2.1 COMMUNICATING EFFECTIVELY IN ENGLISH
II SEMESTER SYLLABUS

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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 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.

II SEMESTER 48 hrs

1. LISTENING COMPREHENSION 4hrs
1.1 Locating Main Ideas in a Listening Excerpt
1.2 Note-taking

2. ORAL COMMUNICATION SKILLS 14 hrs
2.1 Offering-Responding to Offers
2.2 Requesting-Responding to Requests
2.3 Congratulating
2.4 Expressing Sympathy and Condolences
2.5 Expressing Disappointments
2.6 Asking Questions-Polite Responses
2.7 Apologizing, Forgiving
2.8 Complaining
2.9 Persuading
2.10 Warning
2.11 Asking for and Giving Information
2.12 Giving Instructions
2.13 Getting and Giving Permission
2.14 Asking For and Giving Opinions

3. GRAMMAR AND USAGE **10hrs**

3.1 Prepositions
3.2 Pronouns
3.3 Determiners
3.4 Conjunctions
3.5 Question and Question Tag
3.6 Tenses (Simple Present, Simple Past)

*One chapter revising the topics discussed during the first semester. (Punctuation, Articles, Framing questions, Verbs, Word formation)

4. WRITING SKILLS **10hrs**

4.1 Writing Notice
4.2 Writing Circular
4.3 Writing a Memo
4.4 Agenda for a Meeting
4.5 Minutes of the Meeting
4.6 Telephonic Messages

* Writing a paragraph will be a continuous exercise through out the session. (Writing will be based on verbal stimuli, tables and graphs.)

5. READING SKILLS **10hrs**

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.

CONTENTS

Reading Skills

Writing Skills

Grammar and Usage

2.2 APPLIED MATHEMATICS-II

RATIONALE

Applied Mathematics forms the backbone of engineering discipline. Basic elements of differential calculus, integral calculus, differential equations and coordinate geometry have been included in the curriculum as foundation course and to provide base for continuing education to the students

DETAILED CONTENTS

1. Co-ordinate Geometry (18 hrs)

   1.1 Area of a triangle, centroid and incentre of a triangle (given the vertices of a triangle), Simple problems on locus

   1.2 Equation of straight line in various standard forms (without proof) with their transformation from one form to another, Angle between two lines and perpendicular distance formula (without proof)

   1.3 Circle: General equation and its characteristics given:
   - ¾ The center and radius
   - ¾ Three points on it
   - ¾ The co-ordinates of the end's of the diameter

   1.4 Conics (parabola, ellipse and hyperbola), standard equation of conics (without proof), given the equation of conic to calculate foci, directrix, eccentricity, latus rectum, vertices and axis related to different conics Differential Calculus

2. Differential Calculus (22 hrs)

   2.1 Concept of function, four standard limits

   $\lim_{x\to a} (x^n - a^n)/(x-a)$, $\lim_{x\to 0} \sin x/x$, $\lim_{x\to 0} (a^x - 1)/x$, $\lim_{x\to 0} (1+x)^{1/x}$

   2.2 Concepts of differentiation and its physical interpretation

   - ¾ Differentiation by first principle of x^n, $(ax + b)^n$, Sin x, cos x, tan x, sec x,, cosec x and cot x, e^x, a^x, log x. Differentiation of a function of a function and explicit and implicit functions
   - ¾ Differentiation of sum, product and quotient of different functions
   - ¾ Logarithmic differentiation. Successive differentiation excluding n^{th} order

2.3 Application of derivatives for (a) rate measure (b) errors (c) real root by Newton's method (d) equation of tangent and normal (c) finding the maxima and minima of a function (simple engineering problems)

3. Integral Calculus (16 hrs)

3.1 Integration as inverse operation of differentiation

3.2 Simple integration by substitution, by parts and by partial fractions

3.3 Evaluation of definite integrals (simple problems) by explaining the general properties of definite integrals

3.4 Applications of integration for
- ¾ Simple problem on evaluation of area under a curve where limits are prescribed
- ¾ Calculation of volume of a solid formed by revolution of an area about axis (simple problems) where limits are prescribed
- ¾ To calculate average and root mean square value of a function
- ¾ Area by Trapezoidal Rule and Simpson's Rule

4. Differential Equations (8 hrs)

Solution of first order and first degree differential equation by
- ¾ Variable separation
- ¾ Homogeneous differential equation and reducible homogeneou differential equations
- ¾ Linear differential equations and reducible linear differential equations

RECOMMENDED BOOKS

1. Higher Engineering Mathematics by BS Grewal
2. Engineering Mathematics by BS Grewal
3. Engineering Mathematics vol. II by S Kohli and Others, IPH, Jalandhar
4. Engineering Mathematics by Ishan Publication
5. Applied Mathematics Vol. II by SS Sabharwal and Others; Eagle Parkashan, Jalandhar
6. Engineering Mathematics by IB Prasad
7. Applied Mathematics Vol. II by Dr RD Sharma
8. Advanced Engineering Mathematics by AB Mathur and VP Jagi; Khanna Publishers, Delhi
9. Higher Engineering Mathematics by BS Grewal; Khanna Publishers, Delhi
10. Engineering Mathematics by C Dass Chawla; Asian Publishers, New Delhi

2.3 APPLIED CHEMISTRY – II

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2 - 2

RATIONALE

The role of Chemistry and chemical products in every branch of engineering is expanding greatly. Now a day's 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 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. **Metallurgy (10 hrs)**

1.1 A brief introduction of the terms: Metallurgy (types), mineral, ore, gangue or matrix, flux, slag, concentration (methods of concentrating the ores), roasting calcination and refining as applied in relation to various metallurgical operations.

1.2 Metallurgy of (i) Aluminium (ii) Iron (iii) copper with their physical and chemical Properties.

1.3 Definition of an alloy, purposes of alloying, composition, properties and uses of alloys-brass, bronze, monel metal, magnalium, duralumin.

2. **Fuels (10 hrs)**

2.1 Definition of a 'Fuel', characteristics of a good fuel and classification of fuels with suitable examples

2.2 Definition of Calorific value of a fuel and determination of calorific value of a liquid fuel with the help of Bomb calorimeter. Simple numerical problems based upon Bomb-calorimeter method of finding the Calorificvalues

2.3 Brief description of 'Proximate' and 'Ultimate' analysis of a fuel.
Importance of conducting the proximate and ultimate analysis of a
fuel

2.4 Qualities of a good fuel and merits of gaseous fuels over those of
other varieties of fuels

2.5 Manufacture, composition, properties and uses of (i) Water gas (ii) Oil gas
(iii) Biogas (iv) LPG (V) CNG

3 **Corrosion (3 hrs)**

3.1 Meaning of the term 'corrosion' and its definition

3.2 Theories of corrosion i.e. (i) direct chemical action theory and (ii) electro chemical theory

3.3 Prevention of corrosion by

1. (a) Alloying

(b) Providing metallic coatings

2. Cathodic protections: (a) Sacrificial

(b) Impressed voltage method

4 **Lubricants (4 hrs)**

4.1 Definition of (i) lubricant (ii) lubrication

4.2 Classification of lubricants

4.3 Principles of lubrication

(i) fluid film lubrication

(ii) boundary lubrication

(iii) extreme pressure lubrication

4.4 Characteristics of a lubricant such as viscosity, viscosity index, volatility oiliness, acidity, emulsification, flash point and fire point and pour point.

5. **Classification and Nomenclature of Organic Compounds (7 hrs)**

5.1 Homologous series

5.2 IUPAC Nomenclature of Hydrocarbons ,
Alcohols, Aldehydes and Ketones & Carboxylic acids

5.3 Hydrocarbons (Alkanes, Alkenes and Alkynes)-general preparation, Chemical properties and uses.

5.4 Alcohols (Diols and Triols not included)-general preparation, Chemical properties and uses.

5.5 Aldehydes and Ketones preparation properties and uses.

5.6 Monocarboxlic acids-general preparation, chemical properties and uses

6 **Rubber and Polymers (2 hrs)**

6.1 Definition of Rubber and Polymers

6.2 Types of Rubber

6.3 Classification of Polymers

6.4 Composition and uses of Polythene, PVC, Teflon, Bakelite.

LIST OF PRACTICALS

1. Gravimetric analysis and study of apparatus used there in
2. To determine the percentage composition of a mixture consisting of a volatile and a non-volatile substances
3. Determine the viscosity of a given oil with the help of "Redwood viscometer"
4. Estimate the amount of ash in the given sample of coal
5. Determination of copper in the given brass solution, or sample of blue vitriol volumetrically
6 Electroplate the given strip of Cu with Ni
7. Detection of organic compounds (Aldehydes, Ketones, Carboxylic acid, and Amines)

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

2.4 ENGINEERING DRAWING – II

RATIONAL

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. Instructions relevant to various drawings may be given along with Students

DETAILED CONTENTS

1. Detail and Assembly Drawing (2 sheets)

   1.1 Principle and utility of detail and assembly drawings

   1.2 Wooden joints i.e. corner mortice and tenon joint, Tee halving joint, Mitre faced corner joint, Tee bridle joint, Crossed wooden joint, Cogged joint, Dovetail joint, Through Mortice and Tenen joint, Corner and Through halving joint, Closed Mortise and Tenon joint

2. Threads (3 sheets)

   2.1 Nomenclature of threads, types of threads (metric), single and multiple start threads

   2.2 Forms of various external thread sections such as V, square and acme threads, BA, BSW and Knuckle, Metric, Seller Thread, Buttress Threads

   2.3 Simplified conventions of left hand and right hand threads, both external and internal threads

3. Locking Devices (1 sheet)

   Lock nuts, castle nuts, split pin nuts, sawn nuts, slotted nut

4. Nuts and Bolts (3 sheets)

   Different views of hexagonal and square nuts; Different views of hexagonal and square nuts; Assembly of hexagonal headed, square headed, square headed with square neck bolts with hexagonal and square nuts and washers. Foundations bolts – Rag bolt and Lewis bolt

5. Screws, Studs and Washers (1 sheet)

5.1 Drawing various types of machine screws

5.2 Drawing various types of studs and set screws

6. Keys and Cotters (3 sheets)

6.1 Various types of keys and cotters and their practical application and preparation of drawing of various keys and cotters showing keys and cotters in position

6.2 Cotter joints (i) sleeve and cotter joint (ii) gib and cotter joint (iii) knuckle joint (iv) Spigot and socket joint

7. Rivets and Riveted Joints (2 sheets)

7.1 Types of structural and general purpose rivet heads

7.2 Caulking and fullering of riveted joints

7.3 Types of riveted joints – lap, butt (single riveted, double riveted lap joint, single cover plate and double cover plate), chain and zig – zag riveting

8. Welded Joints (1 sheet)

8.1 Various conventions and symbols of welded joints (IS 696)

8.2 Practical applications of welded joints say joints on steel frames, windows, doors and furniture

9. Couplings (2 sheets)

9.1 Muff or Box coupling, half lap muff coupling

9.2 Flange coupling (Protected and non-protected)

9.3 Flexible coupling

10. Symbols and Conventions (2 sheets)

    10.1 Civil engineering sanitary fitting symbols

    10.2 Electrical fitting symbols for domestic interior installations

    10.3 Building plan drawing with electrical and civil engineering symbols

11. Development of Surfaces (3 sheets)

    11.1 Construction of geometrical figures such as square, pentongon, hexogon

    11.2 Development of surfaces of cylinder, square, pentagonal and hexazonal, Prism, Conc and Pyramid, Sequence pentagonal and hexa pyramid

12. Interpenetration of (2 sheets)

    12.1 Cylinder to cylinder

    12.2 Cylinder to cone

13. AUTO CAD

    13.1 Concept of AutoCAD, Tool bars in AutoCAD, coordinate system, snap, grid, and ortho mode

    13.2 Drawing commands – point, line, arc, circle, ellipse

    13.3 Editing commands – scale, erase, copy, stretch, lengthen and explode

    13.4 Dimensioning and placing text in drawing area

    13.5 Sectioning and hatching

    13.6 Inquiry for different parameters of drawing entity

Note: A minimum of 15 sheets should be prepared by each student

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, New Delhi

2.6 ENGINEERING MATERIALS

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RATIONALE

The knowledge of engineering materials is essential for Chemical Engineering discipline. The knowledge of mechanical , electrical, thermal and chemical properties of a material is necessary to make a proper selection of the material for process equipment. Effect of surrounding materials, failure under service conditions etc also affect the material selection

DETAILED CONTENTS

1. Importance of consideration of engineering materials (4 hrs)

2. Different types of engineering materials in use in chemical industries (6 hrs)

3. Properties expected for use of engineering materials in chemical industries (6 hrs)

4. Classification of engineering materials (18 hrs)

4.1 Metallic Materials

4.1.1 Ferrous Metals
Important varieties of iron ores, cast iron; types, properties and uses of cast iron, pig iron: types of pig iron. Wrought iron: properties and uses of wrought iron; Steel: factors affecting physical properties of steel and uses of steel (no manufacturing process)

4.1.2 Non-ferrous Metals
Aluminium, cobalt, copper, lead, magnesium, nickel, tin and zinc, their properties and uses

4.1.3 Various alloys of aluminium, copper, magnesium, nickel and steel

4.2 Non-metallic materials

4.2.1 Polymers
Nylon – 66, nylon – 6, polyesters, polycarbonates, polyurathenes, PVC, Polypropylene, rubber

4.2.2 Ceramics
Definition of ceramic, clays, properties of clay, earthen wares and stone wares, uses of stonewares

Definition of refractory, classification of refractories, properties of refractories, common refractory bricks, fire clay bricks, dolomite bricks, high alumina bricks and carbon bricks

4.2.3 Glass
Definition, classification, composition, types and properties of glass

5. Mechanical, thermal and electrical properties (10 hrs) Tensile strength, compressive strength, shear strength, ductility and malleability,
methods of improving strength; specific heat, glass transition temperature, crystalline melting temperature, thermal conductivity, dielectric strength, dielectric constant, power loss and electrical diffusivity

6. Specification of materials (4 hrs)

RECOMMENDED BOOKS

1. Materials in Industry by WJ Patton; Prentice Hall Publication

2. Introduction to Engineering Materials by Aggarwal; Tata McGraw Hill Publication

3. Material Science by Narula; Tata McGraw Hill Publication

4. Elements of Mettalurgy by HS Bawa; Tata McGraw Hill Publication

2.7 INTRODUCTION TO PULP AND PAPER TECHNOLOGY

RATIONALE

It is an introductory subject to be given to the students opting for chemical engineering (Pulp and Paper). It will expose to the students to various areas to be covered in this course and various field jobs where they can join later on. The course will also impart to the students elementary knowledge regarding units and conversion and specialized knowledge for site selection for setting up an industry. The students are required to be exposed to the overview of pulping and paper making processes.

DETAILED CONTENTS

1. Introduction: History and scope of paper technology (3 hrs

2. Functions of a paper technology/career opportunities for paper technologist

(2 hrs

3. Site selection for setting up an industry (6 hrs)

4. Concept of unit operations and unit process in chemical industry (4 hrs)

5. System of units and unit conversions involving process variables like pressure, viscosity, temperature, density, specific gravity, thermal conductivity (5 hrs)

6. Raw material (10 hrs)

   Introduction to paper on network of cellulosic fibres. Brief study of fibrous raw materials and their classification, their sources and availability in the context of Indian paper industry

7. Process Overview (18 hrs

   A brief overview of the process of paper making. General introduction to the processes of raw material handling, pulping, bleaching, stock preparation, wet end operation and dry end operation. Introduction to chemical recovery, hand made paper, board making, craft paper, cultural and industrial paper

LIST OF PRACTICALS

1. Measurement of moisture content of paper
2. Determination of ash content of paper
3. Visual evaluation of dirt and speck content of paper
4. Visual inspection of quality of paper
5. Klemm test of paper
6. Ink feathering of paper
7. Visual evaluation of colours and shades of paper

RECOMMENDED BOOKS

1. Handbook of Paper Technology by KW Britt
2. Handbook for Pulp and Paper Technology by GA Smook
3. Handbook of Paper Technology by C Biermann
4. Paper Manufacturing Vol. I, and II by RG McDonald

2.8 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.