**Semester I**

**Course Title – Language (English)**

**Code: ZDSE-101 Course Credit: 04**

**Max Marks: 100**

 **Theory:50**

**Practical:50**

**LTP: 202**

**Objectives:** Develop effective communication skills among the students for the business world.

**Learning Outcomes**:

* Able to differentiate in the vowels and consonants that can help the students to pronounce words better and be able to learn phonetics.
* Learn the correct pronunciation of the words helping in the reduction of Mother Tongue Influence.
Able to communicate effectively and will have improved verbal communication.
* Learn to frame the sentences properly with the correct formation. This will improve the written skills of the students.
* Able to write paragraphs on different topics with the correct usage of vocabulary and will improve the written as well as verbal communication.
* Learn the correct usage of the punctuation marks, will draft formal & informal emails and will comprehend the articles.
* Effectively use established communication systems and protocols in the workplace.

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| **Unit Number** | **Key Learning** |
| **Unit-I** **Communication:**  | Meaning of Communication, Importance of Communication, Types of Communication, Process of Communication, Communication network in an organization, Barriers to Communication, Essentials of good Communication. |
| **Unit-II****Grammar and Usage** | Subject and verb agreement, Tenses: simple past (negatives/interrogatives) present perfect, past perfect continuous, past perfect, expressing future time (will and going to), Passive voice (perfect tenses and modals), Modals (must, should ought to, would), Linking words (to like because although, instead of, if, as, since, who, which that, when however, in spite of), Reported speech, statements, questions (yes/no). |
| **Unit-****Reading Skills** | Prose texts: The Gift of the Magi by O. HenryPoems: 1. Death the Leveller by James Shirely 2. Mending wall – Robert FrostDrama: Refund by Fritz Karinthy |
| **Unit-IV** **Listening Skills** | The process of listening, Types of listening, Benefits of effective listening, Barriers to listening. |
| **Unit-V****Writing Skills** | Paragraph Writing:(Describing objects, describing people, Narrating events, stories)Letter Writing: Application for leave Application for jobs, asking for information from various agencies (e.g. Last date for getting prospects; price of items before placing orders)Note making Ending (punctuation, spelling, appropriate vocabulary, structures) |

**Practical:**

1. Greetings and starting a conversation.
2. Nov Verbal Communication Techniques during conversation.
3. Verbal Communication Techniques during Conversation.
4. PPT presentation.
5. Debate.
6. Situational dialogues / Role play.
7. Telephonic skills.
8. Group Discussions

**Books Recommended**

**1. Sethi, J &amp; et al. A Practice Course in English Pronunciation, Prentice Hall of**

**India, New Delhi.**

**2. Sen, Leena. Communication Skills, Prentice Hall of India, New Delhi.**

**3. Prasad, P. Communication Skills, S.K. Kataria&amp; Sons.**

**4. Bansal, R.K. and J.B. Harrison. Spoken English, Orient Language.**

**5. Roach Peter. English Phonetics and Phonology.**

**6. A.S. Hornby&#39;s. Oxford Advanced Learners Dictionary of Current English, 7th Edition.**

**7. Prasad, P. The Functional Aspects of Communication Skills, Delhi.**

**8. McCarthy, Michael. English Vocabulary in Use, Cambridge University Press.**

**9. Rajinder Pal and PremLata. English Grammar and Composition, Sultan Chand**

**Publication.**

**10. Idioms &amp; Phrases (English-Hindi), Arihant Publication (India) Pvt. Ltd.**

**11. One Word Substitution, Dr. Ashok Kumar Singh, Arihant Publications (India) Pvt,**

**Ltd**

**Course Title – Applied Mathematics -I**

**Code: ZDSC-101 Course Credit: 04**

**Max Marks: 100**

 **LTP: 400**

**Objectives:**Develop the knowledge in the area of algebraic functions to solve engineering problems.

**Learning Outcomes:**

* Learn the applications of Sets, Relations and Functions.
* Learn to solve special series and sequences
* Understand basic arithmetic and calculation methods.
* Learn co-ordinate Geometry.
* Learn to solve Statistics and Probability related problems.

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| **Unit** | **KEY LEARNING** |
| **Unit-I** **Sets, Relations and Functions**  | Theory of Sets, Relations, Functions, Polynomials and Graphical Representation |
| **Unit-II** **Sequence and Series** | Introduction to Sequence and Series, Arithmetic Progression (A.P.), Geometric Progression (G.P.), Harmonic Progression (H.P.) |
| **Unit-III****Algebra-I** | Partial Fraction, Permutation, Combination, Binomial Theorem  |
| **Unit-IV** **Trigonometry** | Trigonometric Ratio, Compound Angles, Multiple and sub multiple angles, Transformations of products into sums or differences and vice versa |
| **Unit-V** **Straight Lines**  | Cartesian and Polar Coordinate, Different Forms of a Straight Line, General Equation of a Line, Distance of a Point from a Line |

**Suggested Readings**:

1. Mathematics for class XI Part I and II NCERT.
2. Mathematics for class XII Part I and II NCERT.

**Web URLs:**

* + - 1. www.ncert.nic.in
			2. www.nios.ac.in

**Course Title – Environmental Studies**

**Code: ZDGE-105 Course Credit: 04**

**Max Marks: 100**

 **LTP: 400**

**Objectives:**Create awareness between the students about our ecosystem, related problems and our role in that.

**Learning Outcomes:**

* Encourage to solve the environment related problems and Make other people aware about environment problems
* Comply with the safety policies of ecosystem and environment
* Identify and recommend the opportunity for improving the environment hazards to the organization and society
* Report the polices and procedure need to adapt for environmental safety
* Create awareness among the employees and the society regarding the hazards of environmental pollution.

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| **Unit** |  **KEY LEARNING** |
| **Unit-I****Understanding ourEnvironment** | Definition, Scope and Importance, Natural Resources, Forest Resources, Water Resources, Mineral Resources, Energy Resources, Food Resources, Land Resources. |
| **Unit-II** **Livingthings inEcosystem** | What is Ecosystem, Habitat and ecological niche, interaction of species with each other, adapting to environment, bio geographic zones of India, Energy flow in ecosystem, cycling of materials, Kinds of ecosystem. |
| **Unit-III****Atmosphereand Climate** | The atmosphere, layers of the atmosphere, climate, greenhouse effect, theOzone layer, deforestation, soil erosion |
| **Unit-IV** **Urbanisation** | Causes of urbanisation, Manifestations of Urbanisation, social economic and environmental problems in urbanisation, Agriculture, unsustainablepatterns of modern industrialised agriculture, green revolution. |
| **Unit-V** **Environmental Pollution** | Causes of Air pollution, major air pollutants, classification of air pollutants,thermal inversions, photochemical smog, acid preparation in air, impact ofAir Pollution. |

**Field work**

• Visit to a local area to document environmental assets river/forest/grassland/hill/mountain

• Visit to a local polluted site-Urban/Rural/Industrial/Agricultural

• Study of common plants, insects, birds.

• Study of simple ecosystems-pond, river, hill slopes, etc.

**Recommended Books**

**Text Books**

E- book:<https://ugc.ac.in/oldpdf/modelcurriculum/env.pdf>

**Reference Books**

1. Industrial Safety and Health management” Pearson Prentice Hall,2003 by C.RayAsfahl

2. National Safety Council, “Accident Prevention Manual for Industrial Operations”, N. S. C. Chicago, 1988.

3. Industrial Accident Prevention” McGraw-Hill Company, New York,1980 by Heinrich H.W.

**Course Title – Basics of Electronics Engineering**

**Code: EDEC-107 Course Credit: 03**

**Max Marks: 100**

 **Theory:50**

**Practical:50**

**LTP: 201**

**Objectives:**Exposure to the concepts, theories and practices in the field of electronics and identify its unique vocabulary.

**Learning Outcomes:**

* Able to understand the emergence of electrons and electronic engineering.
* Identify different electronic components and understand basic concept of current and voltage.
* Able to explain the basic concept of semiconductor diodes like p-n junction diodes and Zener diodes.
* Able to describe the working of rectifier circuits such as half and full wave rectifiers.
* Able to demonstrate the working of SMPS, inverters and UPS.

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| **Unit Number** | **Key Learning** |
| **Unit-I****Overview of Atom and Sub-Atomic Particles**  | Atom and its elements, Electron, Force, Field intensity, Potential, Energy, Kinetic energy, energy Mass Relationship. |
| **Unit-II****DC Circuits** | Electronic components, Active and Passive components, Concept of Current and Voltage sources, Constant voltage and current sources, Conversion of voltage source into current source and vice versa. |
| **Unit-III** **Basics of Semiconductor** | Semiconductor materials, Metals and Semiconductors and Photo-electric emission. N-type and P-type semiconductor, PN junction diode, Forward & Reverse bias, Zener diode. |
| **Unit-IV****Introduction to electronic components** | Photo diode, LED, Types and applications of diode. Diode as a rectifier, Half wave and full wave rectifier, Introduction to Filters. |
| **Unit-V****Power supply** | Introduction and Working of Switched Mode Power Supply (SMPS), Voltage Regulator, Introduction to Inverters and UPS. |

**Practical:**

1. Identification and testing of electronic components such as resistor, inductor, capacitor, diode, transistor and different types of switches used in Electronic circuits
2. Study of current, voltage and resistance measurement using of Multi-meter
3. Study of Power and Energy measurement using Wattmeter and Energy meter**.**
4. Study of V-I Characteristic of Diode.
5. Observation of input and output wave shapes of a half-wave rectifier and verification of relationship between dc output and ac input voltage
6. Observation of input and output wave shapes of a full wave rectifier and verification and relationship between dc and ac input voltage
7. Study of V-I Characteristic of Zener Diode. And use of Zener Diode as voltage regulator.
8. Design of 7 segment display using LED and bread board.
9. Study of SMPS Circuit.

**Recommended Books**

1. Basic Electronics and Linear Circuit by NN Bhargava, Kulshreshta and SC Gupta, Tata McGraw Hill Education Pvt Ltd, New Delhi.

2. Electronic Principles by SK Sahdev, Dhanpat Rai & Co., New Delhi

3. Principles of Electrical and Electronics Engineering by VK Mehta; S Chand and Co., New Delhi

**Reference Books**

1. Electronic Components and Materials by SM Dhir, Tata McGraw Hill Publishing Company Pvt Ltd, New Delhi

**Course Title – Applied Physics**

**Code: ZDSC-109 Course Credit: 03**

**Max Marks: 100**

 **Theory:50**

**Practical:50**

**LTP: 201**

**Objectives**:Enhance the learning activities and the required knowledge of students in the area of basic physics and Optics.

**Learning Outcomes**:

* Able to differentiate between fundamental and derived units.
* Able to understand the concept of surface tension and viscosity.
* Able to explore different types of vibrations.
* Able to understand the concept of heat.
* Able to demonstrate the concept of light using reflection and refraction.

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| **Unit Number** | **Key Learning** |
| **Unit-I** **Units & Dimensions** |  M.K.S. fundamentals & derived units, S.I. base units supplementary units and derived units, Dimensions of various physical quantities, uses of dimensional analysis. |
| **Unit-II** **Surface Tension and Viscosity** | Molecular forces, molecular theory of surface tension, surface energy, capillary action, concept of viscosity, coefficient of viscosity, principle and construction of viscometers. |
| **Unit-III** **Vibrations** | Vibration as simple spring mass system, elementary and qualitative concept of free and forced vibrations, resonance. Effects of vibrations on building bridges and machines members. |
| **Unit-IV** **Heat** | Temperature and its measurement, thermoelectric, platinum resistance thermometers and pyrometers. Conduction through compound media and laws of radiations. |
| **Unit-V** **Optics** | Nature of light, reflection and refraction of a wave from a plane surface. Overhead projector and Epidiascope. |

**Practical:**

1. To determine the surface tension of a liquid by rise in capillary.
2. To determine the viscosity of a given liquid.
3. To determine the frequency of tuning fork using a Sonometer.
4. To determine the frequency of AC main using Sonometer.
5. Time period of a cantilever.
6. Familiarisation with vernier calliper, screw gauge and spherometer and determination of their vernier constants and least counts
7. To find diameter of solid cylinder using a vernier calliper
8. To find diameter of hollow cylinder using vernier calliper
9. To find area of cross-section of wire/needle using screw gauge
10. To find thickness of glass strip using spherometer.

**Subject Name: On The Job Training T P C**

**Paper Code: EOJT-IE-101 - - 12**

**Total Marks: 350 Practical (External):105 Practical (Internal): 245**

**Objectives:** Build basic understanding about the tasks of cutting, crimping and connector assembly operator

**Learning Outcomes**:

* Able to understand the cutting opeartions.
* Exposed to the crimping concepts
* Build an understanding on connector assembly operations.

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| **Unit** | **Key Learning** |
| **Unit-I** **Cutting Wire** | 1.1 Inserting of wire in machine and run the cutting program1.2 Program the cutting machine for wire type and length of cut and insulation stripping.1.3 Cut and strip wire manually as per instructions on length of cut. 1.4 Checking wire cutting for consistency and conforming to standards. |
| **Unit-II** **Safe and healthy working environment** | * 1. Keep the machine, equipment and surrounding clean and orderly.
	2. Maintain the environment Safe and healthy for working.
	3. Conveying the environmental Message to Team and colleagues.

1.4 Timely updation and maintenance as and when required |
| **Unit-III** **Crimping pins** | * 1. Operating the press machine for crimping wire by using hand nad leg combination.
	2. Checking of combination of single side or double side crimping as per drawing.
	3. Checking visually for straight and damage –free pins
 |
| **Unit-IV****Assembling connectors** | * 1. Understand the concept of using certified and cut wire.
	2. Understand the process of inserting wire into housing manually and lock

1.3 Checking of loose wiring or crimping or wrong combinations |
| **Unit-V** **5S activity** | * 1. Understand 5S and its implementation
	2. Ensure implementation of 5S activities at the shop floor and the office area.

Create awareness of these activity in the team and also in collegues.. |

**Semester II**

**Course Title – Applied Chemistry**

**Code: ZDSC-102 Course Credit: 04**

**Max Marks: 100**

 **Theory:50**

**Practical:50**

**LTP: 202**

**Objectives**: Enable to develop the concept, processes, theoretical principles and experimental findings in Chemistry.

**Learning Outcomes:**

* Able to understand different symbols and formulae of Chemistry.
* Able to differentiate between different models of atoms and understand the electronic configuration of different atoms.
* Able to explore different periodic properties of elements.
* Able to outline different sources and quality of drinking water.
* Able to provide the difference between different types of lubricants.
* Able to outline various types of corrosion and their preventive measures.
* Able to define polymers and demonstrate its properties.

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| **Unit** | **KEY LEARNING** |
| **Unit-I****Basic concept of Chemistry** | S.I. Units of pressure, volume, density, specific gravity, surface tension and viscosity; Matter, element, compound and mixtures, atoms, molecules, ions, symbols and formulae, Writing chemical formulae of simple chemical compounds |
| **Unit-II****Atomic structure and Chemical Bonding** | Rutherford model of the structure of atom, Bohr's theory of electrons, atomic number, quantum numbers, electronic configuration of 1 to 30 elements, Chemical bond, types of chemical bonding: ionic and covalent (sigma and pie bonds) with suitable examples. |
| **Unit-III****Periodic Properties of Elements** | Periodic law, periodic table, periodicity in properties like atomic radii and volume, ionic radii, ionization energy and electron affinity. Division of elements into s, p, d and f blocks. |
| **Unit-IV** 1. **Water**
2. **Lubricants**
 | 1. Sources of Water, Types of Water (Hard and soft water), Quality criteria of drinking water (with special emphasis on hardness, total dissolved solids (TDS), Chloride, alkalinity present in water)
2. Introduction to lubricants and lubrication, Principle of Lubrication, Properties of lubrication, Types of lubrication, bio-degradable lubricants, Additives of lubricants
 |
| **Unit-V** 1. **Corrosion**
2. **Polymers**
 | 1. Definition, Direct chemical action theory, Electrochemical theory, Prevention of Corrosion (Alloying, providing metallic coatings, Cathodic protections, Heat treatment), Types of Corrosion.
2. Definition, monomer and degree of polymerization, Brief introduction of addition & condensation polymers with suitable examples (PVC, Polyester, Teflon, Nylon 66, Bakelite), Applications of Polymers.
 |

**Practical:**

1. Determination of strength of given HCl iterating against N/10 NaOH volumetrically.
2. Volumetric analysis and study of apparatus used therein. Simple problems on volumetric analysis equation
3. Estimation of total alkalinity of water volumetrically
4. Determine the pH of given sample using pH meter
5. Determination of total, temporary and permanent hardness of given water sample.
6. To determine the flash and fire point of a given lubricating oil.
7. To determine the viscosity of a given lubricating oil by Redwood viscometer.
8. Detection of metal iron in the rust (solution of rust in concentrated HCl may be given)
9. Synthesis of Urea formaldehyde and Bakelite polymer.

**Course Title – Applied Mathematics-II**

**Code: ZDSC-104 Course Credit: 04**

**Max Marks: 100**

 **LTP: 400**

**Objectives:** Make use of matrices, determinants, complex numbers and geometric concepts to solve engineering problems

**Learning Outcomes:**

* Able to acquire knowledge in the area of relations and functions.
* Make use of Limits, continuity and geometric progression and their wider applications in engineering problems.
* Will be able to solve problems related to matrices and determinants.
* Will be able to do vector analysis.
* Able to understand geometric concepts.

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| **Unit** | **KEY LEARNING** |
| Unit-I Relations and Functions  | Types of Relations, Types of Functions, Composition of Functions, Invertible Functions |
| Unit-II Calculus | Limit, Continuity, Differentiation Geometric Progression (G.P.), Integration |
| Unit-IIIAlgebra-II | Complex Numbers, Matrices, Determinants, Probability |
| Unit-IVVector Analysis | Introduction, Position Vector, Products of Vectors., Physical Applications |
| Unit-V Conic Section  | Circle ,Parabola, Ellipse, Hyperbola |

**Suggested Readings**:

Mathematics for class XI Part I and II NCERT.

1. Mathematics for class XII Part I and II NCERT.
2. Engineering Mathematics - Part I & II by H.K. Dass, S. Chand & Co.

**Web Links:**

* + - 1. www.ncert.nic.in
			2. [www.nios.ac.in](http://www.nios.ac.in)

**Course Title – Value Education**

**Code: ZDGE-106 Course Credit: 04**

**Max Marks: 100**

 **LTP: 400**

**Objectives:** Use the principles and tools for the development of the person

**Learning Outcomes:**

* Able to outline the need, objectives and types of Value Education.
* Will be able to make use of self-Exploration and Ethical Corporate Behavior in the organization.
* Apply the Social Values wherever required.
* Apply ethical and inclusive practices in professional practice
* Make the application of 7 Habits when required in the organization.
* Will make the swatch Bharat Campaign as important aspect of your organization.
* Use resources correctly and efficiently.
* Keep your immediate work area clean and tidy.
* Ensure your work meets the agreed requirements.

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| **Unit** | **Key learning** |
| **Unit-I** **Introduction**  | Definition of Values-Why values? –Types of Values: i) Personal values ii) Social values iii) Professional values iv) Moral and spiritual values v) Behavioural (common) values) |
| **Unit-II** **Self-Exploration** | Self-Exploration–what is it? - its content and process, Ethical Corporate Behaviour, its Development, Ethical Leadership. |
| **Unit-III** **Cultural values** | Culture, Concepts Values and Ethics, Human Values-Classification of Values, Understanding Harmony in the Human Being |
| **Unit-IV** **Social Values** | Definition of Society – Units of Society – Individual, family, different groups – Community – Social consciousness – Equality and Brotherhood – Dialogue – Tolerance – Responsibility. |
| **Unit-V** **Unit-V Habits** | Habits, Swach Bharat Abhiyan |

**Text Books**

Eternal Human Values NCRT-Campus Sri Aurobindo Marg., New Delhi by Prof.R.P.Dhokalia.,

**Reference Books**

1. Values for life, Better yourself Books, Bandra Mumbai by Dr. S. Ignacimuthu S.J.,

2. Values (Collection of Essays) by Sri Ramakrishna Math, Chennai-4., (1996)

**Course Title – Basics of Electrical Engineering**

**Code: EDEE-108 Course Credit: 03**

**Max Marks: 100**

**Theory: 50**

**Practical: 50**

 **LTP: 201**

**Objectives:** Provide quality electrical engineering knowledge with extensive hands-on and laboratory experience.

**Learning Outcomes:**

* Outline various electrical quantities and their units.
* Able to derive Ohm’s Law and make use of its applications.
* Make use of the capacitors and use them in series and parallel connection.
* Able to understand the electromagnetic effects and its laws.
* Outline the various concepts of AC Circuits and its connection with resistance, inductance and capacitance.

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| **Unit** | **Key learning** |
| **Unit-I** **Basic Electrical Quantities** | Basic concept of charge, current, voltage, resistance, power, energy and their units, Conversion of units of work, power and energy from one form to another |
| **Unit-II** **DC Circuits** | Ohm’s Law, Series – parallel resistance circuits, calculation of equivalent resistance, Kirchhoff’s Laws and their applications. |
| **Unit-III** **Capacitors** | Capacitor and its capacity, Concept of charging and Discharging of capacitors, Types of Capacitors and their use in circuits, Series and parallel connection of capacitors, Energy stored in a capacitor.  |
| **Unit-IV** **Electromagnetic Effects** | Permanent magnets and Electromagnets, Faraday’s Laws of Electromagnetic Induction, dynamically induced e.m.f., its magnitude and induction, inductance and its unit. Mutually induced e.m.f., its magnitude and direction. Force acting on a current carrying conductor in magnetic field, its magnitude and direction. |
| **Unit-V** **AC Circuits** | Concept of AC Generation, Difference between AC and DC, Concept of alternating current and voltage, equation of instantaneous values, average value, r.m.s value, form factor, power factor etc., A.C. Series Circuits with (i) resistance and inductance (ii) resistance and capacitance and (iii) resistance inductance and capacitance  |

**Practical:**

1. Verify that resistance of conductor is directly proportional to resistivity and length and inversely proportional to cross- sectional area of the conductor
2. Verification of Ohm’s Law
3. Study of series resistive circuits
4. Study of parallel resistive circuits.
5. Verification of Kirchhoff’s current and voltage laws applied to DC circuits
6. Charging and Discharging of a capacitor
7. Verification of Faraday’s Laws of electromagnetic induction.
8. To find ratio of inductance values of a coil having air /iron core respectively and to see the effect of introduction of a magnetic core on coil inductance
9. Study of R.L., R.L.C and R.C series circuit and measurement of power and power factor.

**Course Title – Basics of Computer**

**Code: ZDFC-108 Course Credit: 03**

**Max Marks: 100**

**Theory: 50**

**Practical: 50**

 **LTP: 201**

**Objective:**Build basic technical skills and develop any kind of computer application**.**

**Learning Outcome**

* State the applications of Computers and understand the basic components of computer.
* Identify & describe various parts of computers like CPU, keyboard, monitor, etc.
* View files, work with files and customize window.
* Able to Differentiate in various operating system.
* Apply the office Applications for the task assigned by the authorities.
* Outline the basics of Networking.
* Make use of Internet and its applications when required.

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| **Unit** | **Key learning** |
| **Unit-I** **Introduction to Computer system** | Basic Applications of Computer; Block Diagram of Computer System, Input / Output Devices, Computer Memory, Concepts of Hardware and Software; Computer Virus: Definition, Types of viruses, Characteristics of viruses, Anti-virus software. |
| **Unit-II** **Operating System** | Overview of operating system: Definition, Functions of operating system, Need and its services, Types of operating system, Batch Processing, Spooling, Multiprocessing, Multiprogramming, Time-Sharing, Comparison between DOS and windows, Comparison between Unix and Windows. |
| **Unit-III** **Office Applications** | Introduction to MS Word, Introduction to MS Excel, Introduction to MS PowerPoint, Menus, Shortcuts, Document types, Formatting documents, spread sheet and presentations, Working with Spreadsheets, Different templates. |
| **Unit-IV** **Networking** | Network Technologies, Introduction to Internet: Network connecting devices, Topologies, HTTP, HTTPS DNS, Hub, Switches, Router, Repeator, Firewalls. |
| **Unit-V** **World Wide Web** | WWW and Web Browsers Introduction, Objectives, Concept of internet, Overview of search engines, Popular search engines in use, Surfing the web and websites. |

**Practical:**

1. Troubleshooting
2. Practical based on to be exposed/shown various components and supposed how to switch on a computer.
3. Handling Boot Setup, Installation of Operating System
4. Wordpad, Notepad, Sticky Note, Snipping tool, Paint
5. Ms Word
6. MS-Excel- Creating charts, Creating tables
7. MS-PowerPoint
8. Case study on Operating systems (Windows/ Ubantu/ Android/IoS)
9. Networking
10. Sending E-mails

**Text Books**

1. Computers and Beginners by Jain, V.K.;

2. Computer Fundamentals by Anita Goel, Pearson.

**Reference Books**

1. Introduction to Information Technology, Leon Tech World by Leon and Leon

2. Foundations of Computing, BPB Publiction by Sinha, Kr. Pradeep and Preeti Sinha;

3. Word Processing and Typing by Sharon Spencer, Heinemann.

4. MS Office by S.S. Srivastava, Firewall Media.

5. Microsoft Office 2010 by Bittu Kumar, V & S Publications

6. Data Communication and Networking by Behrouz.A. Forouzan, McGraw Hill

**Web Links**

http://cec.nic.in/E-Content/Pages/default.aspx

**Subject Name: On The Job Training T P C**

**Paper Code: EOJT-IE--102 - - 12**

**Total Marks: 350 Practical (External):105 Practical (Internal): 245**

**Objectives:** Build basic understanding about the functions of Component Preparation Operators

**Learning Outcomes**:

* Able to understand the concept of forming of Component.
* Build an understanding of Bending of components.
* Able to understand the operations of cutting extra leads of components.

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| **Unit** | **Key Learning** |
| **Unit-I** **Forming of component** | 1.1 Understanding the concept of production material required for the job.1.2 Follow the assembly instructions provided.1.3 Cover the component with heat shrink sleeving protecting the components leads from short circuit 1.4 Select forming machine and adjust lead length |
| **Unit-II** **Safe and healthy working environment** | * 1. Keep the machine, equipment and surrounding clean and orderly.
	2. Maintain the environment Safe and healthy for working.
	3. Conveying the environmental Message to Team and colleagues.

1.4 Timely pupation and maintenance as and when required |
| **Unit-III** **Bending of components** | * 1. Ensure the bending is done away from the body of component so that end seal does not crack.
	2. Selecting the correct die for the type of bend according to the instructions.
	3. Insert into the jaws of the machine and lock tight.
	4. Measure the height of die and place the component in the die
 |
| **Unit-IV****Cutting extra leads of components** | * 1. Clip the leads to proper length for the stress relief when they expand on heating up causing damage.
	2. Switch on lead length informing machine.

1.3 Performing of component leads to fit exactly into the hole of the board. |
| **Unit-V** **5S activity** | * 1. Understand 5S and its implementation
	2. Ensure implementation of 5S activities at the shop floor and the office area.

Create awareness of these activity in the team and also in collegues.. |

**Semester III**

**Course Title – Engineering Science**

**Code:ZDSC-201 Course Credit: 04**

**Max Marks: 100**

 **Theory:50**

**Practical:50**

**LTP: 301**

**Objectives:**Enhance the technical skills for developing electrical wires and doing earthing.

**Learning Outcomes**:

* Able to work with different types of measuring instruments such as voltmeter, ammeter and wattmeter etc.
* Able to draw different symbols for electrical devices and equipment.
* Will be able to differentiate between different types of wires used.
* Will be able to do earthing of wires and measure the earth resistance.
* Will be able to take necessary precautions while handling electrical equipment’s.

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| **Unit Number** | **Key Learning** |
| **Unit-I** **Measuring Instruments** | Construction and working principles of moving iron and moving coil voltmeters and ammeters, dynamometer type wattmeter, ohm meter, megger and induction type energy meter- their circuit connection and application for measurement of electrical quantities. |
| **Unit-II****Electrical Engineering Drawing** | Schematic and wiring diagram for domestic simple wiring, symbols used for different electrical devices and equipments. |
| **Unit-****Electrical Wiring** | Types of wiring – cleat wiring, casing and capping, C.T.S./T.R.S. wiring, metal sheath wiring, conduit wiring and concealed wiring – their procedure. Factors of selection of a particular wiring system, importance of switch, fuse |
| **Unit-IV** **Earthing** | Necessity of earthing, definitions of fundamental terms in earthing like earth, earth lead, earth electrode, earth wire, Types of earthing, detailed study of pipe earthing ,Strip earthing and plate earthing, Specifications of materials used for earthing, Measurement of Earth resistance |
| **Unit-V****Safety Precautions**  | Precautions in handling tools, Electric shock – First Aid in Electric Shock, Precautions to be observed while installing different electrical appliances in houses, Electricity rules regarding wiring |

**Practical:**

1. Measurement of resistance by ammeter and voltmeter method and Ohm meter
2. Calibration of ammeter, voltmeter and wattmeter with the help of standard meters.
3. Drawing schematic diagram to give supply to consumers
4. Practice on casing and capping wiring.
5. Practice on cleat wiring.
6. Practice on CTS/TRS wiring
7. Installation of pipe earthing.
8. Installation of plate earthing.
9. Prevention of Electric Shock - First Aid.

**Course Title – Electrical Engineering Materials and Wiring**

**Code:EDMW-203 Course Credit: 04**

**Max Marks: 100**

**LTP: 400**

**Objectives:**Create awareness about material science and its applications in engineering.

**Learning Outcomes**:

* Able to classify different magnetic materials.
* Able to understand the conducting and semi-conducting materials.
* Able to classify different insulating materials.
* Exposure to various wiring accessories.
* Able to do different types of electrical wiring.

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| **Unit Number** | **Key Learning** |
| **Unit-I** **Conducting and Semi-Conducting Materials** | Concept of Conducting materials, Effect of alloying, Low resistance materials, Properties of Aluminium and copper, High Resistance Materials, Properties of Eureka and Nichrome, Classification and application of semi conducting materials |
| **Unit-II****Magnetic Materials** | Classification of magnetic materials, soft and hard magnetic materials, Properties of soft and hard magnetic materials, Properties of pure Iron, Silicon steel, Nickel, Cobalt, Alnico, Ferrites & applications,  |
| **Unit-****Insulating materials** | General properties of Insulating materials, Classification of Insulating Materials, Insulating glasses, Insulating gasses |
| **Unit-IV** **Wiring Accessories** | Types of Wires, Types of Switches, lamp holders, ceiling roses, Sockets, fuses, Main boards, distribution boards, Switch boards, Fuse materials, Wiring tools, wire joints |
| **Unit-V****Wiring Circuits** | Simple Lamp Circuits, Stair Case wiring, Series and parallel circuits, Master switch circuits, Corridor wiring circuits, Selection of number of sub circuits and selection of wires/cables. |

**Course Title – Soft Skill**

**Code:ZDSE-205 Course Credit: 04**

**Max Marks: 100**

 **Theory:50**

**Practical:50**

**LTP: 202**

**Objectives:**Enhance the skills to develop professional and ethical attitude with effective communication skills

**Learning Outcomes**:

* Carry out time management skills with self-confidence.
* Carry out team management skills with leadership qualities.
* Carry out Problem solving skills and its strategies.
* Carry out Decision making skills with creativity.
* Able to interact with supervisor and respond to customer queries.

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| **Unit Number** | **Key Learning** |
| **Unit-I****Introduction to Soft Skills** | Elements of Soft Skills,Communication Skills,Team Management Skills,Self Confidence,Decision Making,TimeManagement, Problem Solving skills. |
| **Unit-II** **Team Management** **Skills** | Understanding Team Work, How to behave in a Team, Qualities of a good Team leader, process of Team Management,Leadership’s Role in a Team, Barriers to Team Management. |
| **Unit-III****Problem Solving Skills** | Definition of Problem Solving, Skills to use for Problem Solving, Barriers to Problem Solving, Steps for Problem Solving, Strategies to Solve Problems, Role of Brain in solving Problems. |
| **Unit-IV** **Decision Making****Skills**  | Definition of Decision Making, Traps in Decision Making,Factors for effective decisions, How to make better decisions,6 C’s of Decision Making, Creativity and Decision Making. |
| **Unit-V****Interacting With Supervisor** | Report problems identified in the field, respond to customers, receiving feedbacks, Communication on a particular situation, when to report to the supervisor. |

**Practical:**

1. Activity on Verbal and Non-verbal Communication
2. Activity on Body Language Skills
3. Activity on Decision Making Skills
4. Activity on Problem Solving Skills
5. Activity on Positive Attitude.
6. Activity on Self Confidence.
7. Activity on interpersonal Skills
8. Activity on Presentation Skills.

**Course Title – Electronics Components Mounting and Soldering**

**Code:EDMS-207 Course Credit: 03**

**Max Marks: 100**

 **Theory:50**

**Practical:50**

**LTP: 201**

**Objectives:**Create awareness about soldering and de-soldering of electronic components.

**Learning Outcomes**:

* Identify materials and components required for soldering and de-soldering of electronic equipments.
* Able to identify soldering tools and their uses.
* Becomes familiar with soldering cleaning processes
* Make the appropriate solder connection.
* Develop knowledge about SMD Components.

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| **Unit Number** | **Key Learning** |
| **Unit-I****Material Components and equipments** | Materials, solder, flux, adhesives, solder ability, tools and equipments, Gold removal |
| **Unit II****Soldering Tools** | Vise, Safety Glasses, solder sucker, Solder tool, Diagonal cutters, needle nose pilers, solder, solder wick, damp sponge, soldering iron |
| **Unit-III****Solder cleanliness** | Pre soldering, post soldering, particulate matter, flux residue, cleanable flux, no clean process |
| **Unit-IV****Solder connection** | General requirements, exposed basic metal, exposed surface finishing, partially visible or hidden, wire/lead preparation, tinning, wire insulation, insulation sleeving, birdcaged wire, connection requirements, solder connection |
| **Unit-V** **Introduction to SMD components** | Soldering and de-soldering of components, Identification of Programmable Gate Array (PGA) packages Soldering / De-soldering of above PGA components Cold/Continuity check of PCBs Identification of lose /dry solders, broken tracks on printed wiring assemblies. |

**Practical:**

1. Identify various connections and the setup required for SMD Soldering station
2. Make the necessary settings on SMD soldering station to de-solder various ICs of different packages (at least four) by choosing proper clamping tools
3. Make the necessary settings on SMD soldering station to solder various ICs of different packages (at least four) by choosing proper clamping tools.
4. Identify different types of soldering guns and practice soldering of different electronic active and passive components and IC bases on lug boards and PCBs
5. Practice the de-soldering using pump and wick
6. Prepare component for soldering
7. Practical on Repair of Plated through hole
8. Practical on Repair of solder mask
9. Safety precautions and emergency plans

**Course Title – Basic of Wire Harnessing and Connectors**

**Code:EDWH-209 Course Credit: 03**

**Max Marks: 100**

**LTP: 300**

**Objectives:**Expose the learner to the different type of process used in wire harnessing

**Learning Outcomes**:

* Able to know about classes of product, Materials and processes required in Wire Harnessing.
* Acquire the knowledge in the field of Stripping, Conductor deformation and wire insulation damage
* Familiar with the Machined Contacts, termination ferrule crimp and ultrasonic welding.
* Able to understand Splices and connectorization
* Exposure about the moulding, potting and cable Assemblies and wires

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| **Unit Number** | **KEY LEARNING** |
| **Unit-I** **Requirements and acceptance for cable and wire harnessing assemblies** | Scope, Classes of Products, Tools and equipment control, defects and process indicators, inspection condition, Electrical clearance, Measurement units and applications, verification of dimensions, visual inspection, ESD, Materials and processes |
| **Unit-II** **Preparation** | Stripping, Strand damage and End cuts, conductor deformation, twisting of wires, wire insulation damage |
| **Unit-III****Crimp termination** | Stamped and formed open barrel and closed barrel, machined contacts, termination ferrule crimp, ultrasonic welding, insulation clearance, weld nugget |
| **Unit-IV** 1. **Splices**
2. **Connectorization**
 | 1. Soldered splices, crimped splices, ultrasonic weld splices
2. Hardware mounting, strain relief, sleeving and boots, connector damage, installation of contacts and sealing plugs into connectors
 |
| **Unit-V**1. **Moulding/ potting**
2. **Cable Assemblies and wires**
 | 1. Molding, potting
2. Cable measuring, wire measuring
 |

**Subject Name: On The Job Training T P C**

**Paper Code: EOJT-IE-201 - - 12**

**Total Marks: 350 Practical (External):105 Practical (Internal): 245**

**Objectives:** Build basic understanding about the functions of Wire Bonding Operators

**Learning Outcomes**:

* Able to understand the concept of operating the wire bonding machines.
* Build an understanding **achieving productivity and quality standards**
* Able to understand the concept of potential source of accidents.

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| **Unit** | **Key Learning** |
| **Unit-I** **Operating the wire bonding machine** | 1.1 Understanding the concept of stack lead frames in the machine indexer or PCB’s1.2 Set speed, bond weight, bond force, ultrasonic eating, bond time etc as per product model on the machine1.3 Load wire, solder and flux on the machine 1.4 Operate the machine 1.5 Check soldering and position of soldering under microscope.1.6 Checking of bonding of wire using hook test |
| **Unit-II** **Safe and healthy working environment** | * 1. Keep the machine, equipment and surrounding clean and orderly.
	2. Maintain the environment Safe and healthy for working.
	3. Conveying the environmental Message to Team and colleagues.

1.4 Timely pupation and maintenance as and when required |
| **Unit-III** **Achieving productivity and quality standards** | * 1. Achieving of 100% target of number of wire bonding.
	2. Ensuring the zero defects
	3. Deliver to the next stage on time.
	4. Ensuring of zero unscheduled machine down time .
 |
| **Unit-IV****Potential Sources of Accidents** | * 1. Spot and report the potential hazards on time.
	2. Follow company policy and rules regarding hazards material

Handle with care when using an electrical drill and sharp cutting objects. |
| **Unit-V** **5S activity** | * 1. Understand 5S and its implementation
	2. Ensure implementation of 5S activities at the shop floor and the office area.

Create awareness of these activity in the team and also in collegues. |

**Semester IV**

**Course Title – Entrepreneurship Management**

**Code:ZDGE-202 Course Credit: 04**

**Max Marks: 100**

**LTP: 400**

**Objectives:**Expose to the fields of entrepreneurship development

**Learning Outcomes**:

* Will be able to develop outline of new projects for their own ventures
* Outline the skills that are required to be needed to start new ventures
* Will be able to develop Business Plans
* Will elaborate the importance of feasibility report
* Will be able to Identify the risks associated with the specific project

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| **UNIT** | **KEY LEARNING** |
| **UNIT I** **Entrepreneurship** | Meaning, Nature and Scope,Characteristics and Qualities of a Successful Entrepreneur,Relationship between Entrepreneurship Development and Economic Development |
| **UNIT-II****Entrepreneurship and Society** | Entrepreneurship and Society,New Venture Development- Meaning and Stages,Sources of Financing Entrepreneurship,Managerial Vs Entrepreneurial Approach. |
| **UNIT-III****EDP Programs** | EDP Programs,Concept of Economic Freedom,Financial Markets and Entrepreneurship,Venture Capital; Angel Capital |
| **UNIT-IV****Entrepreneurial Strategies and Business Plan:** | Entrepreneurial Strategies and Business Plan,Presenting Business Plans to the Investors,Future of Entrepreneurship in India |
| **UNIT-V****Women Entrepreneurship** | Concept,Factors governing women entrepreneurship,Schemes for women entrepreneurship,Rural Entrepreneurship, Concept, advantage and challenges. |

 **Course Title – Analog Electronics**

**Code: EDAE-204 Course Credit: 04**

**Max Marks: 100**

**Theory: 50**

**Practical: 50**

**LTP: 301**

**Objectives:**Carry out analysis and design of analog electronic circuits

**Learning Outcomes**:

* Able to understand the semiconductor diodes.
* Make use of the applications of PN Diode.
* Exposure to bipolar transistor, their symbols and mechanism of current flow.
* Able to make use of transistor biasing circuits.
* Able to work with transistor amplifiers and its applications.

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| **Unit Number** |  **Key Learning** |
| **Unit-I** **Semi-Conductor Diode** | Concept of intrinsic and extrinsic semi-conductor, P and N type impurities, doping of impurity.PN junction diode, mechanism of current flow in PN junction, Drift and diffusion current, depletion layer, forward and reverse biased PN junction., Types of Diodes |
| **Unit-II** **PN diode Applications** | Diode as half wave, full wave and bridge rectifier, PIV, rectification efficiencies and ripple factor calculations, V-I characteristic, Static and dynamic resistances |
| **Unit-III****Introduction to Bipolar transistor** | Concept of bipolar transistor, structure, PNP and NPN transistor, their symbols and mechanism of current flow, current relations in transistor, CB CC CE configuration of the transistor |
| **Unit-IV** **Transistor Biasing Circuits** | Concept of transistor biasing and selection of operating point. Need for stabilization of operating point. Different types of biasing circuits. |
| **Unit-V** **Transistor Amplifier and Applications** | Introduction, Single and Multi-stage amplifiers Introduction to Oscillators, SCR, DIAC, TRIAC |

**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 resistance
3. Plot V-I characteristics for PN junction diode and calculate its static resistance
4. Plot V-I characteristics of Zener diode.
5. Observe the wave shape of following rectifier circuit

a. Half wave rectifier

b. Full wave rectifier

c. Bridge rectifier

1. Plot input and output characteristics and calculate parameters of transistors in CE configuration
2. Plot input and output characteristics and calculate parameters of transistors in CB configuration.
3. Measure the Q-Point and note the variation of Q-Point by increasing the base resistance in fixed bias circuit.
4. Measure the Q-Point and note the variation of Q-Point by changing out of bias resistance in potential divider circuit

Electronics

**Course Title – Digital Electronics**

**Code:EDDE-206 Course Credit: 04**

**Max Marks: 100**

**Theory: 50**

**Practical: 50**

**LTP: 202**

**Objectives:**Build the understanding of digital design and digital system.

**Learning Outcomes**:

* Able to distinguish between analog and digital signals.
* Able to work with number system
* Identify symbols of different logic gates and plot the truth tables
* Able to simplify the logic expressions using Boolean algebra or K-Map
* Obtain the knowledge of multiplexers, latches and flip flops.

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| **Unit** | **Key learning** |
| **Unit-I** **Introduction**  | Distinction between analog and digital signals, Applications and advantages of digital signals |
| **Unit-II** **Number System** | Binary, octal and hexadecimal number system: conversion from decimal and hexadecimal to binary and vice-versa. Binary addition, subtraction, 1’s and 2’s complement method of addition/subtraction |
| **Unit-III** **Logic gates and Families** | Concept of negative and positive logic, Definition, symbols and truth tables of NOT, AND, OR, NAND, NOR, EXOR Gates, NAND and NOR as universal gates. |
| **Unit-IV** **Logic Simplification**  | Boolean algebra, Implementation of Boolean (logic) equation with gates, Karnaugh map (up to 4 variables) and simple application in developing combinational logic circuitsHalf adder and Full adder circuit, design and implementation, Half and Full subtracter circuit, design and implementation. |
| **Unit-V** **Multiplexers and De-Multiplexers** | Multiplexers and De-Multiplexers, Basic functions and block diagram of MUX and DEMUX. Different types and ICs |
| **Unit-VI** **Latches and flip flops**  | Concept and types of latch with their working and applications, Operation using waveforms and truth tables of RS, T, D, and Master/Slave JK flip flops, Difference between a latch and a flip flop |

**Practical**

1.Verification of truth tables for AND, OR, NOT and NAND logic gates.

2. Verification of truth tables for NOR, XOR and XNOR logic gates.

3.Construction and verification of operations of half adder and full adder circuits using basic gates.

4.Construction and verification of operations of half & full Subtractor circuit using basic gates.

5. Study and verification of truth tables for 4:1 MUX using gates.

6. Study and verification of truth tables for 1:4 DEMUX using gates.

7. Construction and verification of truth tables for S-R, D and J-K flip flops.

**Course Title – Fault analysis and repairs**

**Code: EDFR-208 Course Credit: 03**

**Max Marks: 100**

**Theory: 50**

**Practical: 50**

**LTP: 201**

**Objectives:**Exposure to faults in the field of electrical and electronics engineering.

**Learning Outcomes**:

* Able to identify and rectify faults.
* Able to analyze faults in different types of equipment.
* Able to test and analyze the faults.
* Able to categorize the faults.
* Will be able to do troubleshooting of faults and take some preventive measures.

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| **Unit Number** | **Key Learning** |
| **Unit-I****Introduction to Faults** | Classification of fault , Identification of fault Rectification of fault ,Repairing/Replacing Module. |
| **Unit-II** **Analyzing the different types of equipment’s** | Smartphones, Air Conditioning, Security systems, Electronically controlled doors |
| **Unit-III****Fault Analyzing** | Fault analysis based on hardware and software component, Diagnostic and Testing Methods, Visual Inspection, Earth Continuity Test, Insulation Resistance Test |
| **Unit-IV** **Categorization of faults**  | Hardware/Software, User Induced, Component Failures L0 to L4 repairs, Testing electrical/electronic components in the product |
| **Unit-V****Troubleshooting of Faults**  | Troubleshoot and repair of the faults identified in the product, Preventive Maintenance Services |

**Practical’s:**

1. Categorization of faults:
2. Hardware/Software, User Induced, Component Failures
3. L0 to L4 repairs
4. Testing electrical/electronic components in the product
5. Troubleshoot and repair of the faults identified in the product
6. Preventive Maintenance Services

**Course Title – Advanced Wire Harnessing and Connectors**

**Code: EDAH-210 Course Credit: 03**

**Max Marks: 100**

**Theory: 50**

**Practical: 50**

**LTP: 201**

**Objectives:**Exposure to advanced wire harnessing and connectors.

**Learning Outcomes**:

* Able to distinguish between different cable assemblies.
* Able to do securing.
* Able to do sleeving, spiral plastic wrap and shield termination.
* Able to do solderless wrap.
* Will be able to test after repair and rework.

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| **Unit-I****Coaxial and twin axial cable assemblies** | Stripping, Center conductor termination, solder ferrule pins, Coaxial connector termination, Coaxial connector- printed wire board mount, coaxial connector-center conductor length, coaxial connector- center connector solder, , coaxial connector-terminal cover, shield termination, soldering and stripping of biaxial wire |
| **Unit-I** **Securing** | Tie wrap/ Lacing applications, Breakouts, Routing |
| **Unit-III:****Harness / cable electrical shielding** | Braided, Shield termination, tapes, conduit, Shring tubing, braid, Sleeving / shring tubing, Sprial plastic wrap,  |
| **Unit-IV** **Solderless wrap** | Number of turns, turn spacing, end tails / insulation wraps, raised turn overlaps, connection position, wire dress, wire slack, plating, damage. |
| **Unit-V** **Testing** | Non-destructive tests, Testing after rework or repair, Intended table usage, Electrical tests, Electrical test methods, mechanical tests, Mechanical test methods |

**Practical’s:**

Practical’s will be OJT and industry based.

**Subject Name: On The Job Training T P C**

**Paper Code: EOJT-IE-202 - - 12**

**Total Marks: 350 Practical (External):105 Practical (Internal): 245**

**Objectives:** Build basic understanding about the tasks of module soldering operator

**Learning Outcomes**:

* Able to understand the concept of soldering connects.
* Build an understanding **of soldering of Bus wire.**
* Able to understand the concept quality and safety procedures.

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| .**Unit** | **Key Learning** |
| **Unit-I** **Soldering to connects the solar cells** | 1.1 Ensure that there is no damaged solar cells while receiving 1.2 Check and ensure that the negative side is soldered properly using the tabbing wire.1.3 Ensure adequate length of tabbing wire is available in each solar cell to solder the solar cells for connection |
| **Unit-II** **Safe and healthy working environment** | * 1. Keep the machine, equipment and surrounding clean and orderly.
	2. Maintain the environment Safe and healthy for working.
	3. Conveying the environmental Message to Team and colleagues.

1.4 Timely pupation and maintenance as and when required |
| **Unit-III** **Soldering the Bus wire** | * 1. Place the series of soldered solar cells in a array to be inter connected .
	2. Solder the positive side of the first solar cell in the column with a tabbing wire which will be connected with the negative side of the other column.
	3. Use the bus wire for interconnection of solar cells in different columns.
	4. Solder the joints for connection using soldering station.
 |
| **Unit-IV****Quality and safety procedures** | * 1. Wearing of gloves while using soldering station to avoid any accidents.
	2. Ensure no material damage accurs during soldering of solar cells

Keep work area clean and organized |
| **Unit-V** **5S activity** | * 1. Understand 5S and its implementation
	2. Ensure implementation of 5S activities at the shop floor and the office area.

Create awareness of these activity in the team and also in collegues.. |

**Semester V**

**Course Title – Statistical Process Control**

**Code: EDSP-301 Course Credit: 04**

**Max Marks: 100**

**LTP: 400**

**Objectives:** Build an understanding of statistical process control

**Learning Outcomes:**

**•** Able to understand the tools and techniques of process control.

• Identify and analyze the causes in processes.

• Build an understanding on flow control.

• Will be able to acquire the knowledge of control chart methodology.

• Will be able to acquire the knowledge of control chart design:

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| **Unit Number** | **Key Learning** |
| **Unit-I****Introduction****Of SPC** | Definition of Statistical Process Control,importance of SPC, Process Control, Tools for Process Control, Techniques for Process Control, Need of SPC |
| **Unit-II** **Cause Identification** | Methodology to identify assignable causes, cause and effect diagram, master cause analysis table, Why-Why analysis table |
| **Unit-IV****SPC flow control** | SPC procedure flow chart,operator role in SPC for individual sub-group, Reaction Plan |
| **Unit-V** **Control Chart Methodology** | Introduction, control chart for variables,data collection,subgroup size,subgroup frequency,control limits, interpretation for flow control, interpret the process capability |
| **Unit-VI****Control Chart Design** | P-chart, C-chart, X-R chart, histogram |

**Course Title – Quality Management**

**Code: EDME-301 Course Credit: 04**

**Max Marks: 100**

**LTP: 400**

**Objectives:** Develop the understanding regarding Quality from industry approach.

**Learning Outcomes**:

* Able to develop basic understanding of Quality.
* Exposure to different quality policies.
* Able to work with quality management principles
* Able to work with 7 QC tools.
* Able to improve product quality.

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| **Unit Number** | **Key Learning** |
| **Unit-I****Introduction** | Importance of quality in the management of company. Concepts of quality management. Quality dimensions of goods and services. Quality management evolution and works of quality gurus.  |
| **Unit-II** **Quality policy and quality organization** | International and European quality organizations. European quality policy. International, regional and national standardization. System of assessment of quality conformity in Europe. |
| **Unit-III****Management systems and quality management principles for excellence:** | Quality management systems. Quality control methods. Quality audit and certification of management systems. Sustainable development. Environment management systems. Occupational health and safety management system. Eco-labelling. Total quality management |
| **Unit-IV** **Process Quality Improvement** | Introduction to process quality, Graphical and statistical techniques for process, 7 QC tools, Process capability analysis, Measurement system analysis, ISO 9001 and QS 9000 |
| **Unit-V****Product Quality Improvement** | Quality Function Deployment, Robust Design and Taguchi Method, Design Failure Mode & Effect Analysis, Product Reliability Analysis, Six Sigma in Product Development |

**Books Recommended**

**Text Books**

**Reference Books**

1. Besterfield D. H. Quality Control. New Jersey, 2001. 471 p.
2. Dale, B. G. Managing Quality. Oxford: Blackwell Publishing, 2002. 471 p.
3. Evans J. R., Lindsay W. M. The management and control of quality. USA: South-Western college publishing, 1999.
4. Foster T. S. Managing quality: An Integrative Approach. New Jersey: Prentice Hall, 2002. 476 p.
5. Goetsch D. L., Davis S. B. Quality management. Introduction to TQM for production, processing and services. New Jersey: Prentice Hall, 2003.
6. D. C. Montgomery, Introduction to Statistical Quality Control, John Wiley & Sons, 3rd Edition.
7. Mitra A., Fundamentals of Quality Control and Improvement, PHI, 2nd Ed., 1998.
8. J Evans and W Linsay, The Management and Control of Quality, 6'th Edition, Thomson, 2005
9. Besterfield, D H et al., Total Quality Management, 3rd Edition, Pearson Education, 2008.
10. D. C. Montgomery, Design and Analysis of Experiments, John Wiley & Sons, 6th Edition,2004
11. D. C. Montgomery and G C Runger, Applied Statistics and Probability for Engineers, John Wiley & Sons, 4th Edition.

**Course Title – Programmable Logic Controller**

**Code: EDPL-305 Course Credit: 04**

**Max Marks: 100**

**Theory: 50**

**Practical: 50**

**LTP: 301**

**Objectives:** Familiarize the students with PLC.

**Learning Outcomes**:

* Able to understand the basic concept of PLC.
* Will be able to demonstrate the working of PLC.
* Will be able to understand the instruction set of PLC.
* Will be able to do ladder programming.
* Exposure to different applications of PLC

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| **Unit Number** |  **Key Learning** |
| **Unit-I** **Introduction to PLC** | What is PLC, concept of PLC, Building blocks of PLC, Functions of various blocks, limitations of relays. Advantages of PLCs over electromagnetic relays. Different programming languages, PLC manufacturer etc. |
| **Unit-II** **Working of PLC** | Basic operation and principles of PLC, Architectural details processor, Memory structures, I/O structure, Programming terminal, power supply |
| **Unit III****Instruction Set** | Basic instructions like latch, master control self holding relays, Timer instruction like retentive timers, resetting of timers, Counter instructions like up counter, down counter, resetting of counters, Arithmetic Instructions (ADD,SUB,DIV,MUL etc.), MOV instruction, RTC(Real Time Clock Function), Comparison instructions like equal, not equal, greater, greater than equal, less than, less than equal |
| **Unit-IV****Ladder Diagram Programming** | Programming based on basic instructions, timer, counter, sequencer, and comparison instructions using ladder program. |
| **Unit-V** **Applications of PLC** | Assembly, Packaging, Process controls, Car parking, Doorbell operation, Traffic light control, Microwave Oven, Washing machine, Motor in forward and reverse direction, Star-Delta, DOL Starters, Paint Industry, Filling of Bottles, Room Automation |

**Practical’s:**

1. Components/sub-components of a PLC, Learning functions of different modules of a PLC system
2. Practical steps in programming a PLC (a) using a Hand held programmer (b) using computer interface
3. Introduction to step 5 programming language, ladder diagram concepts, instruction list syntax
4. Basic logic operations, AND, OR, NOT functions
5. Logic control systems with time response as applied to clamping operation
6. Sequence control system e.g. in lifting a device for packaging and counting
7. Use of PLC for an application (teacher may decide)

**Course Title –Electronic Device Circuit**

**Code: EDDC-307 Course Credit: 03**

**Max Marks: 100**

**Theory: 50**

**Practical: 50**

**LTP: 201**

**Objectives:** Familiarize the students with different electronic devices.

**Learning Outcomes**:

* Able to understand the charge carriers in semi-conductors.
* Will be able to understand the junctions.
* Will be able to understand the concept of MOSFET.
* Acquire the knowledge of bipolar junction transistor.
* Will be able to generate feedbacks from electronic devices.

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|  **Unit**  | **Key Learning** |
| **Unit-I****Introduction** | Energy Bands and Charge Carrier in Semiconductor: Bonding forces and energy bands in solids, Charge Carriers in Semiconductors, Carrier Concentrations, Drift Mechanism. Excess carriers in Semiconductors: Optical Absorption, Carrier Lifetime: Direct Recombination, Steady State Carrier Generation, Quasi-Fermi Level, Diffusion of carriers and Einstein relation. |
| **Unit-II** **Junctions** | Equilibrium Conditions, Forward and Reveres Biased Junctions; Steady State Conditions. Optoelectronic Devices: Photodiode V-I characteristic, Photodetector, Solar Cells, Light Emitting Diode. |
| **Unit-III****MOSFET** | Device structure and its operation in equilibrium, V-I characteristics. Circuits at DC, MOSFET as Amplifier and switch, Biasing in MOS amplifier circuits, smallsignal operation and models, single stage MOS amplifier, MOSFET internal capacitances and high frequency model, frequency response of CS amplifier |
| **Unit-IV** **BJT** | Review of device structure operation and V-I characteristics, BJT circuits at DC, BJT as amplifier and switch, biasing in BJT amplifier circuit, small-signal operation and models, single stage BJT amplifier, BJT internal capacitances and high frequency model, frequency response of CE amplifier. |
| **Unit-V****Feedback** | The general feedback structure, properties of negative feedback, the four basic feedback topologies, the series-shunt feedback amplifier, the series-series feedback amplifier, the shunt-shunt and shunt series feedback amplifier. Oscillators: Basic principles of sinusoidal oscillators, op-amp RC oscillator circuits, LC oscillator |

**Practical:**

1. Study of Lab Equipments and Components: CRO, Multimeter, and Function Generator, Power supply- Active, Passive Components and Bread Board.
2. P-N Junction diode: Characteristics of PN Junction diode - Static and dynamic resistance measurement from graph.
3. Applications of PN Junction diode: Half & Full wave rectifier- Measurement of Vrms, Vdc, and ripple factor.
4. Characteristics of Zener diode: V-I characteristics of zener diode, Graphical measurement of forward and reverse resistance.
5. Application of Zener diode: Zener diode as voltage regulator. Measurement of percentage regulation by varying load resistor.
6. Characteristic of BJT: BJT in CE configuration- Graphical measurement of hparameters from input and output characteristics. Measurement of Av, AI, Ro and Ri of CE amplifier with potential divider biasing.
7. Measurement of Operational Amplifier Parameters: Common Mode Gain, Differential Mode Gain, CMRR, Slew Rate.
8. Applications of Op-amp: Op-amp as summing amplifier, Difference amplifier, Integrator and differentiator.
9. Field Effect Transistors: Single stage Common source FET amplifier –plot of gain in dB Vs frequency, Measurement of, bandwidth, input impedance, maximum signal handling capacity (MSHC) of an amplifier.
10. Oscillators: Sinusoidal Oscillatorsa. Wein’s bridge oscillator b. phase shift oscillator.

**Course Title –Trouble Shooting Electronic Equipment**

**Code: EDTS-309 Course Credit: 03**

**Max Marks: 100**

**Theory: 50**

**Practical: 50**

**LTP: 201**

**Objectives:** Exposure to the troubleshooting techniques of electronic equipments

**Learning Outcomes**:

* Able to do troubleshooting of microphones.
* Able to do troubleshooting of recorders.
* Able to do troubleshooting of TV Systems.
* Able to do troubleshooting of LCD and LED.
* Able to do troubleshooting of modern appliances.

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| **Unit**  | **Key Learning** |
| **Unit-I****Microphones**  | Construction, working principle and frequency response of Carbon Microphone, Variable Reactance Microphone, Capacitance Microphone, Piezo-Electric Microphone, Moving Coil Microphone. Frequency ranges of musical instruments, Intensity and Dynamic Range, |
| **Unit-II** **Recorder** | Constructions and working principles of Moving Coil Loudspeaker, Impedance and Power Level of loudspeaker, Frequency characteristics of Practical Loudspeakers: Woofer, Tweeter, Squawker |
| **Unit-III****TV System** | Working principle with block diagram of TV transmitter and receiver, Brief description with circuit diagram: TV Tuner, Video IF stage, Sound stage, Picture tube & its associated circuit, synchronizing circuits, Horizontal & vertical deflection circuits, Remote control of a TV receiver, Idea of bandwidth, blanking and synchronization pulses, modulation scheme, color transmission. Cable type TV system, Head end processor, Trunk & cable distribution system with block diagram, Scrambling |
| **Unit-IV** **LCD and LED TV systems** | Introduction to LCD and LED TV systems, Introduction to high definition systems. Steps for Fault finding & Analysis. |
| **Unit-V****Modern Appliances** | Working principle and block diagram of following: Microwave oven, Telephone, Fax machine, Printers, Scanners. Steps for Fault finding & Analysis |

**Practical: As per OJT**

**Subject Name: On The Job Training T P C**

**Paper Code: EOJT-IE-301 - - 12**

**Total Marks: 350 Practical (External):105 Practical (Internal): 245**

**Objectives:** Build basic understanding about the strategies of Sales Executive

**Learning Outcomes**:

* Able to understand the concept of product knowledge.
* Build an understanding of Market.
* Able to understand the operations of coordinating with channel partners.

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| **Unit** | **Key Learning** |
| **Unit-I** **Understanding about the product** | 1.1 Understand the functionalities and purpose of product 1.2 Understand the different component of the product.1.3 Understand the specification and other details of competition brands and products |
| **Unit-II** **Initiating Meeting with prospective customer** | * 1. Prepare a list of potential clients in the region and short list them for marketing the product.
	2. Make Telephone calls to prospective customer and convince them for a meeting.
	3. Reach customer place on time and maintain punctuality for all meetings.

1.4 Interacting periodically with existing customers to understand any new requirement |
| **Unit-III** **Understanding the market** | * 1. Collect information on the demographics of the location to know about the market.
	2. Understand the market share of different products in the region.
	3. Study the key growth drivers of the product in the region by analyzing past sales pattern.
	4. Understand the customer expectation from the product by conducting a market survey.
 |
| **Unit-IV****Coordinating with channel partners** | * 1. Understand the market requirement by analyzing sales data from channel sales partners.
	2. Interact with sales channel partner executive to understand the customer preference and expectation.
	3. Understand the model and brand preference of customers from the channel partners.
	4. Assist with sales partners to promote and display the best products
 |
| **Unit-V** **Interacting and Understanding the customer requirement** | * 1. Greet the client while meeting them and develop a report with them.
	2. Understand the broad level customer requirement.
	3. Understand the power requirement and expectation of customer.
	4. Understand the specification (Power output expectation, space for installation, budget and other technical detail requirement of solar power system from customer..
 |

**Semester VI**

**Course Title –Power Electronics**

**Code: EDPE-302 Course Credit: 04**

**Max Marks: 100**

**Theory: 50**

**Practical: 50**

**LTP: 301**

**Objectives:** Build an understanding about Power electronics.

**Learning Outcomes**:

* Able to understand the working concept of Thyristors.
* Able to understand the different types of inverters.
* Will be able to work with step up and step down chopping operation.
* Will be able to perform cyclo-converter.
* Will be exposed to applications of Thyristors.

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| **Unit** | **Key Learning** |
| **Unit-I** **Thyristors** | Principle of operation of SCR (Thyristors), Static V-I Characteristics of Thyristor, Two transistor analogy of Thyristor, Gate characteristics of Thyristor, Switching characteristic of Thyristor during turn on and turn off, Turn on methods of Thyristor,UJT (Unijunction Transistor). |
| **Unit-II** **Inverters** |  Introduction, Inverter classification, Voltage source series inverter, Voltage source Parallel inverter (single phase), Single phase Voltage source half and full Bridge Inverter with resistive load, Single phase Current source Inverter with ideal Switches |
| **Unit-III** **Chopper** | Principle of step down and step up chopper operation, Chopper configuration and quadrant of operation,Type A, B, C, D and E chopper,Chopper Control strategy of chopper, source filter. |
| **Unit-IV****Cyclo converter** | Principle of Cyclo-converter operation), Single phase to single phase circuit step up Cyclo converter, Single phase to single phase circuit step down Cyclo converter |
| **Unit-V** **Thyristors applications** | Single phase half wave and full wave A. C regulator with resistance load, Switch mode power supply Buck converter, Boost converter, Buck-boost converter, Bridge converter, Snubber Circuit and free-wheeling diode. |

**Practical:**

1. Single phase Semi / Full Converter with R & R-L load
2. Three phase Semi / Full Converter with R load
3. Single phase AC voltage controller using SCRs for R load
4. Single-Phase PWM bridge inverter for R load
5. Three-Phase inverter for R load
6. Step down dc chopper using power MOSFET / IGBT
7. Resonant converter
8. Load & line regulation of SMPS
9. Simulation of any two quadrant chopper circuit
10. Simulation of PWM inverter
11. Case study of any one of the following: HVDC transmission system, Photovoltaic System, Wind generator system

**Course Title –Microprocessors and peripheral devices**

**Code: EDMP-304 Course Credit: 04**

**Max Marks: 100**

**Theory: 50**

**Practical: 50**

**LTP: 301**

**Objectives:** Build basic understanding about interfacing memory and peripheral devices to a microprocessor

**Learning Outcomes**:

* Able to understand the organization of microcomputer system.
* Exposed to the architecture of Microprocessor.
* Build an understanding on instruction timing and cycles.
* Able to do programming in 8085 microprocessors.
* Able to understand the interfacing techniques.

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| **Unit** | **Key Learning** |
| **Unit-I** **Evolution of Microprocessor** | Typical organization of a microcomputer system and functions of its various blocks. Microprocessor, its evolution, function and impact on modern society  |
| **Unit-II** **Architecture of a Microprocessor (With reference to 8085 microprocessor)**  | Concept of Bus, bus organization of 8085, Functional block diagram of 8085 and function of each block, Pin details of 8085 and related signals, Demultiplexing of address/data bus generation of read/write control signals, steps to execute a stored programme |
| **Unit-III** **Instruction Timing and Cycles** | Instruction cycle, machine cycle and T-states, Fetch and execute cycle |
| **Unit-IV****Programming (with respect to 8085 microprocessor)**  | Brief idea of machine and assembly languages, Machines and Mnemonic codes. Instruction format and Addressing mode. Identification of instructions as to which addressing mode they belong. Concept of Instruction set. Explanation of the instructions of the following groups of instruction set. Data transfer group, Arithmetic Group, Logic Group, Stack, I/O and Machine Control Group. Programming exercises in assembly language. (Examples can be taken from the list of experiments).  |
| **Unit-V** **Memories and I/O interfacing** | Concept of memory mapping, partitioning of total memory space. Address decoding, concept of peripheral mapped I/O and memory mapped I/O. Interfacing of memory mapped I/O devices. |

**Practical:**

Study architecture of 8085 & 8086 and familiarization with its hardware, command & operation of Microprocessor kit.

Write a program using 8085 & verify for:

1. Addition of two 8- bit numbers

Write a program using 8085 & verify for:

1. Subtraction of two 8- bit numbers

**Course Title –Spreadsheet Modelling**

**Code: EDSM-306 Course Credit: 04**

**Max Marks: 100**

**Theory: 50**

**Practical: 50**

**LTP: 202**

**Objectives:** Master advanced functions of Spreadsheet Applications that enable to produce reports, and to perform complex statistical calculations

**Learning Outcomes**:

* Work with spreadsheets and save them in different formats for developing proper formats.
* Create mathematical and logical formulas using standard spreadsheet functions.
* Choose, create and format charts to communicate information meaningfully.
* Work with tables and lists to analyze, filter and sort data to analyze the results for different data sets.
* Enhance productivity by working with named cell ranges, macros and templates

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| **Unit**  | **Key Learning** |
| **Unit-****Formatting** | Introduction to Electronic Spreadsheets, Feature of MS-Excel, Entering Data, Entering Series, Editing Data, Cell Referencing, ranges, |
| **Unit-II** **Functions and Formulae** | Date and time Functions, Auto sum, Copying Formula, Formatting Data, Creating Database, Sorting Data, Filtering, etc. Mathematical functions (rounddown, roundup, sumif), statistical functions (countif, countblank, rank), text functions (left, right, mid, trim, concatenate), financial functions (pv, fv, pmt), lookup functions (hlookup, vlookup), two level nested functions. |
| **Unit-III** **Charts** | Create, modify a pivot table/data pilot, Filter, sort data in a pivot table/data pilot, use one-input, two-input data tables/multiple operations tables |
| **Unit-IV** **Analysis: Using tables.** | Creating charts, Adding secondary axis to a chart, Change the chart type, formatting charts, Change display units on the axis of chart, change scale of value axis |
| **Unit-V** **Analysis: using Sorting and filtering:** | sort data by multiple columns at same time, create a customized list and perform a custom sort, macros**,** Customer feedback analysis using Google Doc |

**Practical:**

1. Charts and Tables
2. Text Functions
3. Date and time Functions
4. Statistical functions
5. Financial Function
6. Pivot
7. Look Up
8. Nested
9. Case Study Analysis in different areas
10. Sorting functions
11. Google form development and Analysis

**Course Title –Industrial Marketing**

**Code: EDIM-310 Course Credit: 02**

**Max Marks: 100**

**Theory: 100**

**LTP: 200**

**Objectives:** Develop an understanding among the students about the various concepts of Industrial Marketing.

**Learning Outcomes**:

* Will be able to know about the industrial marketing and consumer marketing and their industrial demand.
* Will be able to know the buying and rebuying process and their relevant organization.
* Will be able to know the environment and organizational influence.
* Will be able to know the industrial product life cycle and decision.
* Will be able to know about the how to sell the product and promotion of industrial products.

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| **Unit** | **Key Learning** |
| **Unit-I****Nature of Industrial Marketing** | Industrial Marketing Vs. Consumer Marketing Relational approach to Industrial Marketing- The Nature of Industrial Demand & Industrial Customer. Introduction to different types of Industrial Products |
| **Unit-II** **Organizational Buying** | BUYGRID MODEL, phases in purchasing decision process & their marketing implications, Buying centers, value analysis & vendor analysis. |
| **Unit-III** **Promotion for Industrial products** | Supporting salesman – Motivating distributors – Stimulating primary demand – Sales appeal – Publicity & sponsorships – Trade shows – exhibits – Catalogs – Samples – promotional letters – Promotional novelties |
| **Unit-IV****Industrial Product Decisions** | Industrial Product Life Cycle –Industrial Product Mix determinants viz. technology – competition – operating capacity – shift in location of customers – government controls – changes in level of business activi |
| **Unit-V** **Factors influencing Organizational Buying** | Buying Roles; Organizational Buying Decision Process; Environmental & organizational Influences |

**Subject Name: On The Job Training T P C**

**Paper Code: EOJT-IE-302 - - 12**

**Total Marks: 350 Practical (External):105 Practical (Internal): 245**

**Objectives:** Build basic understanding about the tasks of Product Engineer

**Learning Outcomes**:

* Able to understand the components of compatibility.
* Exposed to the development of product
* Build an understanding the concept of testing products for manufacturing

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| **Unit** | **Key Learning** |
| **Unit-I** **Components for compatibility** | 1.1 Decide the hardware component requirement for the product. 1.2 Assess the functionality of different hardware component.1.3 Decide the software requirement for the different hardware |
| **Unit-II** **Developing the Product** | * 1. Receive the product concept from marketing and study features to be modified or added.
	2. Work with R&D team and modify existing hardware design using drawings, software and design tools.
	3. Acting as an interface between R & D and production department
	4. Develop product within cost agreed
 |
| **Unit-III** **Testing products for Manufacture** | * 1. Check manufacturability of product and any constraints.
	2. Development of product for manufacturing with available resources.
	3. Develop the product to maintain the organizational targets
 |
| **Unit-IV****Developing Prototype** | * 1. Procure sample components from vendors required for prototype assembling.
	2. Develop a prototype of the product.
	3. Test the product for reliability issues.
	4. Testing of products for voltage, thermal and environment related aspects.
 |
| **Unit-V** **Completing documentations** | * 1. Record any relevant test data if applicable.
	2. Filling the job competition form and secure acceptance.
	3. Follow company standards and documentation activities..
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