## 2.1 COMMUNICATION SKILLS – II

| 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 achieve results and create successful organizations. The goal of the Communicating Skills 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. The objectives of this subject are understanding how communication works, gaining active listening and responding skills, understanding the importance of body language, acquiring different strategies of reading texts and increasing confidence by providing opportunities for oral and written expressions

**DETAILED CONTENTS**

**Section A**

1. Grammar and Usage (15 Hrs)

1.1 Prepositions
1.2 Pronouns
1.3 Determiners
1.4 Conjunctions
1.5 Question and Question Tag
1.6 Tenses (Simple Present, Simple Past)

**Section B**

2. Reading Skills (15 Hrs)

Unseen comprehension passages (at least 5 passages).

3. Writing Skills (18 Hrs)

3.1 Writing Notice
3.2 Writing Circular
3.3 Writing a Memo
3.4 Agenda for a Meeting
3.5 Minutes of the Meeting
3.6 Telephonic Messages

3.7 Paragraph writing:
Simple and Current Topics should be covered.

**LIST OF PRACTICALS**

**(Note: The following contents are only for practice. They should not be included in the final theory examination)**

1. Listening Comprehension

    1.1 Locating Main Ideas in a Listening Excerpt
    1.2 Note-taking

2. Developing Oral Communication Skills

    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

**INSTRUCTIONAL STRATEGY**

Looking into the present day needs of effective communication in every field, it is imperative to develop necessary competencies in students by giving practical tips and emphasis on grammar, vocabulary and its usage in addition to practical exercises. The teacher should give report writing assignments, projects etc. while teaching this subject.

**LIST OF RECOMMENDED BOOKS**

1. Communicating Effectively in English, Book-I by Revathi Srinivas; Abhishek Publications, Chandigarh.
2. High School English Grammar and Composition by Wren & Martin; S. Chand & Company Ltd., Delhi.
3. Communication Techniques and Skills by R. K. Chadha; Dhanpat Rai Publications, New Delhi.

## SUGGESTED DISTRIBUTION OF MARKS

| Topic No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 15 | 30 |
| 2 | 15 | 35 |
| 3 | 18 | 35 |
| **Total** | **48** | **100** |

## 2.2. APPLIED MATHEMATICS - II

**L T P**
**5 - -**

**RATIONALE**

Applied Mathematics forms the backbone of engineering students. The curriculum of mathematics has undergone changes from time to time in accordance with growth of subject. Diploma in Engineering is a launching stage where the students learn the basics of engineering. The revised syllabus has been designed keeping in view the emerging needs of all categories of students. Great emphasis has been laid on application of various contents like differential calculus, integral calculus, differential equations and statistics. This course will develop analytical abilities to make exact calculations and provide continuing educational base to the students.

**Note:- Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to appreciate learning of these concepts and principles.**

**DETAILED CONTENTS**

1. Differential Calculus (30 hrs)

1.1 Definition of function; Concept of limits.

Four standard limits $\lim_{x \to a} \frac{x^n - a^n}{x - a}$,

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

1.2 Differentiation by definition of $x^n$, sin x, cos x, tan x, $e^x$, $\log_a x$ only

1.3 Differentiation of sum, product and quotient of functions. Differentiation of function of a function.

1.4 Differentiation of inverse trigonometrical functions, Logarithmic differentiation, Exponential differentiation, Successive differentiation (upto third order only).

1.5 Applications:

(a) Maxima and minima

(b) Equation of tangent and normal to a curve (for explicit functions only) – Simple problems only

2. Integral Calculus (25 hrs)

2.1 Integration as inverse operation of differentiation

2.2 Simple standard integrals and related problems

2.3 Simple integration by substitution, by parts and by partial fractions (for

linear factors only)

2.4 Evaluation of definite integrals (simple problems)-

Evaluation of $\int_0^{\pi/2} \text{Sin}^n x\, dx$, $\int_0^{\pi/2} \text{Cos}^n x\, dx$, $\int_0^{\pi/2} \text{Sin}^m x\ \text{Cos}^n x\, dx$

using formulae without proof (m and n being positive integers only)

2.5 Numerical integration by Simpson's Rule and Trapezoidal Rule (simple problems only)

3 Ordinary Differential Equations (10 hrs)

3.1. Definition, order, degree, linear and non-linear differential equations
3.2 Formation of differential equations (upto second order)
3.3. Solution of first order differential equations by variable separable method only

4. Statistics (15hrs)

4.1 Measures of Central Tendency: Mean, Median, Mode
4.2 Measures of Dispersion: Mean deviation, Standard deviation
4.3 Co-efficient of rank correlation

**INSTRUCTIONAL STATREGY**

Basic elements of Differential Calculus, Integral Calculus, Ordinary Differential Equations and Statistics can be taught in the light of their applications in the field of engineering and technology. By laying more stress on applied part, teachers can also help in providing continuing education base to the students.

**RECOMMENDED BOOKS**


1. Elementary Engineering Mathematics by BS Grewal; Khanna Publishers, New Delhi
2. Engineering Mathematics by Vol. I & II by S Kohli; IPH, Jalandhar
3. Applied Mathematics by Dr. RD Sharma; Dhanpat Rai Publications, Delhi
4. Applied Mathematics, Vol. I & II by SS Sabharwal & Sunita Jain; Eagle Parkashan, Jalandhar
5. Comprehensive Mathematics, Vol. I & II Laxmi Publications, Delhi.


**SUGGESTED DISTRIBUTION OF MARKS**

| Topic No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 30 | 40 |
| 2 | 25 | 30 |
| 3 | 10 | 10 |
| 4 | 15 | 20 |

| | | |
|---|---|---|
| **Total** | **80** | **100** |

## 2.3 APPLIED PHYSICS-II

L T P
4 - 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.

**Note:- Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to appreciate learning of these concepts and principles.**

**DETAILED CONTENTS**

1. Waves and Vibrations (10 hrs)

   1.1. Definition of wave with examples
   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 ($v = n\lambda$)
   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 (10 hrs)

   2.1 Acoustics of buildings-reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time
   2.2 Ultrasonics-Methods of production (magnetostriction oscillator only) and their engineering applications to cold welding, drilling, cleaning and SONAR

3. Principles of Optics (10 hrs)

   3.1 Lenses, reflection & refraction of light, refractive index, lens formula (no derivation), real and virtual image, magnification.
   3.2 Power of lens, microscope, telescope (definition only)
   3.3 Total internal reflection, critical angle and conditions for total internal reflection.

4. Electrostatics (12 hrs)

4.1 Coulomb's law, unit charge
4.2 Gauss's Law
4.3 Electric field intensity and electric potential (definition and units only)
4.4 Application of Gauss's Law to straight charged conductor, plane charged sheet
4.5 Capacitance, capacitance of parallel plate capacitor, series and parallel combination of capacitors
4.6 Dielectric and its effect on capacitors, dielectric constant and dielectric breakdown

5. Current Electricity (10 hrs)

5.1 Definition of electric current, resistance , potential & their units.
5.2 Ohm's law
5.3 Specific resistance, series and parallel combination of resistances, effect of temperature on resistance.
5.4 Kirchhoff's laws, Wheatstone bridge
5.5 Heating effect of current and concept of electric power

6. Semi Conductor Physics (6 hrs)

6.1 Types of materials (insulator, semi-conductor, conductor), 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 (introduction only)

7. Modern Physics (6 hrs)

7.1 Lasers: concept of energy levels, ionizations and excitation potentials; spontaneous and stimulated emission; population inversion, Laser, types of lasers, ruby laser and applications of laser
7.2 Fiber optics: Introduction and applications
7.3 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.
2. To determine time period of Simple Pendulum.
3. To verify ohm's law.
4. To verify law of resistance in series.
5. To verify law of resistances in parallel.
6. To find resistance of galvanometer by half deflection method.
7. To convert a galvanometer into an ammeter of given range.
8. To convert a galvanometer into a voltmeter of given range.
9. To study and verify laws of reflection using mirrors.

## INSTRUCTIONAL STRATEGY

Teacher may use various instructional media like models, charts and graphs while imparting instructions. The field application should be made clear before teaching the basics of waves, sound, light, electrostatics, semiconductor and modern physics etc to develop proper understanding of the physical phenomenon**.** Use of demonstration will make the subject interesting and develop scientific temper in the students.

## RECOMMENDED BOOKS


1. Concept of Physics by H.C. Verma, Part-1, Bharti Bhawan, New Delhi
2. Concept of Physics by H.C. Verma, Part-2, Bharti Bhawan, New Delhi
3. A Text Book of Applied Physics by RA Banwat and SD Dogra, Eagle Parkashan, Jallandhar
4. Applied Physics by BL Arora, King India Publications, New Delhi


## SUGGESTED DISTRIBUTION OF MARKS

| S.No | Time Allotted (Hrs.) | Marks Allotted (%) |
|---|---|---|
| 1 | 10 | 14 |
| 2 | 10 | 14 |
| 3 | 10 | 14 |
| 4 | 12 | 20 |
| 5 | 10 | 16 |
| 6 | 06 | 12 |
| 7 | 06 | 10 |
| **Total** | **64** | **100** |

## 2.4 APPLIED CHEMISTRY-II

**L T P**
**3 - 2**

**RATIONALE**

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

**Note:- Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to appreciate learning of these concepts and principles.**

**DETAILED CONTENTS**

1. Metallurgy (08 hrs)

   1.1 A brief introduction of the terms: Metallurgy (types), mineral, ore, gangue or matrix, flux, slag, concentration (methods of concentrating the ores), ore, roasting, calcinations, smelting and refining of metal.
   1.2 Metallurgy of (i) Aluminium (ii) Iron
   1.3 Definition of an alloy, purposes of alloying, composition, properties and uses of alloys, monel metal, magnalium, duralumin, alnico, stainless steel and invar.

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 solid 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 coal. Importance of conducting the proximate and ultimate analysis of a fuel
   2.4 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
   2.6 Composition, calorific values and applications of (i) LPG (ii) CNG (iii) Power alcohol

2.7 Fuel rating
- 2.7.1 Octane number for petrol
- 2.7.2 Cetane number for diesel

3 Corrosion (06 hrs)

3.1 Definition of corrosion
3.2 Theories of corrosion i.e. (i) direct chemical action theory and (ii) electro chemical theory
3.3 Passivity
3.4 Prevention of corrosion by
- 3.4.1 Alloying
- 3.4.2 Providing metallic coatings
- 3.4.3 Cathodic protections:
  - (a) Sacrificial
  - (b) Impressed voltage method
- 3.4.4 Heat treatment (quenching, annealing, tempering & normalizing)

4 Lubricants (06 hrs)

4.1 Definition of (i) lubricant (ii) lubrication
4.2 Classification of lubricants
4.3 Principles of lubrication
- 4.3.1 fluid film lubrication
- 4.3.2 boundary lubrication
- 4.3.3 extreme pressure lubrication

4.4 Properties of lubricants
- 4.4.1 Physical properties: viscosity, viscosity index, flash-point, fire-point, cloud-pour point, oiliness, volatility, emulsification
- 4.4.2 Chemical properties-Total acidity number (TAN) saponification and iodine value, coke number and aniline point.

4.5 Criterion for selection of a good lubricant

5 Glass (04 hrs)

5.1 Glass: Chemical composition, types of glasses and their applications
5.2 Manufacture of ordinary glass and lead glass

6. Classification and Nomenclature of Organic Compounds (06 hrs)

Classification of Organic Compounds, functional group, Homogolus Series, IUPAC-Nomenclature of various homogolous series i.e. alcohols, aldehydes, ketones, carboxylic acids, and phenols. (First six members of each series only)

7. Polymers & Plastics (08 hrs)

7.1 Definition of polymer, monomer & degree of polymerization
7.2 Brief introduction of addition & condensation polymers with suitable examples (PVC, Polyester, Teflon, Nylon 66, Bakelite)
7.3 Definition of plastic & type of plastics (thermo & thermo setting plastics) with suitable examples
7.4 Applications of polymers & plastics in daily life.

**LIST OF PRACTICALS**

1. Gravimetric analysis and study of apparatus used
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. Determine the flash point of the given oil with the help of Abel's Flash Point Apparatus
5. Estimate the amount of moisture in the given sample of coal
6. Estimate the amount of ash in the given sample of coal
7. Electroplate the given strip of Cu with Ni
8. Confirmation test of alcohol, aldehydes, carboxylic acid
9. To determination the total acidity number of a lubricant
10. Detection of metal iron in the rust (solution of rust in concentrated HCl may be given)
11. To study the effect of metal coupling on corrosion of metals

**INSTRUCTIONAL STATREGY**

Teacher may take help of various models and charts while imparting instructions to make the concepts clear. More emphasis may be laid on discussing and explaining practical applications of various chemical processes and reactions. In addition, students should be encouraged/motivated to study those processes in more details, which may find practical applications in their future professional life.

**RECOMMENDED BOOKS**


1. Chemistry in Engineering by J.C. Kuriacose and J. Rajaram; Tata McGraw-Hill Publishing Company Limited, New Delhi
2. Engineering Chemistry by Dr. S. Rabindra and Prof. B.K. Mishra ; Kumar and Kumar Publishers (P) Ltd. Bangalore-40
3. A Text Book of Applied Chemistry-I by SS Kumar; Tata McGraw Hill, Delhi
4. Progressive Applied Chemistry –I and II by Dr. G.H. Hugar; Eagle Prakashan, Jalandhar

5. Engineering Chemistry by Jain PC and Jain M Dhanpatrai publishers. New Delhi
6. Chemistry of Engineering by Aggarwal CV
7. Chemistry for Environmental Engineers by Swayer and McCarty, McGraw Hill, Delhi
8. A Text Book of Applied Chemistry-I by Sharma and Others; Technical Bureau of India, Jalandhar
9. A Text Book of Applied Chemistry-II by Dr. J K Sharma (Hindi version), Abhishek Publications, Sec. 17-C, Chandigarh.

## SUGGESTED DISTRIBUTION OF MARKS

| Topic No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 08 | 16 |
| 2 | 10 | 20 |
| 3 | 06 | 14 |
| 4 | 06 | 14 |
| 5 | 04 | 08 |
| 6 | 06 | 12 |
| 7 | 08 | 16 |
| **Total** | **48** | **100** |

## 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 (07 hrs)

   1.1 Concept of electricity, various applications of electricity, advantages of electricity over other types of energy.
   1.2 Definition- 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.
   1.7 Conversion of electrical circuits from Star to Delta and Delta to Star.

2. DC Circuit Theorems (04 hrs)

   2.1. Thevenin's theorem, Norton's theorem, super position theorem, maximum power transfer theorem.
   2.2 Application of network theorems in solving d. c circuit problems.

3. Voltage and Current Sources (04 hrs)

   3.1. Concept of voltage sources- symbol, graphical representation and characteristics of constant/ ideal and practical sources.
   3.2. Concept of current sources- symbol, graphical representation and characteristics of constant/ideal and practical current sources.
   3.3. Basic idea about primary and secondary cells
   3.4. Construction, working and applications of Lead-Acid battery, Nickel- Cadmium cell and Silver-Oxide cells

4. Electro Magnetic Induction (08 hrs)

4.1. 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.
4.2. Faraday's laws of electro-magnetic induction, principles of self and mutual induction, self and mutually induced e.m.f, simple numerical problems.
4.3. Concept of current growth, decay and time constant in an inductive (RL) circuit.
4.4. Energy stored in an inductor, series and parallel combination of inductors.

5. AC Fundamentals (12 hrs)

5.1 Concept of alternating voltage and current
5.2 Difference between a.c and d.c
5.3 Concept of cycle, frequency, time period, amplitude, instantaneous value, average value, r.m.s. value, maximum value, form factor and peak factor.
5.4 Representation of sinusoidal quantities by phasor diagrams.
5.5 Equation of sinusoidal wave form (with derivation)
5.6 Effect of alternating voltage applied to a pure resistance, pure inductance and Pure capacitance.

6. AC Circuits (10 hrs)

6.1. Concept of Inductive reactance, Capacitive reactance and impedance
6.2. Alternating voltage applied to resistance and inductance in series.
6.3 Alternating voltage applied to resistance and capacitance in series.
6.4. Impedance triangle and phase angle
6.5. Solutions and phasor diagrams for simple RLC circuits (series and parallel).
6.6. Series and parallel resonance conditions (with derivation)
6.7 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.
6.8. Definition of conductance, susceptance and admittance

7.. Various Types of Power Plants (03 hrs)

7.1. Principle of power generation in thermal, hydro and nuclear power stations and their comparative study.
7.2. Elementary block diagram of thermal, hydro and nuclear power stations.

**LIST OF PRACTICALS**

1. Familiarization of measuring instruments viz voltmeter, ammeter, CRO, Wattmeter and multi-meter and other accessories

2. Verification of ohm's law

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 Law 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 measure its specific gravity.

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. Principles of Electrical Engineering by BR Gupta, S Chand and Co, New Delhi

6. Electrical Engineering by DR Arora; Ishan Publications, Ambala
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 T.S. Anand, North Publications, Jalandhar.

## SUGGESTED DISTRIBUTION OF MARKS

| S.No | Time Allotted (Hrs.) | Marks Allotted (%) |
|---|---|---|
| 1 | 07 | 15 |
| 2 | 04 | 10 |
| 3 | 04 | 10 |
| 4 | 08 | 15 |
| 5 | 12 | 20 |
| 6 | 10 | 20 |
| 7 | 03 | 10 |
| **Total** | **48** | **100** |

## 2.6 ANALOG ELECTRONICS – I

| 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, 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 terms used in the subject. Practical exercises will reinforce various concepts. Industrial/field exposure must be given by organizing visits.

**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 type 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 hrs)

- 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 filter, capacitor filter, series inductor filter, LC Filter and RC Filters

- Types of diodes – Zener Diode, Varactor Diode, Photo Diode, LED, LCD. Characteristics and applications of Zener diode. Zener breakdown 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. Need for stabilization of operating point. Different types of biasing circuits.

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( FETs) (12 hrs)

Construction, operation and characteristics of FET and its application.

- Construction, operation and characteristics of MOSFET in depletion and enhancement modes and its applications.
- C MOS- advantages and applications
- Comparison of JFET, MOSFET and BJT.
- FET amplifier circuit and its working principle. (No analysis).

**LIST OF PRACTICALS**

1. Familiarization with operation of following instruments:

   Multi-meter, CRO, Signal generator, Regulated Power Supply by taking readings of relevant quantities with their help.

2. Plot V-I characteristics for PN junction diode and calculate its dynamic and static resistances

3. Plot V-I characteristics of Zener 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. RC filter

6. Plot input and output characteristics and calculate parameters of transistors in CE configuration.

7. Plot input and output characteristics and calculate 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 stage CE amplifier circuit.

**INSTRUCTIONAL STRATEGY**

The aim of this subject is to provide the knowledge of the fundamental concepts related to basic electronics. The teacher should give more emphasis on understanding of concepts and the measuring of various terms used in the subject. The students be made familiar with diodes, transistors, resistors, capacitors, inductors etc. and various measuring instruments such as Multi-meter, CRO, Signal generator, Regulated Power Supply etc. Practical exercises should be included to reinforce the various concepts. Practical applications of semiconductor diodes, transistors, field effect transistors etc must be elucidated to the students.

**BOOKS RECOMMENDED**


1. Basic Electronics and Linear Circuit by NN Bhargava and Kulshreshta, Tata McGraw Hill Publishing Co, 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 Publishing Co, New Delhi
4. Electronics Devices and Circuits by Millman and Halkias; McGraw Hill.

5. Principles of Electronics by Albert Paul Malvino; Tata McGraw Hill Publishing Co, New Delhi.
6. Electronic Devices and Circuits by Bhupinder Jit Kaur; Modern Publishers, Jalandhar
7. Analog Electronics – I by DR Arora, North Publications, Jalandhar.

## SUGGESTED DISTRIBUTION OF MARKS

| Topic No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 12 | 10 |
| 2 | 12 | 20 |
| 3 | 12 | 20 |
| 4 | 06 | 10 |
| 5 | 10 | 20 |
| 6 | 12 | 20 |
| **Total** | **64** | **100** |

## 2.7 PROGRAMMING IN 'C'

| L | T | P |
|---|---|---|
| 3 | - | 3 |

**RATIONALE**

Developing a software for real world problems essentially requires a thorough knowledge and understanding of problem solving process. C language is a vehicle in the present industrial context which provides opportunity to use logical thinking abilities for acquisition of programming skills. This will be reinforced by the practical exercises. Hence this subject.

**DETAILED CONTENTS**

1. Algorithm and Programming (6 Hrs)
   Problem solving techniques – algorithms and flowcharts, basics of programming language, steps in development of a program, program compilation and debugging

2. Program Structure (6 Hrs)
   Input/output statements, assignment statements, constants, variables and data types, operators and expressions, use of header files and library functions

3. Control Structures (8 Hrs)
   Introduction, decision making with if – statement, if – else and Nested if, while and do-while, until, for loop, switch and break statements

4. Functions (6 Hrs)
   Introduction to functions, global and local variables, function definition, declaration and function call, parameters and parameter passing techniques – call by value/ reference

5. Arrays (5 Hrs)
   Introduction to arrays, array declaration and initialization, single and multidimensional array, arrays of characters

6. Pointers (5 Hrs)
   Introduction to pointers, address operator and pointers, declaring and initializing pointers, assignment through pointers, pointers and functions, pointers and arrays

7. Structures and Unions (4 Hrs)
   Declaration of structures, accessing structure members, structure initialization, arrays of structure, unions, differences between structure and union

8. Strings (4 Hrs)
   Introduction, declaring and initializing string variables, reading and writing strings, string handling functions, array of strings

9. Files (4 Hrs)
Introduction, file reading/writing in different modes, file manipulation using standard function types.

## INSTRUCTIONAL STRATEGY

Students should be given clear idea about the basic concepts of programming. In practical session student should be asked to write algorithm and then write program for the algorithm and run on computer. It is required that students should maintain records (files with printouts).

## LIST OF PRACTICALS

1. Programming exercises on executing and editing a C program.
2. Programming exercises on defining variables and assigning values to variables.
3. Programming exercises on arithmetic and relational operators.
4. Programming exercises on arithmetic expressions and their evaluation
5. Programming exercises on formatting input/output using printf and scanf.
6. Programming exercises using if statement.
7. Programming exercises using if – Else.
8. Programming exercises on switch statement.
9. Programming exercises on do – while statements.
10. Programming exercises on for – statement.
11. Programming exercises on function – Call by value/reference
12. Programs on one-dimensional array.
13. Programs on two-dimensional array.
14. Simple programs on string handling functions.
15. Simple programs using pointers.
16. Simple programs using structures.
17. Simple programs for reading from a file and writing into a file

## RECOMMENDED BOOKS


1. Programming in C by Schaum Series, McGraw Hills Publishers, New Delhi.
2. Let Us C by Yashwant Kanetkar; BPB Publication, New Delhi.
3. Exploring C by Yashwant Kanetkar; BPB Publications, New Delhi.
4. Application Programming in C by RS Salaria, Khanna Book Publishing Co. (P) Ltd., New Delhi.
5. Programming in C by R Subburaj, Vikas Publishing House Pvt. Ltd., Jangpura, New Delhi.
6. Programming with C Language by C Balaguruswami, Tata McGraw Hill, New Delhi.
7. Programming in C by BP Mahapatra, Khanna Publishers, New Delhi

## SUGGESTED DISTRIBUTION OF MARKS

| Topic No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 6 | 12 |
| 2 | 6 | 14 |
| 3 | 8 | 16 |
| 4 | 6 | 12 |
| 5 | 5 | 10 |
| 6 | 5 | 10 |
| 7 | 4 | 8 |
| 8 | 4 | 10 |
| 9 | 4 | 8 |
| **Total** | **48** | **100** |