

## 2.1 ENGLISH AND COMMUNICATION SKILLS - II

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### RATIONALE

The curriculum aims to develop the use of English for three major purposes social interaction, academic achievement and professional use. Listening, speaking, reading, and writing skills can not be thought of as independent skills. They are generally perceived as interdependent where one skill often activates the other skills as well as the paralinguistic skills required for the achievement of effective communication. It is believed that the most effective way to achieve these purposes is through the adoption of a thematic, integrated, content-based approach to teaching and learning.

### DETAILED CONTENTS

#### 1. LISTENING

##### Practical:

- Pre-recorded CDs of famous speeches and dialogues: Comprehension exercises based on the audio
- Note-taking
- Drawing inferences
- Summarizing

**Note:** Teachers are expected to give necessary demonstrations, instructions and guidelines, while teaching above topics

#### 2. SPEAKING

##### Practical:

- Voice Modulation: Horizons (pitch, tone, volume, modulation)
- Word stress, rhythm, weak and strong form, pauses, group-sense, falling and rising tones, fluency, pace of delivery, dealing with problem sounds, accent, influence of mother tongue etc.
- Situational Conversation/role-playing with feedback, preferably through video recording
- Telephonic Conversation: Types of calls, agreeing and disagreeing, making and changing appointments, reminding, making complaints and handling complaints, general etiquettes,
- A small formal and informal speech
- Seminar
- Debate

**Note:** Teachers are expected to give necessary demonstrations, instructions and guidelines, while teaching above topics

### 3. READING

#### Theory:

(10 hrs.)

- Comprehension, Vocabulary enrichment and grammar exercises based on the following selective readings:

#### Section-I

- The Portrait of a Lady - Khushwant Singh
- The Lost Child by Mulk Raj Anand
- The Refugees – Pearl S. Buck

#### Section-II

- Life Sketch of Dr. Abdul Kalam
- Abraham Lincoln's letter to his son's Headmaster

#### Section-III

- All The World's A Stage – W. Shakespeare
- Say Not, The Struggle Nought Availeth – A.H. Clough
- Pipa's Song – Robert Browning
- A Viewpoint – RP Chaddah

- Comprehension exercises on unseen passages

### 4. WRITING

#### Theory:

(20 hrs.)

- The Art of Précis Writing
- Correspondence: Business and Official
- Drafting
  - Report Writing: Progress report and Project report
  - Inspection Notes
  - Notices: Lost and found; Obituary; Auction
  - Memos and Circulars
  - Notices, Agenda and Minutes of Meetings
  - Use of internet and E-Mails
  - Press Release
  - Applying for a Job: Resume writing; forwarding letter and follow-up
- Writing Telephonic messages
- Filling-up different forms such as Banks and on-line forms for Placement etc.

**Note:** Teachers are expected to give practical examples, while teaching above topics

## 5. VOCABULARY AND GRAMMAR

### Theory and Practical exercises on following:

(12 hrs.)

- Vocabulary of commonly used words
- Glossary of Administrative Terms (English and Hindi)
- One word substitution
- Idioms and Phrases
- Prefixes and Suffixes
- Punctuation
- Narration
- Forms of verbs: Regular and irregular

## 6. EMPLOYABLE SKILLS

### Theory:

(06 hrs.)

Importance of developing employable and soft skills; List and tips for developing of employable skills

### Practicals:

- Group discussions
- Presentations, using audio-visual aids (including power-point)
- Interview techniques: Telephonic interviews, Group interviews, face to face interviews
- Mannerism and etiquette etc.

## RECOMMENDED BOOKS

1. Spoken English (2<sup>nd</sup> Edition) by V Sasikumar & PV Dhamija; Published by Tata MC Graw Hills, New Delhi.
2. Spoken English by MC Sreevalsan; Published by M/S Vikas Publishing House Pvt. Ltd; New Delhi.
3. Spoken English –A foundation course (Part-I & Part-II) By Kamlesh Sdanand & Susheela Punitha; Published by Orient BlackSwan, Hyderabad
4. Practical Course in English Pronunciation by J Sethi, Kamlesh Sadanand & DV Jindal; Published by PHI Learning Pvt. Ltd; New Delhi.
5. A Practical Course in Spoken English by JK Gangal; Published by PHI Learning Pvt. Ltd; New Delhi.
6. English Grammar, Composition and Usage by NK Aggarwal and FT Wood; Published by Macmillan Publishers India Ltd; New Delhi.
7. Business Correspondence & Report writing (4<sup>th</sup> Edition) by RC Sharma and Krishna Mohan; Published by Tata MC Graw Hills, New Delhi.
8. Business Communication by Urmila Rani & SM Rai; Published by Himalaya Publishing House, Mumbai.
9. Business Communication Skills by Varinder Kumar, Bodh Raj & NP Manocha; Published by Kalyani Publisher, New Delhi.
10. Professional Communication by Kavita Tyagi & Padma Misra; Published by PHI Learning Pvt. Ltd; New Delhi.

11. Business Communication and Personality Development by Bsiwajit Das and Ipseeta Satpathy; Published by Excel Books, Delhi
12. Succeeding Through Communication by Subhash Jagota; Published by Excel Books, Delhi
13. Communication Skills for professionals by Nira Konar; Published by PHI Learning Pvt. Ltd; New Delhi.
14. Developing Communication Skills (2<sup>nd</sup> Edition) by Krishna Mohan & Meera Banerji; Published by Macmillan Publishers India Ltd; New Delhi.
15. Effective Technical Communication By M .Ashraf Rizwi; Published by Tata MC Graw Hills, New Delhi.
16. Basic Communication Skills for Technology by Andrea J Rutherford; Published by Pearson Education, New Delhi
17. English & Communication Skills for students of Science & Engineering by SP Dhanavel; Published by Orient BlackSwan, Hyderabad.
18. Technical Communication- Principles & Practices by Meenakshi Raman & Sangeetha Sharma; Published by Oxford University Press, New Delhi.
19. Technical English by S. Devaki Reddy & Shreesh Chaudhary; Published by Macmillan Publishers India Ltd; New Delhi.
20. Advanced Technical Communication, by Kavita Tyagi & Padma Misra; Published by PHI Learning Pvt. Ltd; New Delhi.
21. Communication Skills for Engineer & Scientist by Sangeeta Sharma & Binod Mishra; Published by PHI Learning Pvt. Ltd; New Delhi.

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

<b>Topic No.</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted (%)</b>
1	-	-
2	-	-
3	10	22
4	20	40
5	12	26
6	06	12
<b>Total</b>	<b>48</b>	<b>100</b>

## 2.2 APPLIED MATHEMATICS - II

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### RATIONALE

Applied mathematics forms the backbone of engineering students. Basic elements of Differential calculus and integral calculus and statistics 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.

### DETAILED CONTENTS

#### 1. Algebra (10 hrs)

- 1.1 Determinants: Elementary properties of determinants up to 3<sup>rd</sup> order, consistency of equations, Cramer's rule.
- 1.2 Matrix: Algebra of matrices, Inverse of a matrix, matrix inverse method to solve a system of linear equations in 3 variables.
- 1.3 Application of Matrix in computer programming

#### 2. Differential Calculus (24 hrs)

- 2.1 Definition of function; Concept of limits.  
Four standard limits  $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a}$ ,  
 $\lim_{x \rightarrow 0} \frac{\sin x}{x}$ ,  $\lim_{x \rightarrow 0} \frac{a^x - 1}{x}$ ,  $\lim_{x \rightarrow 0} (1+x)^{1/x}$
- 2.2 Differentiation of  $x^n$ ,  $\sin x$ ,  $\cos x$ ,  $\tan x$ ,  $e^x$ ,  $\log_a x$  (Please take one example of differentiation by definition)
- 2.3 Differentiation of sum, product and quotient of functions. Differentiation of function of a function.
- 2.4 Differentiation of trigonometric inverse functions. Logarithmic differentiation. Exponential differentiation, Successive differentiation (excluding nth order).
- 2.5. Application of differential calculus in:
  - (a) Rate Measures
  - (b) Errors and increments
  - (c) Maxima and minima
  - (d) Equation of tangent and normal to a curve (for explicit functions only)

#### 3. Integral (26 hrs)

- 3.1 Integration as inverse operation of differentiation with simple examples.

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

3.3 Evaluation of definite integrals (simple problems)-

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

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

3.4 Applications of integration for :

(a) Simple problem on evaluation of area bounded by a curve and axes.

(b) Calculation of volume of a solid formed by revolution of an area about axes. (Simple problems).

(c) To calculate average and root mean square value of a function and

(d) Area by Trapezoidal Rule and Simpson's Rule

#### 4. Statistics and Probability

(12 hrs)

4.1 Measures of Central Tendency: Mean, Median, Mode with example of daily life.

4.2. Measures of Dispersion: Mean deviation, Standard deviation

4.3. Probability definition and addition law of probability, theorem and simple numerical problems, General view of normal probability curve (No numericals)

4.4. Explanation of different sampling techniques ( No numericals )

#### 5. Differential Equations

(08 hrs)

5.1 Solution of first order and first degree differential equation by variable separation method (simple problems)

5.2. Differential equations of homogeneous equation

### INSTRUCTIONAL STRATEGY

Basic elements of Differential Calculus, Integral Calculus, Co-ordinate geometry 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
4. Applied Mathematics, Vol. I & II by SS Sabharwal & Sunita Jain, Eagle Parkashan, Jalandhar
5. Comprehensive Mathematics, Vol. I & II by Laxmi Publications
6. Engineering Mathematics by Dass Gupta
7. Engineering Mathematics by C Dass Chawla, Asian Publishers, New Delhi
8. Engineering Mathematics, Vol I, II & III by V Sundaram et.al, Vikas Publishing House (P) Ltd., New Delhi

9. Engineering Mathematics by N.Ch.S.N Iyengar et.al, Vikas Publishing House (P) Ltd., New Delhi
10. Engineering Mathematics, Vol I & II by SS Sastry, Prentice Hall of India Pvt. Ltd.,
11. Engineering Mathematics, Vol I & II by AK Gupta, Macmillan India Ltd., New Delhi
12. Applied Mathematics-II, Archana Sharma, Lords Publications, Jalandhar
13. Advanced Engineering Mathematics by Peter V.O,neil, University of Albama 2007 edition, Cengage Learning India Pvt. Ltd. Patparganj, New Delhi.

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

<b>Topic No.</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted (%)</b>
1	10	15
2	24	28
3	26	32
4	12	17
5	08	08
<b>Total</b>	<b>80</b>	<b>100</b>

## 2.3 APPLIED PHYSICS – II

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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

### DETAILED CONTENTS

- 1. Optics (12 hrs)**
  - 1.1 Review of basic optics laws: Reflection and Refraction
  - 1.2 Refractive index and magnification, image formation in lenses, lens formulae (thin lens only), power of lens, total internal reflection and their applications
  - 1.3 Simple concepts of interference, diffraction, Polarization and their applications like Commercial equipment, optic glasses and its manufacturing and use of Polarimeter in sugarcane industry and distilleries (No explanation required).
  - 1.4 Simple and compound microscope, astronomical telescope, magnifying power and its calculation (in each case) and their applications
- 2. Electrostatics (10 hrs)**
  - 2.1 Coulombs law, unit charge and electric lines of force
  - 2.2 Electric flux and Gauss's Law, Electric field intensity and electric potential
  - 2.3 Electric field due to point charge, straight charged conductor, plane charged sheet and charged sphere (Inside and outside the sphere)
  - 2.4 Capacitance, types of capacitors, capacitance of parallel plate capacitor, series and parallel combination of capacitors, Dielectric and its effect on capacitance, and dielectric break down
  - 2.5 Pollution, different types of pollution and polluting agents, Use of Electronics in reducing Air and Water pollution e.g. precipitation of microbes and moisture reparation from air and gases in industry (small explanation only)
- 3. DC Circuits (15 hrs)**
  - 3.1 Concept of electricity, various applications of electricity

- 3.2 Current, voltage, resistance, potential difference and e.m.f, power, electrical energy and their units, advantages of electrical energy over other forms of energy and Alternating Current and Direct Current
- 3.3 Ohm's law and its applications, specific resistance, effect of temperature on resistance, co-efficient of resistance, series and parallel combination of resistors an Resistance, Definitions of Conductance and Super Conductor's
- 3.4 Kirchoff's laws, Wheatstone bridge principle and its applications
- 3.5 Heating effect of current and concept of electric power, energy and their units, related numerical problems and their applications
- 3.6 Examples of DC Circuits e.g. Various electrical and electronic equipment CRO, T.V., Audio system, Computers (Only examples, no explanations)

**4. Electromagnetism (10 hrs)**

- 4.1 Magnetic field and its units, magnetic intensity, magnetic lines of force, magnetic flux and their units
- 4.2 Permeability and susceptibility and their applications. Electromagnetic Induction, Lenz's law and its uses like dynamo, Right hand and left hand rules, Magnetic lines of force due to straight conductor, Solenoid and Circular coil. Force on a current carrying rectangular coil placed in magnetic field and its uses in moving coil galvanometer, electric motor (Concept only). Lorentz force, Force on a current carrying conductor (straight and rectangular)
- 4.3 Moving coil galvanometer its principle, construction and working.

**5. Semiconductor physics (07 hrs)**

- 5.1 Energy bands, intrinsic and extrinsic semiconductors, p-n junction diode and its characteristics
- 5.2 Diode as rectifier – half wave and full wave rectifier, semiconductor transistor pnp and npn (concept only)

**6. Modern Physics (10 hrs)**

- 6.1 Lasers: concept of energy levels, ionizations and excitation potentials; spontaneous and stimulated emission; lasers and its characteristics, population inversion, types of lasers, Helium- Neon and ruby lasers their engineering and medical applications
- 6.2 Fibre optics: introduction to optical fiber materials, types, light propagation and applications in communication.

## **LIST OF PRACTICALS (To perform minimum eight experiments)**

1. To find the focal length of convex lens by displacement method.
2. To determine the magnifying power of an astronomical telescope
3. To verify ohm's laws by drawing a graph between voltage and current.
4. To verify laws of resistances in series and in parallel connection.
5. To find resistance of galvanometer by half deflection method
6. To measure very low resistance and very high resistance using Wheat Stone bridge
7. To determine the capacity of a parallel plate capacitor by discharging through a voltmeter and also find out the time constant of the given capacitor.
8. To draw characteristics of a pn junction diode and determine knee and break down voltages
9. To find wave length of He Ne semiconductor LASER.
10. Use of CRO in plotting AC/DC

## **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, dc circuits, electromagnetism, and semiconductor physics etc 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 for Class XI (Part-I, Part-II) N.C.E.R.T
2. Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi
3. Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
4. Fundamentals of Physics by Resnick, Halliday and Walker, Asian Book Pvt. Ltd., New Delhi
5. Fundamentals of Optics by Francis A. Jenkins & Harvey E White, McGraw Hill International Editions, Physics Series
6. A Text Book of Optics, Subramanian and Brij Lal, S Chand & Co., New Delhi
7. Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publishers
8. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
9. Applied Physics I & II by RA Banwait & R Dogra, Eagle Parkashan, Jalandhar
10. Applied Physics Vol II by Jasmer Kaur and Bhupinder Singh, Lords Publications, Jalandhar
11. Basic Electronics and Linear Circuits by NN Bhargava et al Tata Mc Graw Hill Publishers, New Delhi
12. Principles of Electronics by SK Sahdev, Dhanpat Rai and Co, New Delhi
13. Engineering Physics by Vanchna Singh and Sheetal Kumar, Cengage Learning India Pvt. Ltd. Patparganj, Delhi (year 2008)

### Suggested Distribution of Marks for Facilitating Paper Setter

<b>Sr No</b>	<b>Topic</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted (%)</b>
1	Optics	12	20
2	Electrostatics	10	15
3	DC Circuits	15	20
4	Electromagnetism	10	20
5	Semiconductor Physics	07	10
6	Modern Physics	10	15
	<b>Total</b>	<b>64</b>	<b>100</b>

## 2.4 BASIC ELECTRICAL ENGINEERING

[Common in ECE, I&C, Eltx. (Microprocessor) Computer Engg. & IT]

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### RATIONALE

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

### DETAILED CONTENTS

1. Overview of DC Circuits (06 hrs)
  - 1.1 Simple problems on series and parallel combination of resistors with their wattage consideration,
  - 1.2 Application of Kirchoff's current law and Kirchoff's voltage law to simple circuits. Star – Delta connections and their conversion.
2. DC Circuit Theorems (06 hrs)

Thevenin's theorem, Norton's theorem, application of network theorems in solving d.c circuit problems.
3. Voltage and Current Sources (04 hrs)
  - a) Concept of voltage source, symbol and graphical representation characteristics of ideal and practical sources.
  - b) Concept of current sources, symbol, characteristics and graphical representation of ideal and practical current sources.
4. Electro Magnetic Induction (10 hrs)
  - a) Concept of electro-magnetic field produced by flow of electric current, magnetic circuit, concept of magneto-motive force (MMF), flux, reluctance, permeability, analogy between electric and magnetic circuit.
  - b) Faraday's laws 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 (06 hrs)
- 5.1 Basic idea of primary and secondary cells
  - 5.2 Construction, working principle and applications of Lead-Acid, Nickel-Cadmium and Silver-Oxide batteries
  - 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
  - 5.7 Introduction to maintenance free batteries
6. AC Fundamentals (10 hrs)
- 6.1 Concept of alternating quantities
  - 6.2 Difference between ac and dc
  - 6.3 Concepts 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 for an alternating quantity and its derivation
  - 6.6 Effect of alternating voltage applied to a pure resistance, pure inductance and pure capacitance.
7. AC Circuits (16 hrs)
- 7.1 Concept of inductive 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, definition and significance of power factor.
  - 7.8 j-notation and its application in solving series and parallel ac circuits
  - 7.9 Definition of conductance, susceptance, admittance, impedance and their units
8. Various Types of Power Plants (06 hrs)
- 8.1 Brief explanation of principle of power generation practices in thermal, hydro and nuclear power stations and their comparative study. A Visit to a nearby Power Station(s) may be organized for better understanding and exposure.
  - 8.2 Elementary block diagram of above mentioned power stations

## LIST OF PRACTICALS

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

2. Determination of voltage-current relationship in a dc circuit under specific physical conditions and to draw conclusions.
3. Measurement of resistance of an ammeter and a voltmeter
4. Verification of dc circuits:
  - a.. Thevenin's theorem,
  - b. Norton's theorem,
5. Observation of change in resistance of a bulb in hot and cold conditions, using voltmeter and ammeter.
6. Verification of Kirchhoff's Current and 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. Computation of the voltage current relationship in single phase R-L and R-C series circuits, drawing of their impedance triangles and determination of the power factor in each case .
9. Charging and testing of a lead - acid storage battery.
10. Measurement of power and power factor in a single phase R-.L-.C. Circuit and calculation of active and reactive powers in the circuit.
11. Visit to a nearby Power Station(s) may be arranged

### **INSTRUCTIONAL STRATEGIES**

Basic electrical engineering being a fundamental subject, it needs to be handled very carefully and in a manner such that students develop clear understanding of the related concepts and principles. The teacher may lay more emphasis on laboratory work and give home assignments to students to inculcate self-study and problem solving abilities amongst them.

### **RECOMMENDED BOOKS**

1. Electrical Technology, Fifth Edition by Edward Hughes, Longman Publishers.
2. Basic Electrical and Electronics Engineering by SK Sahdev; Dhanpat Rai and Co, New Delhi.
3. Experiments in Basic Electrical Engineering by SK Bhattacharya, KM Rastogi; New Age International (P) Ltd.; Publishers New Delhi.
4. Electrical Science by Choudhury S.; Narosa Publishing House Pvt Ltd, Darya ganj, New Delhi.
5. Basic Electrical and Electronics Engineering by Kumar KM, Vikas Publishing House Pvt Ltd, Jang pura, New Delhi.
6. Electrical Technology by BL Theraja, S Chand and Co, New Delhi.
7. Basic Electricity by BR Sharma; Satya Prakashan; New Delhi.
8. Principles of Electrical Engineering by BR Gupta, S Chand and Co, New Delhi.
9. Basic Electrical Engineering by PS Dhogal, Tata Mc Graw-Hill publishing Company Ltd., New Delhi.
10. Basic Electrical Engineering by JB Gupta; SK Kataria and Sons, New Delhi.
11. Experiments in Basic Electrical Engineering by GP Chhalhotra, Khanna Publishers, New Delhi
12. Basic Electrical Engineering by J.S. Katre, Technical Max. Publication, Pune.

**SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING PAPER SETTER**

<b>Sr No</b>	<b>Topic</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted (%)</b>
1.	Overview of DC Circuits	06	8
2.	DC Circuit Theorems	06	10
3.	Voltage and Current Sources	04	08
4.	Electro Magnetic Induction	10	15
5.	Batteries	06	12
6.	AC Fundamentals	10	15
7.	AC Circuits	16	20
8	Various Types of Power Plants	06	12
	<b>Total</b>	<b>64</b>	<b>100</b>

## 2.5 BASIC ELECTRONICS

[Common in ECE, I&C, Eltx. (Microprocessor) Computer Engg. & IT]

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### RATIONALE

This subject gives the knowledge of fundamental concepts and principles of basic electronics and aims at providing the students with basic understanding of various types of materials such as conductors, semiconductors and insulators, extrinsic and intrinsic semi-conductors, p-n junction, need of rectifiers, significance and use of filters in rectifiers, basic structure and working principle of tunnel diodes, LEDs, varactor diodes, LCD; working of transistors in various configurations; fundamental knowledge of FETs and MOSFETs etc. and their applications. The teacher should give emphasis on understanding of concepts by explaining the various terms used in the subject. Practical exercises have been included in order to reinforce various concepts. Industrial/field exposure must be given by organizing industrial visit.

### DETAILED CONTENTS

1. Semi conductor physics: (12 hrs)
  - 1.1 Review of basic atomic structure and energy levels, concept of insulators, conductors and semi conductors, atomic structure of Germanium (Ge) and Silicon (Si), covalent bonds
  - 1.2 Concept of intrinsic and extrinsic semi conductor, process of doping.
  - 1.3 Energy level diagram of conductors, insulators and semi conductors; minority and majority charge carriers.
  - 1.4 P and N type semiconductors and their conductivity, effect of temperature on conductivity of intrinsic semi conductors.
  
2. Semi conductor diode: (12 hrs)
  - 2.1 PN junction diode, mechanism of current flow in PN junction, forward and reverse biased PN junction, potential barrier, drift and diffusion currents, depletion layer, concept of junction capacitance in forward and reverse biased condition.
  - 2.2 V-I characteristics, static and dynamic resistance and their value calculation from the characteristics.
  - 2.3 Application of diode as half-wave, full wave and bridge rectifiers. PIV, rectification efficiencies and ripple factor calculations, shunt capacitor filter, series inductor filter, LC and RC filters.
  - 2.4 Types of diodes, characteristics and applications of Zener diodes. Zener and avalanche breakdown.
  
3. Introduction to Bipolar-transistors: (12 hrs)
  - 3.1 Concept of a bipolar transistor, its structure, PNP and NPN transistors, their symbols and mechanism of current flow; Current relations in a transistor; concept of leakage current;
  - 3.2 CB, CE, CC configurations of a 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;

- 3.4 Transistor as an amplifier in CE Configuration; concept of dc load line and calculation of current gain and voltage gain using dc load line.
4. Transistor biasing Circuits: (06 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, ac load line and its use in calculation of current 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.
6. Field effect Transistors (12 hrs)  
Construction, operation and characteristics of FETs and their applications.
- 6.1 Construction, operation and characteristics of a MOSFET in depletion and enhancement modes and its applications.
- 6.2 C MOS - advantages and applications
- 6.3 Comparison of JFET, MOSFET and BJT.
- 6.4 FET amplifier circuit and its working principle. (Excluding Analysis).

## LIST OF PRACTICALS

1. Familiarization with operation and use of the following instruments.  
Multi-meter, CRO, Signal generator, LCR meter, Regulated Power Supply by way of taking readings of relevant quantities with their help.
2. Plotting of V-I characteristics of a PN junction diode
3. Plotting of V-I characteristics of a Zener diode
4. Measurement of the voltage gain, input and output impedance in a single state CE amplifier circuit.
5. Fabrication of:
  - a. Half-wave rectifier circuit using one diode
  - b. Full-wave rectifier circuit using two diodes
  - c. Bridge-rectifier circuit using four diodes
6. Observation of the wave shapes for the following rectifier circuit
  - d. Half-wave rectifier
  - e. Full-wave rectifier
  - f. Bridge-rectifier
7. Plotting of the wave shape of full wave rectifier with
  - a. Shunt capacitor filter
  - b. Series inductor filter
  - c. RC filter

8. Plotting of input and output characteristics and calculation of parameters of transistors in CE configuration.
9. Plotting of input and output characteristics and calculation of parameters of transistors in CB configuration.
10. Plotting of V-I characteristics of a FET based amplifier.
11. Measurement of the Q-point and observation of variation of Q-point by:
  - a. By increasing the base resistance in fixed bias circuit.
  - b. By changing out of bias resistance in potential divider circuit.
12. Measurement of voltage gain, input and output impedance in a 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, LCR meter, 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.

### **RECOMMENDED BOOKS**

1. Basic Electronics and Linear Circuit by NN Bhargava, Kulshreshta and SC Gupta, Tata McGraw Hill Publishing Company Pvt Ltd, 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 Company Pvt Ltd, 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 Company Pvt Ltd, New Delhi.
6. Basic Electronics by J.S. Katre, Sandeep Bajaj, Tech. Max. Publications, Pune.

### SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING PAPER SETTER

<b>Sr No</b>	<b>Topic</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted (%)</b>
1	Semi Conductor Physics	12	20
2	Semi Conductor Diode	12	20
3	Introduction To Bipolar-Transistors	12	20
4	Transistor Biasing Circuits	6	5
5	Single Stage Transistor Amplifier	10	15
6	Field Effect Transistors	12	20
	<b>Total</b>	<b>64</b>	<b>100</b>

## 2.6 BASICS OF INFORMATION TECHNOLOGY

L T P  
- - 3

### **RATIONALE**

Information technology has great influence on all aspects of life. Primary purpose of using computer is to make the life easier. Almost all work places and living environment are being computerized. The subject introduces the fundamentals of computer system for using various hardware and software components. In order to prepare diploma holders to work in these environments, it is essential that they are exposed to various aspects of information technology such as understanding the concept of information technology and its scope; operating a computer; use of various tools of MS office; using internet etc. form the broad competency profile of diploma holders. This exposure will enable the students to enter their professions with confidence, live in a harmonious way and contribute to the productivity.

### **Note:**

**Explanation of Introductory part should be dovetailed with practical work. Following topics may be explained in the laboratory along with the practical exercises. There will not be any theory examination.**

### **TOPICS TO BE EXPLAINED THROUGH DEMONSTRATION**

1. Information Technology – its concept and scope, applications of IT, impact of computer and IT in society.
2. Computers for information storage, information seeking, information processing and information transmission
3. Computer Application in office, book publishing, data analysis, accounting, investment, inventory control, graphics, Air and Railway Ticket reservation, robotics, Military, banks, Insurance financial transactions and many more
4. Elements of computer system, computer hardware and software; data types – numeric data, alpha numeric data; contents of a program, processing
5. Computer organization, block diagram of a computer, CPU, memory
6. Input devices; keyboard, Scanner, mouse etc; output devices; VDU and Printer, Plotter
7. Electrical requirements, inter-connections between units, connectors and cables
8. Secondary storage; magnetic disks – tracks and sectors, optical disk (CD, CD-RW and DVD), primary and secondary memory: RAM, ROM, PROM etc., Capacity; device controllers, serial port, parallel port, system bus
9. Installation concept and precautions to be observed while installing the system and software
10. Introduction about Operating Systems such as MS DOS, Windows, Windows NT etc. as an interface to Computer System
11. Special features, various commands of MS word and MS-Excel, MS PowerPoint
12. About the internet – server types, connectivity (TCP/IP, shell); applications of internet like: e-mail and browsing

13. Various Browsers like Internet explorer, Mozilla Fire fox, WWW (World wide web); hyperlinks; HTTP (Hyper Text Transfer Protocol); FTP (File Transfer Protocol)
14. Basics of Networking – LAN, WAN, Topologies
15. Ethics and information Technology
16. Future with information Technology

### ***LIST OF PRACTICALS***

1. *Given a PC, name its various components and peripherals. List their functions*
2. Practice in installing a computer system by giving connection and loading the system software and application software
3. Exercises on entering text and data (Typing Practice)
4. Installation of operating System viz. Windows XP, Windows 2007 etc.  
Features of Windows as an operating system
  - Start
  - Shutdown and restore
  - Creating and operating on the icons
  - Opening closing and sizing the windows
  - Using elementary job commands like – creating, saving, modifying, renaming, finding and deleting a file
  - Creating and operating on a folder
  - Changing setting like, date, time, colour (back ground and fore ground)
  - Using short cuts
  - Using on line help
5. MS-Word
  - File Management:
    - Opening, creating and saving a document, locating files, copying contents in some different file(s), protecting files, Giving password protection for a file
  - Page Set up:
    - Setting margins, tab setting, ruler, indenting
  - Editing a document:
    - Entering text, Cut, copy, paste using tool- bars
  - Formatting a document:
    - Using different fonts, changing font size and colour, changing the appearance through bold/ italic/ underlined, highlighting a text, changing case, using subscript and superscript, using different underline methods
    - Aligning of text in a document, justification of document, Inserting bullets and numbering
    - Formatting paragraph, inserting page breaks and column breaks, line spacing
    - Use of headers, footers: Inserting footnote, end note, use of comments
    - Inserting date, time, special symbols, importing graphic images, drawing tools

- Tables and Borders:
- Creating a table, formatting cells, use of different border styles, shading in tables, merging of cells, partition of cells, inserting and deleting a row in a table
- Print preview, zoom, page set up, printing options
- Using Find, Replace options
- Using Tools like:
  - Spell checker, help, use of macros, mail merge, thesaurus word content and statistics, printing envelopes and labels
  - Using shapes and drawing toolbar,
  - Working with more than one window in MS Word,
  - How to change the version of the document from one window OS to another
  - Conversion between different text editors, software and MS word

## 6. MS-Excel

- Starting excel, open worksheet, enter, edit, data, formulae to calculate values, format data, create chart, printing chart, save worksheet, switching between different spread sheets
- Menu commands:
  - Create, format charts, organise, manage data, solving problem by analyzing data, exchange with other applications. Programming with MS-Excel, getting information while working
- Work books:
  - Managing workbooks (create, open, close, save), working in work books, selecting the cells, choosing commands, data entry techniques, formula creation and links, controlling calculations, working with arrays
- Editing a worksheet, copying, moving cells, pasting, inserting, deletion cells, rows, columns, find and replace text, numbers of cells, formatting worksheet
- Creating a chart:
  - Working with chart types, changing data in chart, formatting a chart, use chart to analyze data
- Using a list to organize data, sorting and filtering data in list
- Retrieve data with query: Create a pivot table, customising a pivot table. Statistical analysis of data
- Exchange data with other application: embedding objects, linking to other applications, import, export document.

## 7. MS PowerPoint

- a) Introduction to PowerPoint
  - How to start PowerPoint
  - Working environment: concept of toolbars, slide layout, templates etc.
  - Opening a new/existing presentation
  - Different views for viewing slides in a presentation: normal, slide sorter etc.
- b) Addition, deletion and saving of slides
- c) Insertion of multimedia elements

- Adding text boxes
  - Adding/importing pictures
  - Adding movies and sound
  - Adding tables and charts etc.
  - Adding organizational chart
- d) Formatting slides
- Using slide master
  - Text formatting
  - Changing slide layout
  - Changing slide colour scheme
  - Changing background
  - Applying design template
- e) How to view the slide show?
- Viewing the presentation using slide navigator
  - Slide transition
  - Animation effects etc.
8. Working with MS Access
- a) Understanding different data types
  - b) Creation of table
  - c) Entering data in a table and modify it.
  - d) Creating simple Queries
9. Internet and its Applications
- a) Log-in to internet
  - b) Navigation for information seeking on internet
  - c) Browsing and down loading of information from internet
  - d) Sending and receiving e-mail
    - Creating a message
    - Creating an address book
    - Attaching a file with e-mail message
    - Receiving a message
    - Deleting a message

### **INSTRUCTIONAL STRATEGY**

Since this subject is practice oriented, the teacher should demonstrate the capabilities of computers to students while doing practical exercises. The students should be made familiar with computer parts, peripherals, connections and proficient in making use of MS office, MS Excel, MS Power Point and MS Access in addition to working on internet. The student should be made capable of working on computers independently

## **RECOMMENDED BOOKS**

1. Fundamentals of Computer by V Rajaraman; Prentice Hall of India Pvt. Ltd., New Delhi
2. Information Technology for Management by Henery Lucas, 7<sup>th</sup> edition, Tata Mc Graw Hills, New Delhi
3. Computers Fundamentals Architecture and Organisation by B Ram, revised Edition, New Age International Publishers, New Delhi
4. Computers Today by SK Basandara, Galgotia publication Pvt Ltd. Daryaganj, New Delhi.
5. MS-Office 2000 for Everyone by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., New Delhi
6. Internet for Every One by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
7. A First Course in Computer by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
8. Mastering Windows 95, BPB Publication, New Delhi
9. Computer Fundamentals by PK Sinha; BPB Publication, New Delhi
10. Fundamentals of Information Technology by Leon and Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
11. On Your Marks - Net...Set...Go... Surviving in an e-world by Anushka Wirasinha, Prentice Hall of India Pvt. Ltd., New Delhi
12. Learning MS Office XP by Ramesh Bangia, Khanna Book Publishing Co. (P) Ltd., New Delhi.
13. Fundamentals of Information Technology by Vipin Arora, Eagle Parkashan, Jalandhar

## 2.7 GENERAL WORKSHOP PRACTICE - II

L T P  
- - 6

### RATIONALE

As we know that, the psychomotor skills are mastered through practice, an opportunity therefore, has been extended to students through this course to refine their skills in different trades. The basic skills developed during first semester will be refined during this course by doing higher order skills jobs. In addition to developing general manual and machining skills in the students, the objective of development of sense of dignity of labour, precision, safety at work places, team working and right attitude among the students will also be met.

### DETAILED CONTENTS (PRACTICALS)

The following shops are included in the syllabus. Student can opt relevant shops depending upon the need of his/her branch of diploma programme :

1. Carpentry and painting shop-II
2. Fitting shop -II
3. Welding shop -II
4. Electric shop -II
5. Smithy shop -II or Electronic shop-II
6. Sheet Metal Shop -II

#### Note:

1. The branches e.g. Civil Engineering, Electrical Engineering, Mechanical Engineering, Mechanical (RAC), Production and Industrial Engineering will do **Smithy Shop -II** instead of Electronic shop- II  
**and**
2. The branches e.g. Electronics and Communication Engineering, Electronics (with Specialization in Microprocessor), will do **Electronic shop- II** instead of Smithy Shop-II
3. The instructor is to first explain the introductory part given at the beginning under each shop followed by demonstration and practice by students.

### 1. Carpentry and Painting Shop - II

- 1.1 Introduction to joints, their relative advantages and uses.  
Job I Preparation of Dovetail joint and glued joint.  
Job II Preparation of Mitre Joint  
Job III Preparation of a lengthening Joint  
Job IV Preparation of atleast one utility job with and without lamination.
- 1.2 Demonstration of job showing use of Rip Saw, Bow saw and Tenon saw, method of sharpening various saws.
- 1.3 Demonstration of job on Band Saw and Circular Saw, Chain and Chisel, Universal wood working machine, Saw re-sharpening machine, Saw Brazing unit.
- 1.4 Importance and need of polishing wooden items, Introduction to polishing materials.  
Job V Preparation of surface before polishing including prime coat.  
Job VI Polishing on wooden items.

## **2 Fitting Shop – II**

- 2.1 Introduction to various types of threads (internal, external)-single start, multi-start, left hand and right hand threads.
- 2.2 Description and demonstration of various types of drills, taps and dies Selection of dyes for threading, selection of drills and taps for tapping operations.  
Job I Making internal and external threads on a job by tapping and dieing operations (manually)
- 2.3 Precautions while drilling soft metals, e.g. Copper, Brass, Aluminium etc.  
Job II Drilling practice on soft metals (Aluminum, Brass and Copper)
- 2.4 Care and maintenance of measuring tools like calipers, steel rule, try square, vernier calipers, micrometer, height gauge, combination set. Handling of measuring instruments, checking of zero error, finding of least count.  
Job III Preparation of a job by filing on non-ferrous metal up to an accuracy of  $\pm 0.1\text{mm}$   
Job IV Preparation of job involving thread on GI pipe/ PVC pipe and fixing of different types of elbow, tee, union, socket, stopcock, taps, etc

## **3. Welding Shop – II**

- 3.1 Introduction to gas welding, spot welding and seam welding and machinery and equipment used. Adjustments of different types of flames in gas welding, demonstration and precautions about handling welding equipment.  
  
Job I Practice in handling gas welding equipment (Low pressure and High pressure) and welding practice on simple jobs.
- 3.2 Common welding joints generally made by gas welding.  
  
Job II Preparation Butt joint by gas welding.  
Job III Preparation of small cot frame from conduit pipe by electric arc welding/gas welding.  
Job IV Preparation of square pyramid from MS rods by welding (type of welding to be decided by students themselves).  
Job V Exercise of preparing a job on spot/seam welding machine.

## **4 Electric Shop – II**

- 4.1 Importance of three-phase wiring and its effectiveness.  
Job I Laying out 3 phase wiring for an electric motor or any other 3 phase machine.
- 1.1 Estimating and costing of power connection.  
  
Job II Connecting single-phase energy meter and testing it. Reading and working out the power consumption and the cost of energy.  
Job III Checking continuity of connection (with tester and series lamp) location of faults with a multimeter) and their rectification in simple machines and/or other electric circuits fitted with earthing.

- 1.2 Demonstration of dismantling, servicing and reassembling a table fan/ceiling fan/air cooler/mixer/electric iron, Electric heater, geyser, electric oven, air conditioner etc.

Job IV Dismantling, servicing and reassembling of any of the above electrical appliances.

Job V Testing Single phase/three phase electrical motor by using voltmeters, ammeter, clip on meter, tachometer etc.

Job VI Reversing the rotation of a motor.

## **5. Smithy Shop – II**

- 5.1 Introduction to various heat treatment processes e.g annealing, hardening, tempering, normalizing etc.

- 5.2 Description of various types of power hammers and their usage (Demonstration only).

Job I To forge a ring to acquaint the students with forge welding

Job II To forge a chisel and acquaint the students with simple idea of hardening and tempering .

Job III To forge squares on both ends of a circular rod

Job IV To forge a single/double ended spanner.

Job V To prepare a job involving drawing down process

**OR**

## **6. Electronic Shop- II**

- 6.1 Demonstrate the jointing methods. mounting and dismantling as well as uses of the items mentioned below:

a) Various types of single, multi-cored insulated screened power, audio video, co-axial, general purpose wires/cables

b) Various types of plugs, sockets connectors suitable for general purpose audio and video use, 2 and 3 pin mains plug and sockets.

Banana-plugs, and sockets, BNG, RCA, DIN, UHF, Ear phone speaker connector, telephone jacks and similar male and female connectors and terminal strips.

c) Various types of switches such as: normal/ miniature toggle, slide, push button, piano key, rotary, micro switches, SPST, SPDT, DPST, DPDT, band selector, multi way Master Mains Switch.

d) Various types of protective devices such as : Wire fuse, cartridge fuse, slow acting/fast acting fuse, HRC fuse, thermal fuse, single/multiple circuit breakers, over and under current relays.

- 6.2 Identification and familiarisation with active and passive components; colour code and types of resistor, capacitors and potentiometers (including VDR, LDR, and thermistor). Identification of components including LED, LCD, UJT, FET, Coils, relays, switches (SPDT, DPDT, etc.) connectors, micro switches, read relays, transformers (mains, audio and RF, etc) Linear and Digital ICs, Thyristors, etc.

6.3 Demonstrate the following:

- 1) To make perfect solder joints and soldering on PCBs
- 2) To remove components/wires by unsoldering.
- 3) To assemble components on boards, chassis, tape strips.
- 4) Various laying methods of cables
- 5) Exposure to modern soldering and de-soldering processes
- 6) Field visits to relevant work-places

Job I De-solder, remove and clean all the components, wires from a given equipment, a PCB or a tap strip using the following:

Job II Soldering Iron

Job III Temperature Control Soldering Iron

Job IV De-soldering Pump

Job V De-soldering Strip

Job VI Wiring of a small circuit on a PCB/tag strip involving lacking, sleeving and use of identifier tags

## **6. Sheet Metal Shop-II**

6.1 Introduction to various metal forming processes e.g. Spinning, Punching, Blanking, cup drawing

6.2 Introduction to soldering and brazing.

6.3 Introduction to metal spinning process.

Job I Preparation of job involving shearing, circular shearing, rolling, folding, beading and soldering process e.g. Funnel or any other job involving above operations.

Job II Exercise on job involving brazing process

Job III Spinning a bowl/cup/saucer

Job IV Visit to a sheet metal industry e.g. coach builders etc.

## **RECOMMENDED BOOKS**

1. Workshop Technology I,II,III, by S K Hajra, Choudhary and A K Choudhary. Media Promoters and Publishers Pvt. Ltd., Bombay
2. Workshop Technology by Manchanda Vol. I,II,III India Publishing House, Jalandhar.
3. Manual on Workshop Practice by K Venkata Reddy; MacMillan India Ltd. New Delhi
4. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi
5. Workshop Technoogy by B.S. Raghuwanshi, Dhanpat Rai and Co., New Delhi
6. Workshop Technology by HS Bawa, Tata McGraw Hill Publishers, 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 eco system and controlling pollution by pollution control measures. He should also be aware of environmental laws related to the control of pollution.

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

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