

## 2.1 ENGLISH AND COMMUNICATION SKILLS - II

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### **RATIONALE**

Communication skills play an important role in career development. This subject aims at introducing basic concepts of communication besides laying emphasis on developing listening, speaking, reading and writing skills.

### **LEARNING OUTCOMES**

After undergoing the subject, the students will be able to:

- Make proper oral presentations.
- Speak confidently.
- Debate properly.
- Write accurate official/business letters.
- Respond to telephone calls effectively.
- Overcome communication barriers.

### **DETAILED CONTENTS**

1. Functional Grammar and Vocabulary (12 hrs)

Theory and Practical exercises on following:

One word substitution  
Functional Grammar and Vocabulary  
Prefixes and Suffixes  
Punctuation  
Narration  
Idioms and Phrases

2. Reading (9 hrs)  
Comprehension, Vocabulary enrichment and grammar exercises based on the following readings:

Section-I

- The Last Leaf - O' Henry
- Sparrows - K A Abbas
- The Postmaster - Rabindra Nath Tagore

## Section-II

- Night of the Scorpion - Nissim Ezekiel
- All the World is a Stage - William Shakespeare
- Success – Emily Dickenson
- Daffodils – William Wordsworth

### 3. Writing (24 hrs)

Writing Resume and Cover letter  
Correspondence: Business and Official  
Report Writing – Introduction and features of good report.  
Press Release  
Memos and Circulars  
Notices (lost, found, and auction)  
Agenda and Minutes of Meetings  
Filling-up different forms such as bank form and on-line form for placement etc.  
Precis Writing  
E mail writing

### **LIST OF PRACTICALS**

1. Group discussion on some current topic of interest.
2. Small speech using voice modulation.
3. Debate
4. Manners and Etiquette
5. Power point presentation
6. Telephonic conversation: General etiquette for making and receiving calls.
7. Mock interviews

### **INSTRUCTIONAL STRATEGY**

Open source software should be used to help the students in developing listening skills. Student centred activities such as group discussions, role play should be used to ensure active participation of students in the classroom.

### **RECOMMENDED BOOKS**

1. Revathi, Srinivas, “Communicating Effectively in English, Book-I”, Abhishek Publications, Chandigarh.
2. Mohan, Krishna & Meera Banerji, “Developing Communication Skills (2<sup>nd</sup> Edition)”, Published by Macmillan Publishers India Ltd; New Delhi.
3. Eastwood, John, “Oxford Practice Grammar”, Oxford University Press, London

4. Chadha, R. K., “Communication Techniques and Skills”, Dhanpat Rai Publications, New Delhi.
5. Wren & Martin, “High School English Grammar and Composition”, S. Chand & Company Ltd., Delhi.
6. Kumar, Sanjay & Pushp Lata, “Communication Skills”, Oxford University Press, New Delhi

#### **WEBSITES FOR REFERENCE**

1. [http://www.mindtools.com/ page 8.html](http://www.mindtools.com/page 8.html)
2. <http://www.letstalk.com.in>
3. <http://www.englishlearning.com>
4. <http://learnenglish.britishcouncil.org/en/>

#### **SUGGESTED DISTRIBUTION OF MARKS**

<b>Topic No.</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted (Out of 50)</b>
1	12	12
2	9	12
3	24	26
<b>Total</b>	<b>45</b>	<b>50</b>

## 2.2 APPLIED MATHEMATICS – II

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### RATIONALE

Applied mathematics forms the backbone of engineering students. Basic elements of differential calculus, integral calculus and differential equations have been included in this course. This will develop analytical abilities to apply in engineering field and will provide continuing educational base to the students.

### LEARNING OUTCOMES

After undergoing the subject, students will be able to:

- Apply differential calculus to solve max/min and related rate measure problems.
- Apply concepts of definite integrals to calculate the area of a curve bounded by axes.
- Evaluate complex integrals in a simpler way by applying definite integral.
- Solve engineering problems by making use of ordinary differential equations.

### DETAILED CONTENTS

#### 1. Differential Calculus (18 hrs)

Definition of function; Introduction to limit and continuity (definition only).

Standard differentiation of algebraic, trigonometric, inverse trigonometric functions, logarithmic function and exponential function.

Differentiation of sum, product and quotient of functions, Differentiation of function of a function, differentiation of implicit functions and parametric functions.

Logarithmic differentiation and successive differentiation (excluding nth order).

Application of differential calculus in:

- (a) Rate Measures
- (b) Maxima and minima (single variable functions) using second order derivative only
- (c) Equation of tangent and normal to a curve (for explicit functions only)

2. Integral Calculus (22 hrs)

Indefinite integrals, Integration as inverse operation of differentiation with simple examples.

Standard integrals and related simple problems

Simple integration by substitution, by parts and by partial fractions (for linear factors only)

Evaluation of definite integrals (simple problems)

Evaluation of  $\int_0^{\pi/2} \sin^n x \, dx$ ,  $\int_0^{\pi/2} \cos^n x \, dx$ ,  $\int_0^{\pi/2} \sin^m x \cos^n x \, dx$

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

Applications of integration for evaluation of area bounded by a curve and axes (Simple problems).

3. Differential Equations (5 hrs)

Definition, order, degree of ordinary differential equations.

Formation of differential equation (up to 2<sup>nd</sup> order). Solution of Differential equations with Variable separation and Linear Differential equations.

### INSTRUCTIONAL STATREGY

Basic elements of Differential Calculus, Integral Calculus, and Differential Equations 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. Grewal, BS, "Elementary Engineering Mathematics", Khanna Publishers, New Delhi
2. Engineering Mathematics by Vol. I & II by S Kohli, IPH, Jalandhar
3. Sabharwal, SS & Dr Sunita Jain, "Applied Mathematics, Vol. I & II", Eagle Parkashan, Jalandhar

4. Engineering Mathematics, Vol I, II & III by V Sundaram et al, Vikas Publishing House (P) Ltd., New Delhi
5. Sastry, SS, "Engineering Mathematics, Vol I & II", Prentice Hall of India Pvt. Ltd.,
6. Pal, Srimanta and Subodh C. Bhunia, "Engineering Mathematics", Oxford University Press, New Delhi

#### **SUGGESTED DISTRIBUTION OF MARKS**

<b>Topic</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted (Out of 50)</b>
1	18	20
2	22	25
3	5	05
<b>Total</b>	<b>45</b>	<b>50</b>

## 2.3 APPLIED PHYSICS – II

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### 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

### LEARNING OUTCOMES

After undergoing this subject, the student will be able to;

- Apply the concept of wave motion
- Illustrate laws of reflection and refraction of light.
- Comprehend the phenomenon related to electrostatics
- Comprehend the terms and laws related to electricity and magnetism.
- Make use of laser for engineering applications.

### DETAILED CONTENTS

#### 1. Wave motion and its Applications (6 hrs)

Wave motion, transverse and longitudinal wave motion with examples, sound and light waves, relationship among wave velocity, frequency and wave length and its application

Free, forced and resonant vibrations with examples

Acoustics of buildings –reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time and their applications

Ultrasonics –Introduction and applications.

#### 2. Optics (6 hrs)

Laws of reflection and refraction, refractive index, lens formula for thin lenses, power of lens, magnification

Total internal reflection and its applications, Critical angle and conditions for total internal reflection

Simple and compound microscope, astronomical telescope in normal adjustment, magnifying power (Only formula).

3. Electrostatics (6 hrs)
- Coulombs law, unit of charge,  
 Electric field, Electric lines of force and their properties, Electric flux,  
 Electric potential and potential difference  
 Capacitor and its working principle, Capacitance and its units. Capacitance  
 of parallel plate capacitor (No derivation), Series and parallel combination  
 of capacitors (numericals)  
 Dielectric and its effect on capacitance, dielectric break down
4. Electricity and Magnetism (9 hrs)
- Electric Current and its Unit, Direct and alternating current,  
 Resistance and its Units, Specific Resistance, Conductance, Specific  
 Conductance, Series and Parallel combination of Resistances. Factors  
 affecting Resistance, Superconductivity (concept only)
- 4.3 Ohm's law and its verification  
 Kirchoff's laws, Wheatstone bridge principle  
 Heating effect of current, Electric power, Electric energy and its units  
 (related numerical problems)  
 Introduction to magnetism, Types of magnetic materials. Dia, para and  
 ferromagnetic materials with their properties,  
 Magnetic field and its units, magnetic lines of force, magnetic flux and  
 their units  
 Concept of electromagnetic induction, Faraday's Laws and Lenz's  
 Galvanometer and its use.
5. Modern Physics (3 hrs)
- Lasers: its characteristics, spontaneous and stimulated emission,  
 population inversion; Principle, construction and working of Ruby laser,  
 engineering applications of lasers.

**LIST OF PRACTICALS** (To perform minimum 8 experiments)

1. To find the time period of a simple pendulum
2. To determine and verify the time period of cantilever
3. To verify laws of reflection from a plane mirror.
4. To find the focal length of convex lens by parallax method.
5. To determine the magnifying power of an astronomical telescope
6. To verify ohm's laws by drawing a graph between voltage and current.
7. To verify laws of resistances in series and parallel combination.
8. To find resistance of galvanometer by half deflection method
9. To measure very low resistance and very high resistances using Slide Wire bridge
10. Use of CRO in plotting AC and DC waveforms.
11. To find wave length of the laser beam.



## **INSTRUCTIONAL STATREGY**

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 to develop proper understanding of the physical phenomenon. Use of demonstration can make the subject interesting and develop scientific temper in the students.

## **RECOMMENDED BOOKS**

1. Text Book of Physics (Part-I, Part-II); N.C.E.R.T., Delhi
2. Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
3. Practical Physics by C. L. Arora, S Chand Publications
4. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi

## **SUGGESTED DISTRIBUTION OF MARKS**

<b>Topic</b>	<b>Time Allotted (hrs)</b>	<b>Marks Allotted (Out of 50)</b>
1	06	10
2	06	10
3	06	10
4	09	15
5	03	05
<b>Total</b>	<b>30</b>	<b>50</b>

## 2.4 FUNDAMENTALS OF ELECTRICAL ENGINEERING

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### RATIONALE

For a diploma holder in electrical engineering, it becomes imperative to know the fundamentals of the subject in order to grasp the knowledge of the field. This subject will provide acquaintance with various terms knowledge of fundamental concepts of electricity, magnetism and various principles related to it.

### LEARNING OUTCOMES

After completing the course the student should be able to:

- Acquire knowledge and understand the elements of electricity and DC circuits.
- Acquire knowledge of AC circuits and their components
- Illustrate the single phase and poly phase connections
- Measure power and power factor in a single phase circuits
- Measure power and power factor in a poly phase 23circuits
- Explain the various batteries as storage devices and be aware of safe disposal of batteries.

### DETAILED CONTENTS

#### 1. Electrostatics (14 hrs)

Introduction to Electricity, Charge, free electrons, Electric potential and potential difference, Electric current, Electrical Energy, Electrical power and their unit. SI units of work, power and energy and meters used to measure the electrical quantities, Concepts of Electrostatics, Coulomb's law.

Advantages and application of Electrical Energy, Rating and the connections of various Electrical appliances.

Concept of resistance, conductivity and resistivity, Laws of resistance, Effect of temperature on resistance, Temperature coefficient of resistance, Color coding of resistance.

Introduction to Capacitors, capacitance, Variable capacitor, Factors affecting capacitance of a capacitor, Introduction to Inductors, Inductance Concept of voltage source & current source, connections and their conversions.

Applications of series, parallel, and series-parallel connections of resistance, inductance and capacitance

2. DC Circuits (6 hrs)

- 2.1 Applications of Ohm's law with practical implementation.  
DC circuit, types of DC circuits: series circuit, parallel circuit, series-parallel circuit.  
Applications of Kirchhoff's Laws-KVL and KCL.  
Definitions of Nodes, Branches and loops.  
Working Principle of Wheatstone bridge.  
Voltage division in series resistors. Current division in parallel resistors

3. AC Fundamentals (14 hrs)

Concept of alternating current and voltage.  
Difference between A.C and D.C  
Equation of sinusoidal waveform for an alternating quantity  
Concept of cycle, frequency, time period, amplitude.  
Concept of instantaneous value, RMS value, maximum value and average value.  
Concept of form factor, peak factor and power factor.  
Concept of phasor and phase difference  
Representation of alternating sinusoidal quantities by vectors  
Phasor algebra (addition, subtraction)

4 AC Circuits (14 hrs)

Effect of alternating voltage applied to a pure resistance, pure inductance and pure capacitance.  
Concept of inductive and capacitive reactance.  
Alternating voltage applied to RL, RC and RLC series circuits

Power and power factor in pure resistance, inductance, capacitance, RL, RC, RLC circuits.

Active and reactive power and their significance

Definition and significance of Power factor.

Definition of susceptance, conductance, admittance, impedance and their units.

5. Poly Phase System (6 hrs)

Introduction of Three Phase system, Comparison between single and poly phase systems

Interconnection of three phases

Star or Y connection

Delta or mesh connection

6. Batteries (6 hrs)

Basic idea about primary and secondary cells

Concept of Cell: definition, emf of cell, internal resistance of cell, terminal potential of cell, types of cell (primary and secondary cell), grouping of cell (series grouping, parallel grouping, series-parallel grouping).

Working principle, construction and applications of Lead acid, Nickel Cadmium and Silver Oxide Cells, Lithium ion batteries, Button Cells

Charging, care, maintenance and Disposal of batteries

### LIST OF PRACTICALS

1. Familiarization of meters: Use of analog and digital multimeter for measurement of voltage, current (A.C/D.C) and resistance.
2. (a) To verify that  $R_t = R_1 + R_2 + \dots$  where  $R_1, R_2$  etc. are resistances connected in series (b) To verify  $\frac{1}{R_t} = \frac{1}{R_1} + \frac{1}{R_2} + \dots + \frac{1}{R_m}$  Where  $R_1, R_2$  etc. are resistances connected in parallel.
3. Measure the current drawn by the lamp at different voltages from zero to 220 volts and the resistance of lamp at different voltages, plot a graph between current and voltage
4. Verify KVL and KCL in different circuits
5. To generate an electric current using a magnetic field.

6. To calculate the self-inductance for a solenoid.
7. To calculate the mutual inductance of two adjacent inductive coils.
8. To find the value of inductors connected in series and parallel.
9. Measurement of power and power factor of a single phase RLC circuit.
10. To construct an RL and RC circuit and to measure
  - a) Total impedance
  - b) Phase angle between voltage and current
  - c) Construct impedance triangle
11. To construct an RLC series circuit and to measure
  - a) Total impedance
  - b) Phase angle between voltage and current
  - c) Construct impedance triangle
12. To determine the impedance of a capacitor and inductor in an AC circuit.
13. Power measurement in single phase systems
14. Power measurement three phase systems
15. Demonstration of parts of a battery and find the specific gravity of battery.
16. Testing a battery for its charged condition and to charge it.
17. Demonstration of charging and discharging of Battery and measure the terminal voltage during charging and discharging condition.
18. Charging and testing of a lead - acid storage battery.

## **INSTRUCTIONAL STRATEGY**

This is hands-on practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in the students.

1. Teachers may take help of various models and charts, you-tubes video's, e-learning resources while studying the contents of the subject to the students so that the concepts should be clear. More emphasis should be laid on discussing and explaining practical applications.
2. Teachers should give examples from daily routine as well as, engineering/technology applications on various concepts and principles in each topic so that students are able to understand and grasp these concepts and principles.
3. Preparing students to apply the technological method of problem solving to a real life problems. This quality is buildup in the students when students practice the numerical problems of the subject. Teachers should motivate students to solve the numerical problems of subject.

4. Teachers must ask 30% of numerals problems in sessional test and final semester exam of this subject.
5. Teachers should expose to different learning tools used in respective labs, Operational safety and Procedure to be followed in the laboratory. Students may ask to make micro projects by using the idea as learning in the subject.
6. Demonstrate/practice approach may be followed throughout the courses so that learning may be skill and employ-ability based.
7. Teachers should take assignments, seminar, quiz, viva-voce etc. to enhance the learning ability of the students.
8. Students must have to perform at least 12 experiment in the laboratory.

### **RECOMMENDED BOOKS**

1. Theraja, B. L. and A. K. Theraja, “ABC of Electrical Engineering”, S Chand Publishers, New Delhi.
2. Bhattacharya, S. K., “Basic Electrical and Electronics Engineering”, Pearson Education India.
3. Kothari, DP, and Nagrath, “Basic Electric Engineering”, Tata McGraw Hill.
4. Mittle, V., and Arvind Mittle, “Basic Electrical Engineering”, Mc Graw Hill Companies.
5. Mehta, V. K., & Rohit Mehta, “Basic Electrical Engineering”, S. Chand & Co.
6. Bhattacharya, SK, and KM Rastogi, “Experiments in Basic Electrical Engineering”, New Age International (P) Ltd. Publishers, New Delhi.

### **SUGGESTED DISTRIBUTION OF MARKS**

<b>Topic No.</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allocation (Out of 50)</b>
1.	14	12
2.	6	5
3.	14	12
4.	14	12
5	6	5
6	6	4
<b>Total</b>	<b>60</b>	<b>50</b>

## 2.5 ELECTRICAL ENGINEERING MATERIALS

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### RATIONALE

A diploma holder in Electrical Engineering will be involved in maintenance, repair and production of electrical equipment and systems. In addition, he may be required to procure, inspect and test electrical engineering materials. Knowledge of various types of materials will be needed in order to execute the above mentioned functions. He may also have to decide for an alternative when a particular material is either not readily available in the market or its cost becomes prohibitive.

### LEARNING OUTCOMES

After undergoing the subject, students will be able to:

- Identify various electrical engineering materials
- Select proper conducting or insulating material for engineering application
- Comprehend the properties of various materials
- Identify alternate materials for various engineering applications

### DETAILED CONTENTS

1. Classification (4 hrs)

Classification of materials: Conductor, semi-conductor and insulators  
Brief reference to their atomic structure and energy bands  
Criteria for selection of material for particular application

2. Conducting Materials (12 hrs)

Introduction  
Resistance and factors affecting it such as alloying and temperature etc.  
Classification of conducting material as low resistivity and high resistivity materials, low resistance materials. Copper - General properties as conductor: Resistivity, temperature coefficient, density, mechanical

properties of hard-drawn and annealed copper, corrosion, contact resistance. Application in the field of Electrical Engineering. Aluminum - General properties as conductor: resistivity, temperature coefficient, density, mechanical properties of hard and annealed aluminum, solderability, contact resistance. Applications in the field of electrical engineering. Steel- Mechanical properties of steel, applications in the field of electrical engineering. Introduction to bundle conductors and its applications. Low resistivity copper alloys- Brass and Bronze their practical applications with reasons for the same  
Applications of special metals e.g. Silver, Gold, and Platinum etc.  
High resistivity materials and their applications e.g., Manganin, Constantan, Nichrome, Mercury, Platinum, Carbon and Tungsten  
Superconductors and their applications

3. Properties of Insulators (10 hrs)

Electrical Properties: Volume resistivity, surface resistance, dielectric loss, dielectric strength (breakdown voltage)

Physical Properties: Hygroscopicity, tensile and compressive strength, abrasive resistance, brittleness

Thermal Properties: Heat resistance, classification according to permissible temperature rise. Effect of overloading on the life of an electrical appliance, Thermal conductivity

Chemical Properties: Solubility, chemical resistance, weatherability

Mechanical properties: mechanical structure, tensile structure

4. Insulating Materials (12 hrs)

Plastics: Definition and classification, Thermosetting materials: Phenol-formaldehyde resins (i.e. Bakelite) amino resins (Urea Formaldehyde and Melamine-formaldehyde), Epoxy resins - their important properties and applications. Thermo-plastic materials: Polyvinyl chloride (PVC), Polyethylene, Silicons, their important properties and applications.

Natural insulating materials, properties and the applications of Mica, Asbestos, Ceramic materials (porcelain and steatite), Glass, Cotton, Silk, Jute, Paper (dry and impregnated), Rubber, Bitumen, Mineral and insulating oil for transformers switchgear capacitors, high voltage



insulated cables, insulating varnishes for coating and impregnation, Enamels for winding wires, Glass fibre sleeves.

Gaseous materials; Air, Hydrogen, Nitrogen, SF<sub>4</sub> their properties and applications

5. Magnetic Materials (7 hrs)

Introduction - ferromagnetic materials, permeability, B-H curve, magnetic saturation, hysteresis loop including coercive force and residual magnetism, concept of eddy current and hysteresis loss, curie temperature, magnetostriction effect.

Soft Magnetic Materials: Alloyed steels with silicon, High silicon alloy steel for transformers, low silicon alloy steel for electric rotating machines. Cold rolled grain oriented steels for transformer, Non-oriented steels for rotating machine

Hard magnetic materials: Tungsten steel, chrome steel, hard ferrites and cobalt steel, their applications

### **INSTRUCTIONAL STRATEGY**

The teacher should bring different materials and devices in the class while taking lectures and explain and make students familiar with them. Also he may give emphasis on practical applications of these devices and components in the field. In addition, the students should be given exercises on identification of materials used in various electrical gadgets etc. and be encouraged to do practical work independently and confidently.

### **RECOMMENDED BOOKS**

1. Bhattacharya, SK, "Electrical and Electronic Engineering Materials", Khanna Publishers, New Delhi.
2. Sahdev, "Electrical Engineering Materials", Unec International Publications, Jalandhar.
3. Kapoor, PL, "Electrical Engineering Materials", Khanna Publishers, New Delhi.
4. Sharma, BR, and Others, "Electrical and Electronics Engineering Materials", Satya Parkashan, New Delhi.
5. Dogra, Rakesh, "Electrical Engineering Materials", SK Kataria and Sons, New Delhi.

### SUGGESTED DISTRIBUTION OF MARKS

<b>Topic No</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allocation (Out of 50)</b>
1.	4	6
2.	12	14
3.	10	10
4.	12	12
5.	7	8
<b>Total</b>	<b>45</b>	<b>50</b>

## ENVIRONMENTAL STUDIES

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### RATIONALE

Engineering activities require the use of natural resources which results in wide-ranging adverse effects on the environment. Natural replenishment of these resources is practically impossible. This necessitates that all technicians should know about the basics of ecology, environment and its functions, environmental pollution and management and environmental legislation which will enable them to accomplish their professional work with environmental compatibility. Hence this subject.

### LEARNING OUTCOMES

After undergoing the subject, the student will be able to:

- Comprehend the importance of ecosystem and environment.
- Demonstrate interdisciplinary nature of environmental issues.
- Identify different types of environmental pollution and control measures.
- Take corrective measures for the abatement of environmental pollutions.
- Compute the impact of human activities on the environment.
- Understand purpose of environmental legislation acts.
- Define energy management, energy conservation and energy efficiency
- Demonstrate positive attitude towards judicious use of energy and environmental protection
- Practice energy efficient techniques in day-to-day life and industrial processes.
- Adopt cleaner productive technologies
- Identify the role of non-conventional energy resources in environmental protection.

### DETAILED CONTENTS

1. Introduction: (4 hrs)  
Basics of ecology, eco system and environment. Review of carbon, nitrogen, sulphur and water cycle)
2. Conservation of land reforms: (3 hrs)  
Desertification, Causes, effects and prevention. rain water harvesting, maintenance of ground water, deforestation – its effects and control measures
3. Environmental Pollution: (10 hrs)  
Sources of pollution - natural and man made, causes, effects and control measures of pollution (air, water, noise, soil and radioactive). Concept of BOD, COD and AQI, Prevention of Pollution- Introduction to Cleaner Production Technologies, Waste Minimization Techniques, Concept of Zero Discharge, Impact of Energy

Usage on Environment: Global Warming, Green House Effect, Depletion of Ozone Layer, Acid Rain.

4. Solid Waste management (3 hrs)  
Classification of refuse material, sources, effects and control measures.  
Introduction to E-waste Management
5. Environmental Legislation (4 hrs)  
Introduction to Water (prevention and control of pollution) Act, Air (Prevention and Control of Pollution) Act and Environmental Protection Act, Role and Function of State Pollution Control Board, Introduction to Energy Conservation Act & its importance, Concept of Environmental Impact Assessment (EIA)
6. Energy Conservation and Sustainable Development (6 hrs)  
Introduction to Energy Management, Energy Conservation, Energy efficiency and its need. Role of Non-conventional Energy Resources (Solar Energy, Wind Energy, Bio mass energy, hydro energy) in environmental protection. Sustainable development, Concept of Green building and eco friendly materials.

### **INSTRUCTIONAL STRATEGY**

In addition to theoretical instructions, different activities pertaining to Environmental Studies like expert lectures, seminars, visits etc. may also be organized.

### **RECOMMENDED BOOKS**

1. Sharma, BR, "Environmental and Pollution Awareness", Satya Prakashan, New Delhi.
2. Khitoliya, Dr. RK, "Environmental Pollution", S Chand Publishing, New Delhi.
3. Deswal and Deswal, "Environmental Science", Dhanpat Rai and Co. (P) Ltd. Delhi.
4. Bharucha, Erach, "Environmental Studies", University Press (India) Private Ltd., Hyderabad.
5. Dhamija, Suresh K, "Environmental Engineering and Management", SK Kataria and Sons, New Delhi

### **SUGGESTED DISTRIBUTION OF MARKS**

<b>Topic No.</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted (Out of 50)</b>
1	4	06
2	3	05
3	10	16
4	3	05
5	4	06
6	6	12
<b>Total</b>	<b>30</b>	<b>50</b>

## **ELECTRICAL WORKSHOP PRACTICE - I**

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### **RATIONALE**

An electrical diploma holder will be required to inspect, test and modify the work done by skilled workers working under him. In addition, many a times, it will become necessary for him to demonstrate the correct method and procedure of doing a job. In order to carry out this function effectively in addition to conceptual understanding of the method or procedure he must possess appropriate manual skills. The subject aims at developing special skills required for repairing, fault finding, wiring in electrical appliances and installations.

### **LEARNING OUTCOMES**

After undergoing the subject, students will be able to:

Illustrate types of tools/equipment required for

- Repair various domestic appliances
- Detect and rectify various types of faults in house wiring, and contactor control circuits.
- Perform wiring, testing and fault finding of the control circuits process
- Identify electrical hazards and its safety measures
- Assemble distribution and extension boards
- Install electrical wiring and test it using meggar

### **PRACTICAL EXERCISES**

#### **1.     Electrical Safety Measures and Identification of Common Electrical Tools**

Study safety measures while working or handling the electrical equipment.

Use of fire extinguisher during electric fire.

Study the methods to take restoration of person suffering from electric shock.

Identification of common electrical materials with standard ratings and specifications such as wires, cables, switches, 1-pole, 2-pole and 3-pole

MCB, RCCB & ELCB, fuses, cleats, clamps and allied items, tools and accessories.

Identification, use and connections of 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.

Identification of phase, Neutral and Earth wires for connection to domestic electrical appliances and their connections to three pin plugs.

Identification and familiarization of following electrical wiring tools with respect to their usage: Screw drivers (different sizes), Insulated Pliers, Cutter, Sniper, Screw Driver (Star Screw Driver), L- Keys, Soldering Iron, soldering wire, flux, Drilling machines and Drilling Bits, Voltage/line tester, Insulation remover, Standard Wire Gauge .

## 2. Wiring System

Types of joints: Straight married Joint, Western union joint, Britania joint, Twist sleeve joint and Bolted type joint

Types of wiring and to make different light control circuits in the following types of wiring:

- i. Casing and capping (PVC) wiring.
- ii. Conduit wiring (surface/concealed), Filling and crimping of thimbles

Wiring of main distribution board with four outgoing circuits for light and fan loads including main switch and fuses (only internal connection)

Fault detection and its repair in wiring system

Construction/assembly of Distribution Board and Extension Board with following specifications:

- i. Two 5A sockets and one 15A Socket controlled by their respective switches, a fuse and indicator with series test lamp provision.
- ii. Board panel using MCB, main switch, change over switch and ELCB/RCCB.
- iii. Main distribution board with four outgoing circuits for light and fan loads including main switch and fuses (only internal connection)

Fault detection and repair of domestic electric installation

### 3. Household Appliances

Winding/re-winding of a fan (ceiling and table)/ motor and BLDC

Repair and maintenance of domestic electric appliances, Electric iron, geyser, fan, heat convector, desert cooler, room heater, electric kettle, electric oven, electric furnace etc.

Dismantling and assembly of voltage stabilizers

Assembly and interchange wiring of fluorescent tube light, CFL lamp etc.

Earth resistance measurement and earthing processes.

To carry out pipe/plate earthing for a small house and 3-phase induction motor. Testing the earthing using earth tester for the following

- i. One lamp controlled by two switches (staircase circuit)
- ii. Two lamps controlled by three switches (double staircase circuit)
- iii. Two ordinary bells (for day and night) used at a distant residence
- iv. Traffic light control system for two roads crossing
- v. Wiring of a switch board containing at least two switches, one fan regulator and one 5/15A socket controlled by their respective switches using piano type switches and matching socket

Wiring of a series test lamp board and to use it for finding out simple faults

Testing of domestic wiring installation using Meggar

### 4. Power Supply Connection

Connecting single phase energy meter with supply and load. Reading and working out power consumption and cost of energy.

Introduction to single phase and three phase supply and wiring system.

Importance of three phase supply (RYB) & its sequence and wiring system.

Connecting Generator and 3 phase wiring through Change over Switch.

Power cable jointing using epoxy based jointing kits.

Demonstration of laying of underground cables at worksite.

Assembly of distribution board/ panel using MCB, main switch, changeover switch and ELCB etc.

## **RECOMMENDED BOOKS**

1. Bhattacharya, SK, “Electrical and Electronic Engineering Materials”, Khanna Publishers, New Delhi.
2. Grover, and Jamwal, “Electronic Components and Materials”, Dhanpat Rai and Co., New Delhi.
3. Sahdev, “Electrical Engineering Materials”, Uneek International Publications, Jalandhar.
4. Dhir, SM, “Electronic Components and Materials”, Tata Mc Graw Hill, New Delhi.
5. Kapoor, PL, “Electrical Engineering Materials”, Khanna Publishers, New Delhi.
6. Sharma, BR, and Others, “Electrical and Electronics Engineering Materials”, Satya Parkashan, New Delhi.

## **INSTRUCTIONAL STRATEGY**

This is hands-on practice based workshop for development of required skills in the students. All the experiments are to be performed by the students. There are five units of equal weightage. The teacher should also engage the students in various Hands on Practice/Training of Students



## **TRAFFIC AWARENESS & ROAD SAFETY CAMP (II)**

A diploma holder must have knowledge of various types of traffic rules and regulations. Road safety education is vital for people of all ages. As a responsible citizen, you should be aware of each and every road safety rules. Observation is the key skill you need in ensuring road safety. By obeying safety rules and regulations, you can save yourself and others on the road. This camp covers the basic concepts of traffic rules and safety. Lectures will be delivered on following broad topics with the coordination of Distt. Traffic police. There will be no exam for this camp.

1. Time management
2. Traffic light signals
3. Speed limits of vehicles
4. Schedule of offences
5. Dividing lines
6. Proper road Maintenance and Warnings
7. Test yourself

