Butterworth – Heinemann; Oxford
3. Text Book of Microbiology by Ananthanarayan and Paniker; Orient Longman, Hyderabad
4. Textbook of Medical Microbiology by Satish Gupta; JP Brothers, New Delhi
5. Practical Book of Medical Microbiology by Satish Gupta; JP Brothers, New Delhi
6. Medical Laboratory Manual for Tropical Countries Vol. I and II by Monica Cheesbrough; Cambridge University Press; UK
7. Textbook of Medical Laboratory Technology by Praful B Godkar; Bhalani Publishing House, Mumbai
8. Text book of Medical Microbiology by Gruckshiank Vol. I and II

1.5 CLINICAL HAEMATOLOGY - I

L T P
3 - 4

RATIONALE

The training in haematology is imparted to enable the students to know the principle of tests, methodology of routine as well as advanced procedures being carried out in the laboratory by using routine sample as well as sophisticated instruments. Stress is also given in use of safety measures in the laboratory

DETAILED CONTENTS

Theory

1. Introduction to haematology (1 hr)
2. Apparatus and Instruments (9 hrs)

Parts, functions, principles/maintenance and working of microscope, centrifuge, water bath, differential cell counter, shaker, pH meter

 - 2.1 Washing, cleaning and sterilization of glass and plastic ware
 - 2.2 General and volumetric apparatus cleaning
3. Haemopoiesis (13 hrs)
 - 3.1 Erythropoiesis, leucopoiesis, thrombopoiesis
 - 3.2 Definition, composition and functions of blood
 - 3.3 Normal values
4. Anticoagulants (4 hrs)

Definition and various types of anticoagulants alongwith their mode of action, merits and demerits of each
5. Collection and preservation of blood (7 hrs)
 - 5.1 Collection of blood; venous and capillary
 - 5.2 Various equipment used for collection of blood samples
 - 5.3 Safety measures at the time of sampling and collection
 - 5.4 Preservation and disposal of processed blood samples
6. Romanowsky stains (6 hrs)
 - 6.1 Theory and preparation
 - 6.2 Choice of slide and spreader and preparation of blood film
 - 6.3 Characteristics of good film preparation
 - 6.4 Staining procedure and principle
 - 6.5 Effects of pH on staining
7. Differential leucocyte counting, blood cell morphology in health and diseases (8 hrs)

LIST OF PRACTICALS

1. Demonstration of various parts of centrifuge; its functioning and care
2. Demonstration of various parts of microscope its functioning and care
3. Cleaning and drying of glass and plastic ware
4. Preparation of various anticoagulants
5. Collection of venous and capillary blood
6. Cleaning of glass-syringes and its sterilization
7. Preparation of buffers
8. Preparation of the stains and other reagents
9. Preparation of peripheral blood film (PBF)
10. To stain a peripheral blood Film by Leishman - stain
11. Haemoglobin estimation (oxy Hb and cyanmethaemoglobin method)

RECOMMENDED BOOKS

1. Medical Laboratory Technology Vol. 1 by KL Mukherjee; Tata McGraw Hill Publishers, New Delhi
2. An Introduction to Medical Laboratory Technology by FJ Baker; Butterworth Heinmann, Oxford
3. Medical Laboratory Manual for Tropical Countries by Monica Cheesbrough; Cambridge University Press, UK
4. Textbook of Medical Laboratory Technology by Praful B Godkar; Bhalani Publishing House, Mumbai
5. Practical Haematology by JV Decei; ELBS with Curchill Living Stone; UK
6. Medical Laboratory Science Theory and Practical by J Ochei and A Kolhatkar, Tata McGraw Hill Publishing Company Ltd., New Delhi 2000 Ed.

1.6 CLINICAL BIOCHEMISTRY - I

L T P
3 - 4

RATIONALE

The students are imparted basic training of theoretical and practical aspects in the field of clinical biochemistry. The students are made to learn the technique of collection of clinical samples and their processing along with recording of data. The student will also obtain the basic knowledge of chemistry and metabolism of various metabolites which are routinely estimated in different diseases so that a clear understanding of the different tests is obtained. The students are also given basic training in safety measures, quality control and automation

DETAILED CONTENTS

1. Introduction to Biochemistry (8 hrs)
 - 1.1 Definition
 - 1.2 Importance of biochemistry
 - 1.3 SI Units and their use
 - 1.4 Volumetric apparatus and their calibration
2. Cleaning and storage of laboratory, glass and plastic ware (10 hrs)
 - 2.1 Cleaning and care of laboratory glass and plastic ware
 - 2.2 Different cleaning agents (soaps, detergents, chromic acid)
 - 2.3 Methods of cleaning and storage
3. Important instruments; principle of working, handling and care of (10 hrs)
 - 3.1 Balance (Analytical, electrical/electronic)
 - 3.2 Centrifuge
 - 3.3 Colorimeter
 - 3.4 Spectrophotometer
 - 3.5 Flamephotometer
 - 3.6 Glucometer
4. Blood chemistry (12 hrs)
 - 4.1 Composition of blood and its functions
 - 4.2 Use of various anticoagulants
 - 4.3 Separation of serum and plasma
 - 4.4 Process of sterilizing blood collecting equipment, disposal of infected material
 - 4.5 Different protein precipitation agents and preparation of protein free filtrate (PFF)
5. Collection and preservation of biological specimens (8 hrs)
 - Blood
 - Urine/other body fluids
 - Stool

LIST OF PRACTICALS

1. Cleaning of glass and plastic ware
2. Sterilization of glass and plastic ware
3. Standardization of volumetric apparatus
4. Handling and maintenance of analytic instruments – centrifuge, flame photometer, analytical balance, colorimeter, spectrophotometer
5. Preparation of various anticoagulants and specimen collection containers
6. Collection of blood by various methods and use of vacutainers
7. Separation of serum and plasma
8. Preparation of different protein precipitating agents, PFF preparation

RECOMMENDED BOOKS

1. A Procedure Manual for Routine Diagnostic Tests Vol. I and II by KL Mukherjee; Tata McGra Hill Publishers, New Delhi
2. A Textbook of Medical Laboratory Technology by P Godkar; Bhalani Publishing House, Mumbai

ECOLOGY AND ENVIRONMENTAL AWARENESS CAMP

A diploma holder must have knowledge of different types of pollution caused due to industries and constructional activities so that he may help in balancing the eco system and controlling pollution by pollution control measures. He should also be aware of environmental laws related to the control of pollution.

This is to be organized at a stretch for 3 to 4 days. Lectures will be delivered on following broad topics. There will be no examination for this subject.

1. Basics of ecology, eco system and sustainable development
2. Conservation of land reforms, preservation of species, prevention of advancement of deserts and lowering of water table
3. Sources of pollution - natural and man made, their effects on living and non-living organisms
4. Pollution of water - causes, effects of domestic wastes and industrial effluent on living and non-living organisms
5. Pollution of air-causes and effects of man, animal, vegetation and non-living organisms
6. Sources of noise pollution and its effects
7. Solid waste management; classification of refuse material, types, sources and properties of solid wastes, abatement methods
8. Mining, blasting, deforestation and their effects
9. Legislation to control environment
10. Environmental Impact Assessment (EIA), Elements for preparing EIA statements
11. Current issues in environmental pollution and its control
12. Role of non-conventional sources of energy in environmental protection

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, planing
- 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 dies 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 45⁰ (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 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.