

## 2.1 COMMUNICATING EFFECTIVELY IN ENGLISH II SEMESTER SYLLABUS

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 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

Foreword	
Acknowledgements	
Preface	
Instructions to the Teacher	
Second Semester Syllabus	

### **Listening Skills**

Unit 1	The Ganga	17
Unit 2	Community Policing	19
Unit 3	Patiala Heritage	22
Unit 4	Rock Garden	24

### **Oral Communication Skills**

Unit 1	Offering and Responding to Offers	29
Unit 2	Requesting and Responding to Requests	34
Unit 3	Congratulating	38
Unit 4	Expressing Sympathy and Offering Condolences	41
Unit 5	Expressing Disappointment	44
Unit 6	Asking Questions and Giving Polite Responses	47
Unit 7	Apologising and Responding to an Apology	50
Unit 8	Making Complaints	53
Unit 9	Persuading	57
Unit 10	Warning	60
Unit 11	Asking for and Giving Information	63
Unit 12	Giving Instructions	68
Unit 13	Asking and Giving Permission	71
Unit 14	Asking for and Giving Opinions	75

**Reading Skills**

Unit 1	The Clever Lawyer	79
Unit 2	The Letter	87
Unit 3	My Boyhood Days	99
Unit 4	Dracula's Guest	106
Unit 5	Independence Day	131

**Writing Skills**

Unit 1	Notices	141
Unit 2	Circulars	151
Unit 3	Memos	157
Unit 4	Agenda for a Meeting	163
Unit 5	Minutes of the Meeting	168
Unit 6	Telephonic Messages	175
Unit 7	Integrated Practice	181

**Grammar and Usage**

## Review Unit

Unit 1	Prepositions	185
Unit 2	Pronouns	191
Unit 3	Determiners	199
Unit 4	Conjunctions	204
Unit 5	Question and Question Tags	213
Unit 6	Tenses: Simple Present and Simple Past	217

Annexure I:	List of New Lexical Items and Expressions	230
Annexure II:	Sample Paper 1	246
Annexure III:	Text of Listening Skills Section	252

## 2.2 APPLIED MATHEMATICS-II

L T P  
4 - 1 -

### 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:
    - $\frac{3}{4}$  The center and radius
    - $\frac{3}{4}$  Three points on it
    - $\frac{3}{4}$  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
$$\text{Lt}_{x \rightarrow a} (x^n - a^n) / (x - a), \text{Lt}_{x \rightarrow 0} \sin x/x, \text{Lt}_{x \rightarrow 0} (a^x - 1)/x, \text{Lt}_{x \rightarrow 0} (1+x)^{1/x}$$
  - 2.2 Concepts of differentiation and its physical interpretation
    - $\frac{3}{4}$  Differentiation by first principle of  $x^n$ ,  $(ax + b)^n$ ,  $\sin x$ ,  $\cos x$ ,  $\tan x$ ,  $\sec x$ ,  $\text{cosec } x$  and  $\cot x$ ,  $e^x$ ,  $a^x$ ,  $\log x$ . Differentiation of a function of a function and explicit and implicit functions
    - $\frac{3}{4}$  Differentiation of sum, product and quotient of different functions
    - $\frac{3}{4}$  Logarithmic differentiation. Successive differentiation excluding  $n^{\text{th}}$  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
  - $\frac{3}{4}$  Simple problem on evaluation of area under a curve where limits are prescribed
  - $\frac{3}{4}$  Calculation of volume of a solid formed by revolution of an area about axis (simple problems) where limits are prescribed
  - $\frac{3}{4}$  To calculate average and root mean square value of a function
  - $\frac{3}{4}$  Area by Trapezoidal Rule and Simpson's Rule

4. Differential Equations (8 hrs)

Solution of first order and first degree differential equation by

- $\frac{3}{4}$  Variable separation
- $\frac{3}{4}$  Homogeneous differential equation and reducible Homogeneous differential equations
- $\frac{3}{4}$  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 PHYSICS

L T P  
3 - 2

### RATIONALE

Applied physics includes the study of a large number of diverse topics 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 behave. Concrete use of physical principles and analysis in various fields of engineering and technology are given prominence in the course content.

### DETAILED CONTENTS

- 1. Waves and vibrations (8 hrs)**
  - 1.1 Waves, Generation of waves by vibrating particles.
  - 1.2 Types of wave motion, transverse and longitudinal wave motion with examples
  - 1.3 Relation between velocity of wave, frequency and wave length of a wave ( $v = \eta\lambda$ )
  - 1.4 Simple harmonic motion: definition, expression for displacement, velocity, acceleration, time period, frequency in S.H.M.
  - 1.5 Vibration of spring mass system, cantilever and determination of their time period.
  - 1.6 Free, forced and resonant vibrations with examples
  
- 2. Applications of sound waves (8)**
  - 2.1 Acoustics of buildings-reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation
  - 2.2 Ultrasonics-Methods of production (magnetostriction and piezoelectric) and their engineering applications to cold welding, drilling, cleaning, flaw detection and SONAR
  
- 3. Principles of optics (8 hrs)**
  - 3.1 Review of concept of mirrors, lenses, reflection & refraction of light, refractive index, lens formula (no derivation), real and virtual image, magnification.
  - 3.2 Power of lens
  - 3.3 Simple and compound microscope, astronomical telescope, magnifying power and its calculation (in each case)
  - 3.4 Total internal reflection, critical angle and conditions for total internal reflection.
  
- 4. Electrostatics (10 hrs)**
  - 4.1 Coulomb's law, unit charge
  - 4.2 Gauss's Law
  - 4.3 Electric field intensity and electric potential
  - 4.4 Electric field of point charge, charged sphere, straight charged conductor, plane charged sheet
  - 4.5 Capacitance, types of capacitors, capacitance of parallel plate capacitor, series and parallel combination of capacitors
  - 4.6 Dielectric and its effect on capacitors, dielectric constant and dielectric

**5. Current Electricity****(8 hrs)**

- 5.1 Ohm's law
- 5.2 Resistance of a conductor, specific resistance, series and parallel Combination of resistors, effect of temperature on resistance
- 5.3 Kirchhoff's laws, Wheatstone bridge principle and its applications
- 5.4 Heating effect of current and concept of electric power

**6. Semi conductor physics****(8 hrs)**

- 6.1 Energy bands, intrinsic and extrinsic semi conductor, p-n junction diode and its characteristics
- 6.2 Diode as rectifier-half wave and full wave rectifier, semi conductor transistor pnp and npn (concept only)

**7. Modern Physics****(9 hrs)**

- 7.1 Lasers: concept of energy levels, ionizations and excitation potentials; spontaneous and stimulated emission; lasers and its characteristics, population inversion, types of lasers, ruby laser and applications
- 7.3 Fiber optics: Introduction and applications
- 7.4 Super conductivity: Phenomenon of super conductivity, Type I and Type II super conductor and its applications

**LIST OF PRACTICALS**

1. To determine and verify the time period of cantilever by drawing graph between load and depression
2. To determine the magnifying power of a compound microscope
3. To determine the magnifying power of an astronomical telescope
4. To verify Ohm's law
5. To verify law of resistances in series
6. To verify law of resistances in parallel
7. To convert a galvanometer into an ammeter of given range
8. To convert a galvanometer into a voltmeter of a given range

**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



## 2.4 APPLIED CHEMISTRY – II

L T P  
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 Calorific values

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 Monocarboxylic 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

## 2.5 BASIC ELECTRICAL ENGINEERING

L T P

3 – 2

### RATIONALE

This course will enable the students to understand the basic concepts and principles of d.c and a.c fundamental, a.c circuits, batteries, electromagnetic induction etc. including constant voltage and current sources. A diploma holder may be involved in various jobs ranging from preventive maintenance of electrical installation to fault location etc. In addition, he may be working in testing laboratories where he uses measuring instruments. To carry out these and similar jobs effectively, knowledge of basic concepts, principles and their applications is very essential.

### DETAILED CONTENTS

1. DC Circuits (5 hrs)
  - 1.1 Concept of electricity, various applications of electricity, advantages of electricity over other types of energy.
  - 1.2 basic terms – voltage, current, potential difference, power, energy and their units.
  - 1.3 Ohm's law and its practical applications, concepts of resistance, conductance, resistivity and their units,
  - 1.4 Effect of temperature on resistance, temperature coefficient of resistance
  - 1.5 Series and parallel combination of resistors, wattage consideration, simple problems
  - 1.6 Kirchhoff's current law and Kirchhoff's voltage law and their applications to simple circuits. Conversion of circuits from Star to Delta and Delta to Star.
2. DC Circuit Theorems (4 hrs)
 

Thevenin's theorem, Norton's theorem, super position theorem, maximum power transfer theorem, application of network theorem in solving d.c circuit problems.
3. Constant Voltage and Constant Current Sources (3 hrs)
  - a) Concept of constant voltage source, symbol and graphical representation characteristics of ideal and practical sources.
  - b) Concept of constant current sources, symbol, characteristics and graphical representation of ideal and practical current sources.

4. Electro Magnetic Induction (8 hrs)
- a) Concepts of magnetic field produced by flow of current, Magnetic circuit, concept of magneto-motive force (MMF), flux, reluctance, permeability, analogy between electric and magnetic circuit.
  - b) Faraday's law and rules of electro-magnetic induction, principles of self and mutual induction, self and mutually induced e.m.f, simple numerical problems.
  - c) Concept of current growth, decay and time constant in an inductive (RL) circuit. d) Energy stored in an inductor, series and parallel combination of inductors.
5. Batteries (4 hrs)
- 5.1 Basic idea about primary and secondary cells
  - 5.2 Construction, working and applications of Lead-Acid battery and Nickel- Cadmium cells, Silver-Oxide cells
  - 5.3 Charging methods used for lead-acid battery( accumulator )
  - 5.4 Care and maintenance of lead-acid battery
  - 5.5 Series and parallel connections of batteries.
  - 5.6 General idea of solar cells, solar panels and their applications
6. AC Fundamentals (12 hrs)
- 6.1 Concept of alternating voltage and current
  - 6.2 Difference between a.c and d.c
  - 6.3 Concept of cycle, frequency, time period, amplitude, instantaneous value, average value, r.m.s. value, maximum value, form factor and peak factor.
  - 6.4 Representation of sinusoidal quantities by phasor diagrams.
  - 6.5 Equation of sinusoidal wave form (with derivation)
  - 6.6 Effect of alternating voltage applied to a pure resistance, pure inductance and pure capacitance.

7. AC Circuits (10 hrs)
- 7.1 Inductive reactance and Capacitive reactance
  - 7.2 Alternating voltage applied to resistance and inductance in series.
  - 7.3 Alternating voltage applied to resistance and capacitance in series.
  - 7.4 Impedance triangle and phase angle
  - 7.5 Solutions and phasor diagrams for simple RLC circuits (series and parallel).
  - 7.6 Introduction to series and parallel resonance and its conditions
  - 7.7 Power in pure resistance, inductance and capacitance, power in combined RLC circuits. Power factor, active and reactive power and their significance, importance of power factor.
  - 7.8  $j$ -notation and its application in solving a series and parallel AC circuits
  - 7.9 Definition of conductance, susceptance and admittance
- 8.. Various Types of Power Plants (2 hrs)
- Brief explanation of principle of power generation in thermal, hydro and nuclear power stations and their comparative study.
- Elementary block diagram of above mentioned power stations

### LIST OF PRACTICALS

1. Familiarization of measuring instruments viz voltmeter, ammeter, CRO, Wattmeter and multi-meter and other accessories
2. Determination of voltage-current relationship in a dc circuit under specific physical conditions and to draw conclusions.
3. To measure (very low) resistance of an ammeter and (very high) resistance of a voltmeter
4. To verify in d.c circuits:

- a.. Thevenin's theorem,
  - b. Norton's theorem,
  - c. Super position theorem,
  - d. Maximum power transfer theorem,
5. To observe change in resistance of a bulb in hot and cold conditions, using voltmeter and ammeter.
  6. Verification of Kirchhoff's Current Law and Kirchhoff's Voltage Laws in a dc circuit]
  7. To find the ratio of inductance of a coil having air-core and iron-core respectively and to observe the effect of introduction of a magnetic core on coil inductance
  8. To find the voltage current relationship in a single phase R-L and R-C Series circuits, draw their impedance triangles and determine the power factor in each case .
  9. To test a lead - acid storage battery and to charge it.
  10. Measurement of power and power factor in a single phase R.L.C. circuit and to calculate active and reactive power.
  11. Visit to a nearby Power Station(s).

### **RECOMMENDED BOOKS**

1. Electrical Technology, Fifth Edition by Edward Hughes, Longman Publishers
2. Electrical Technology by BL Theraja, S Chand and Co, New Delhi
3. Basic Electrical and Electronics Engineering by SK Sahdev; Dhanpat Rai and Sons, New Delhi
4. Experiments in Basic Electrical Engineering by SK Bhattacharya, KM Rastogi; New Age International (P) Ltd.; Publishers New Delhi
5. Basic Electricity by BR Sharma; Satya Prakashan; New Delhi
6. Principles of Electrical Engineering by BR Gupta, S Chand and Co, New Delhi
7. Basic Electrical Engineering by PS Dhogal, Tata Mc Graw Hill, New Delhi
8. Basic Electrical Engineering by JB Gupta; SK Kataria and Sons, New Delhi

9. Experiments in Basic Electrical Engineering by GP Chhalhotra, Khanna Publishers, New Delhi

10. Basic Electrical Engineering by Mool Singh, Gilgotia Publications Pvt. Ltd. New Delhi

11. Electrical Science by S Chaudhari, R Chakrabarti and PK Chattopathyay, Narosa

Publishing House, New Delhi



## 2.6 ANAOG ELECTRONICS

L T P

4 - 2

### RATIONALE

This subject gives the knowledge of fundamental concepts of basic electronics and aims at providing the students with basic understanding of conductors, semiconductors and insulators, extrinsic and intrinsic semi-conductors, p-n junction, need of rectifiers in electronics, understanding of filters in rectifiers, tunnel diodes, LEDs, varactor diodes, LCD; understanding the working of transistors in various configurations; understanding of FETs and MOSFET etc. for effective functioning in the field of electronic service industry. The teacher should give emphasis on understanding of concepts and explanation of various term used in the subject. Practical exercises will reinforce various concepts. Industrial/field exposure must be given by organizing visit

### DETAILED CONTENTS

1.     Semi conductor physics: (12 hrs)  
       Review of basic atomic structure and energy levels, concept of insulators, conductors and semi conductors, atomic structure of Ge and Si, covalent bonds  
  
       Concept of intrinsic and extrinsic semi conductor, P and N impurities, doping of impurity.  
  
       P and N type semiconductors and their conductivity. Effect of temperature on conductivity of intrinsic semi conductor.  
  
       Energy level diagram of conductors, insulators and semi conductors; minority and majority carriers.
  
2.     Semi conductor diode: (12 hr)  
  
       PN junction diode, mechanism of current flow in PN junction, Drift and diffusion current, depletion layer, forward and reverse biased PN junction, potential barrier, concept of junction capacitance in froward and reverse bias condition.  
  
       V-I characteristics, static and dynamic resistance and their calculation from diode characteristics.

Diode as half wave, full wave and bridge rectifier. PIV, rectification efficiencies and ripple factor calculations, shunt capacitor filter, series inductor filter, LC filter and  $\pi$  filter.

Types of diodes, characteristics and applications of Zener diodes. Zener and avalanche breakdown.

3. Introduction to Bipolar transistor: (12 hrs)

Concept of bipolar transistor, structure, PNP and NPN transistor, their symbols and mechanism of current flow; Current relations in transistor; concept of leakage current;

CB, CE, CC configuration of the transistor; Input and output characteristics in CB and CE configurations; input and output dynamic resistance in CB and CE configurations; Current amplification factors. Comparison of CB CE and CC Configurations;

Transistors as an amplifier in CE Configurations; d.c load line and calculation of current gain, voltage gain using d.c load line.

4. Transistor biasing Circuits: (6 hrs)

Concept of transistor biasing and selection of operating point. Different types of Need for stabilization of

5. Single stage transistor amplifier: (10 hrs)

Single stage transistor amplifier circuit, a.c load line and its use in calculation of currents and voltage gain of a single stage amplifier circuit. Explanation of phase reversal of output voltage with respect to input voltage. H- parameters and their significance. Calculation of current gain, voltage gain, input impedance and output impedance using h-parameter.

6. Field effect Transistors (12 hrs)

Construction, operation and characteristics of FET and its

- Construction, operation and characteristics of MOSFET in depletion and
- CMOS- advantages and applications
- Comparison of JFET, MOSFET and BJT.
- FET amplifier circuit and its working principle. (No

**LIST OF PRACTICALS**

1. Familiarization with operation of following instruments.  
Multi-meter, CRO, Signal generator, Regulated Power Supply by taking readings of relevant electrical quantities with their help.
2. Plot V-I characteristics for PN junction diode
3. Plot V-I characteristics of Zenor diode
4. Observe the wave shape of following rectifier circuit
  - a. Half wave rectifier
  - b. Full wave rectifier
  - c. Bridge rectifier
5. Plot the wave shape of full wave rectifier with
  - a. Shunt capacitor filter
  - b. Series inductor filter
  - c. Filter
6. Plot input and output characteristics and calculate parameters of transistors in CE configuration.
7. Plot input and output characteristics and calculate of parameters of transistors in CB configuration.
8. Plot V-I characteristics of FET amplifier.
9. Measure the Q-Point and note the variation of Q-Point.
  - a. By increasing the base resistance in fixed bias circuit.
  - b. By changing out of bias resistance in potential divider circuit.
10. Measure the Voltage Gain, input, output impedance in single state CE amplifier circuit.

**BOOKS RECOMMENDED**

1. Basic Electronics and Linear Circuit by NN Bhargava and Kulshreshta, Tata McGrow Hill, New Delhi.
2. Principles of Electrical and Electronics Engineering by VK Mehta; S Chand and Co., New Delhi

3. Electronic Components and Materials by SM Dhir, Tata McGraw Hill, New Delhi
4. Electronics Devices and Circuits by Millman and Halkias; McGraw Hill.
5. Principles of Electronics by Albert Paul Malvino; Tata McGraw Hill, New Delhi
6. Electronics Devices and Circuits-I by Naresh Gupta, Jyotesh Malhotra and Harish C Saini, Eagle Prakashan, Jalandhar
7. Electronics Devices and Circuits by Rama Reddy, Narosa Publishing House Pvt. Ltd., New Delhi

## **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 ecosystem and controlling pollution by adopting pollution control measures. He should also be aware of environmental laws related to the control of pollution.

An awareness camp is to be organized at a stretch for 3 to 4 days during the first year. 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 and its 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 on man, animal, vegetation and non-living organisms
6. Sources of noise pollution and its effects on human beings
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 pollution
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

## 2.7 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<sup>2</sup> 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 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  $\varphi$

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.