

National Skills Qualification Framework (NSQF)

Competency Based Curriculum

Level 1 (Class 9) to Level 4 (Class 12)

ELECTRICAL TECHNOLOGY

Job Roles: Field Technician – Other Home Appliances (QP: ELE/Q3104), Field Technician – Refrigerator (QP: ELE/Q3103), Field Technician – Washing Machine (QP: ELE/Q3103), Assembly Operator – Energy Meter (QP: ELE/Q7304), Field Technician – UPS and Inverter (QP: ELE/Q7201), Wireman – Control Panel (QP: ELE/Q7302), Electrical Technician (QP: ELE/Q6301), LED Light Repair Technician (QP: ELE/Q9302)



Developed By:

**Directorate of Vocational Education & Training, Department of Higher and Technical Education,
Government of Maharashtra, Mumbai – 400001**



Vetted By

PSS Central Institute of Vocational Education, Bhopal
(a constituent unit of NCERT, under Ministry of Human Resource Development, Govt. of India)

CURRICULUM:**Electrical Technology for NSQF Level 1 (Class 9) Level 4 (Class 12)**

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DVET, Maharashtra Coordinator: Shri. P. L. Saygaonkar, DVEO, Satara

PSSCIVE Coordinator: Dr. Deepak D. Shudhalwar, Head, Computer Centre, PSSCIVE, NCERT, Bhopal

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Preface

Ministry of Human Resource Development, Government of India developed the National Skill Qualification Framework (NSQF) to introduce vocational courses from class 9th onwards. The NSQF organizes qualifications according to a series of levels of knowledge and skills. These levels are defined in terms of learning outcomes i.e. the competencies (knowledge, skills and attitude) which the learners must possess regardless of whether they were acquired through formal, non-formal or informal education and training system. Qualifications are made up of occupational standards for specific areas of learning units or unit of competency. Units of competency are the specification of knowledge and skill and the application of that knowledge and skill to the standard of performance expected in the workplace. The unit of competency or National Occupation Standards comprising generic and technical competencies an employee should possess are laid down by the Sector Skill Council of the respective economic or social sector.

Competency is defined in terms of what a person is required to do (performance), under what conditions it is done (conditions) and how well it is to be done (standards). It can be broadly categorized into foundational, practical and reflexive competencies. Generic competencies are considered essential for a person to participate effectively in the workforce, whereas technical competencies are an individual's knowledge and expertise in the specific group task and its processes and its rules and regulations.

The competency based curriculum is broken down into coherent parts known as Units. Each unit is further broken down into knowledge and skills on the basis of which evidence is to be provided by the learner and the evaluation is to be done by the teacher or trainer.

PSSCIVE which is part of NCERT New Delhi is mandated by Government of India as a apex R & D Institute for Vocational Education. The institute has taken up development of Curriculum and course-ware for NSQF Level 1 (class 9) to Level 1 (class 12) to introduce vocational courses in Secondary and senior secondary schools in of the country.

The above curriculum on Electrical Technology is developed by a team of experts deputed by Directorate of Vocational Education and Training, Mumbai, Maharashtra and vetted by PSSCIVE faculty and coordinator. It is expected that the student workbook and teacher guide will be developed soon to start the course from this academic year 2015-16.

Dr. R. B. Shivagunde
Joint Director and Head
PSSCIVE Bhopal

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Introduction

The National Skills Qualification Framework (NSQF) developed by the Ministry of Human Resource Development (MHRD), Government of India is a descriptive framework that provides a common reference for linking various qualifications. It is used for setting common principles and guidelines for a nationally recognized qualification system covering Schools, Vocational Education and Training Institutions, Technical Education Institutions, and Universities/Colleges.

The NSQF organizes qualifications according to a series of levels of knowledge and skills. These levels are defined in terms of *learning outcomes* i.e., the *competencies* (knowledge, skills and attitude) which the learners must possess regardless of whether they were acquired through *formal, non-formal or informal* education and training system. *Qualifications* are made up of *occupational standards* for specific areas of learning units or unit of competency. *Units of competency* are the specification of knowledge and skill and the application of that knowledge and skill to the *standard of performance* expected in the workplace. The Unit of competency or National Occupation Standards comprising generic and technical competencies an employee should possess are laid down by the Sector Skill Council of the respective economic or social sector.

The **competency based curriculum** is broken down into coherent parts known as **Units**. Each unit is further broken down into knowledge and skills on the basis of which evidence is to be provided by the learner and the evaluation is to be done by the teacher or trainer.

After successful completion of this course from Level 1 (Class 9) to level 4 (Class 12), students will be able to perform job role of Web Developer. Student can also go for higher education in degree courses in engineering and science stream.

About the Sector

The discovery of electricity is one of the greatest achievements of man. Its use has made our lives so comfortable that, today, scientists in all countries are trying their utmost to use it more and more for all purposes.

Electricity has helped to remove darkness and increase human activity. Powerful lights are used in factories, schools, hospitals and in all other dark places where men have to work for the benefit of others or for themselves. Men are able to go anywhere even in the darkest of nights.

Electricity has also enabled men to increase the production of their goods. Huge machines are operated in large factories with the help of electricity for the manufacture of useful goods. These machines work ceaselessly and produce enormous quantities of goods, which are distributed throughout the world, for the comfort of people in all parts of the earth.

Electricity has become quite common in today's world. Everybody loves what it can do and loves the level at which it is being used. The street lights work on electric current. Fans in the court, office rooms, homes, etc. all work on electricity. Trains and trams too run on the power on electricity. Hence electricity is no longer a strange thing.

We need human resource for repairing and maintenance of electrical and electronics devices. This curriculum is for the technician doing repair and maintenance of electrical gadgets. After successful completion of level-I, the students will be able to understand the fundamental of Electricity and Electronics, after the completion of level-II the students will be able to perform the job role of Domestic Appliances Technician, after the completion of level-III the job roles of Wireman ,Home Appliances Technician, Electrician Helper , House Wiring Technician ,and after the completion of level-IV the job roles of Field Technician-Industrial & Commercial wiring, Home Electric Technician, D.G.Set Operator ,House Wiring Technician, Electrician, Panel wiring Technician, Maintenance Operator-LT & HT Substation, Owner of Electrical Wiring accessories shop. After completion of all the levels the students can select the vocation of his choice or pursue higher studies including diploma, graduation, post-graduation or obtain specialized diploma in any of the job roles to become supervisor in the industry.

Objectives of the Course

Upon completion of this course, students will be able to:

- To provide an overview of the Fundamentals of Electricity and Electronics
- To enable the students to carry out repair and maintenance of various electrical domestic appliances
- To Identify Electrical material requirement for household wiring , design the wiring layout and carryout household wiring work
- To develop an entrepreneurial skills for starting a business
- Get familiar with the shop discipline, layout of electrical shop, safety practice.
- To make students familiar with shop discipline layout of electrical shop, safety practice.
- To make students familiar with shop discipline, layout of electrical shop, safety practice.
- To acquire knowledge and skills about safety precautions while working.
- To acquire knowledge about function and use of various electrical tools, equipments and accessories.
- To acquire with properties and usage of different materials (conducting, insulating, wiring etc).
- To know about electrical symbols of commonly used electrical parts.
- To develop knowledge about the wiring.
- To get introduced to electrical shop to classify different tools machines and equipments.
- To acquire skills for wiring methods.
- To do any type of wiring such as house wiring.
- To get knowledge about estimation, costing and billing of wiring
- To understand how to work on electrical installation and shop floor safety precautions maintenance and upkeep.
- To make students familiar with shop discipline, layout of electrical shop, safety practice.
- To acquire knowledge and skills about safety precautions while working.
- To acquire knowledge about function and use of various electrical tools, equipments and accessories.
- To acquire with properties and usage of different materials (conducting, insulating, wiring etc).
- To know about electrical symbols of commonly used electrical parts.
- To develop knowledge about the wiring.
- To get introduced to electrical shop to classify different tools machines and equipments.
- To acquire skills for wiring methods.
- To do any type of wiring such as house, industrial, commercial wiring, Tender form filling.
- To get knowledge about estimation, costing and billing of wiring.
- To acquire the detail knowledge of Electrical, tools with their specific use handling and
- Maintenance and precaution while handling. To gain the knowledge and skill of motors ,transformer repairing, servicing and overhauling

Classroom Activities: Classroom activities are an integral part of this programme and interactive lecture sessions, followed by discussions should be conducted by trained teachers. Teachers should make effective use of a variety of instructional aids, such as Videos, Colour Slides, Charts, Diagrams, Models, Exhibits, Handouts, Recorded Compact Discs, etc. to transmit knowledge in projective and interactive mode.

Practical Activities: Activities that provide practical experience through case based problems, role play, games, etc. and practical exercises using props, tools and equipment should be regularly organized off-the-job and on-the-job. Equipment and supplies should be provided to enhance hands-on experiences to students in the chosen occupation. Trained personnel should teach specialized techniques such as dismantling and assembling of computer parts, servicing of computers, operating Web programming, etc.

On-the-Job Training: On-the-job training (OJT) occurs whenever more experienced employee or supervisor teaches less experienced person on how to do one or more tasks of a job. The training utilizes actual equipment and materials. OJT should be undertaken in a structured manner with a training plan under the supervision of an experienced trainer or supervisor. A training plan that reflects tasks to be performed and competencies to be imparted should be prepared and signed by the student, teacher, and supervisor at the workplace for training of the students in the organization/industry. The trainer should break down all the steps of the job and train the students as per the training plan. In a structured OJT, the following steps should be followed:

Step 1: The Instructor or the trainer tell, show, demonstrate, and explain. The trainer gives an overview of the task while explaining the constructional details and use of the tools, equipment, materials, etc. in performing the tasks.

Step 2: The Instructor or the trainer demonstrates each step in detail, actually doing the steps of the task and explaining each step, one at a time, while the trainee watches. The steps may not necessarily be demonstrated in the sequence of actual operation, as sometimes it is better that simple tasks are demonstrated first to build confidence. Showing finished products at each appropriate step will help the learner understand what is required as outcome. While demonstrating, the trainer explains why each step is done in the way it is done.

Step 3: It involves direct trainee participation. The trainer monitors the progress on a checklist of competencies and offers feedback and pointers where and when needed.

Step 4: The trainee practices with clearly defined targets for performance standards.

Certification: Upon successful completion of this course, the State Education Board and the IT-ITeS Sector Skill Council will provide a certificate to the student verifying the competencies acquired by the student. For more details about SSC visit the website of NASSCOM at <http://www.nasscom.in/itites-sector-skill-council>.

Competency Based Curriculum for NSQF Level 1 (Class 9)

Sector: Electronics (Electrical Technology)

Objectives:

Upon completion of this course, students will be able to:

- Get acquainted with the fundamentals of Electricity, Electronics, Measurements and Electronics
- Get aware of workshop layout and electricity and awareness
- Practice the safety measures of equipment
- Read the voltage, current along with various laws
- Explain the concept of atomic structure along with active and passive components and its uses

Course Structure: This course (vocational qualification package) is a planned sequence of instructions consisting of the following modules, called as Units.

Sn	Unit Code	Unit Title	Theory	Practical	Total
1	ELE-101	Basic Electricity	15	15	30
2	ELE-102	Application of Electrical Hand Tools	10	10	20
3	ELE-103	Conducting, insulating & semiconducting materials	10	10	20
4	ELE-104	Basic Circuits	15	15	30
5	ELE-105	Magnetism	10	10	20
6	ELE-106	Power Supply	10	10	20
7	ELE-107	Electronic Devices	10	10	20
8	ELE-108	Electrical measuring instruments	10	10	20
9	ELE-109	House Wiring	10	10	20
		Total Hours	100	100	200

RELEVANT SKILLS (Generic)

- Reading skill
- Writing skill
- Communication skill
- Language skill
- Behavioral skill
- Observation
- Listing skill
- Handling tools
- Electronic Measurements

Teaching and Training Methods: Theory with Demonstration and Practical Hands on

Location for Training: Classroom and Practical Laboratory

UNIT CODE & TITLE	ELE-101: Basic Electricity	
UNIT DESCRIPTOR	This basic unit requires for every students to enter into the field of electrical. It covers the origin of electricity Important of electricity Generation of electricity, Basic units, SI units, Electronic components.	
DURATION	30 Hours (Theory and Demonstration: 15 Hrs, Practical Hands on: 15 Hrs)	
LEARNING OUTCOME	PERFORMANCE CRITERIA	RELEVANT KNOWLEDGE
Introduce with Electricity	Explain the concept of electricity List the sources of electricity Explain the importance of electricity Explain how electricity is generated	Electricity – concept and definition Origin of electricity Importance of electricity Generation of electricity
Basic electrical quantity	Make list of the basic electrical quantity List out and name the basic units of electrical quantity Identify and draw the symbols for each electrical quantity Define the various electrical quantity List out the importance and use of various electrical quantity List out and name the measuring instruments required to measure the various electrical quantity	Basic units, SI units Basic electrical quantity – current, voltage, resistance, load, energy power, work Definition, symbols, units, measuring instruments and use of basic electrical quantities
Basic laws and application	Name the basic laws of electricity Define the ohms laws and Joule's law Verify ohms law and interpret the result State applications of Joule's law in heating appliances.	Basic laws – definitions of ohms law, Joule's law and its application Verification of ohm's law Applications of Joule's law in heating appliances
Electronic components	Explain the term electronic components List the types of components List and name the various active and passive components List out the various types of resistor, capacitor and inductor Explain the importance and use of electronic components in circuit Identify the passive components by visual inspection Interpret the coded marking of colours on the resistors	Electronic components Types of components – active and passive components Active components – current source, voltage source Passive components – resistor, capacitor, inductor Types and features of passive components Importance and use of electronic components Colour codes for passive components

UNIT CODE & TITLE	ELE-102: Electrical Hand Tools	
UNIT DESCRIPTOR	This unit covers the various electrical hand tools and their use, specifications, applications and Safety use.	
DURATION	20 Hours (Theory and demonstration 10 Hrs., Practical Hands on 10 Hrs)	
LEARNING OUTCOME	PERFORMANCE CRITERIA	RELEVANT KNOWLEDGE
Introduce of electrical Hand Tools	Identify electrical hand tools. State Specifications of tools.	Introduction of electrical hand tools – Pliers, screw drivers, connectors, hammers, tester, electrician knife, wire stripper etc. their specifications-size and numbers.
Safely use electrical Hand Tools	List out the various electrical hand tools List safety precautions while using tools Use the appropriate hand tools for work	The various electrical hand tools Safety precautions while using tools Various hand tools and their use

UNIT CODE & TITLE	ELE-103: Conducting, insulating & semiconducting materials	
UNIT DESCRIPTOR	This unit covers the topics on conducting, insulating and semiconducting materials, their applications in electrical field.	
DURATION	20 Hours (Theory and demonstration 10 Hrs., Practical Hands on 10 Hrs.)	
LEARNING OUTCOME	PERFORMANCE CRITERIA	RELEVANT KNOWLEDGE
Describe the Conducting, insulating & semiconducting materials	List out electrical conducting and insulating materials Explain electrical conducting and insulating materials	Conducting materials Features and band energy diagram of conducting and insulating materials
Identify different materials	Read and explain band energy diagram Differentiate the various conducting and insulating material	Different conducting materials Different insulating material Various semi-conducting materials
Applications of conducting, insulating & semiconducting materials	State applications of different materials.	Application of – conductor, semiconductor, insulating material – insulator

UNIT CODE & TITLE	ELE-104: Basic Circuits	
UNIT DESCRIPTOR	This unit covers Circuit and Symbols, Circuit types – series connection, parallel connection, series-parallel connection, Calculations of passive components in various circuits.	
DURATION	30 Hours (Theory and demonstration 15 Hrs., Practical Hands on 15 Hrs.)	
LEARNING OUTCOME	PERFORMANCE CRITERIA	RELEVANT KNOWLEDGE
Introduce with Basic	List the types of electrical circuits	Drawing of simple series & parallel

Circuits & Drawing	Draw simple series & parallel circuits Read and explain circuit diagram	circuits and symbols Circuit types – series connection, parallel connection, series-parallel connection
Prepare various connections	Calculate the value of passive components in series, parallel and series-parallel circuits.	Calculations of passive components in various circuits

UNIT CODE & TITLE	ELE-105: Magnetism	
UNIT DESCRIPTOR	This unit covers the Concept of magnetism, list various magnetic materials, electromagnetic induction, transformer, its working principle, types, connections & applications.	
DURATION	20 Hours (Theory & demonstration 10 Hrs., Practical Hands on 10 Hrs.)	
LEARNING OUTCOME	PERFORMANCE CRITERIA	RELEVANT KNOWLEDGE
Introduce with magnetism	Explain Concept of magnetism List various magnetic materials	Fundamental of magnetism Concept of magnetic flux
Introduce with electromagnetic induction	State law of electromagnetic induction	Law and awareness of magnetic material
Function of transformer	List out types of transformer with its specification Explain working principle of transformer	Transformer and its working principle Construction, specification, losses Application of transformer
Testing of transformer	Identification of terminals of transformer Measure primary and secondary voltage of transformer Perform continuity test of transformer	Continuity test of transformer-primary & secondary winding

UNIT CODE & TITLE	ELE-106: Power Supply	
UNIT DESCRIPTOR	This unit covers concept of power supply AC and DC power supply Differentiate between AC and DC power supply.	
DURATION	20 Hours (Theory and demonstration 10 Hrs., Practical Hands on 10 Hrs.)	
LEARNING OUTCOME	PERFORMANCE CRITERIA	RELEVANT KNOWLEDGE
Describe Power Supply	Explain the concept of power supply List various power supply units and their use	Power supply units AC and DC power supply
Introduce AC and DC power supply	Explain Alternating Current (AC) and Direct Current (DC) Identify and draw the wave diagram of various elements of AC and DC power	Symbolic representation of AC and DC power supply block diagram of various elements of AC and DC power supply

	supply Differentiate between AC and DC power supply	
Conversion of AC to DC power supply	Convert AC to DC power supply	Power conversion – AC to DC power conversion with its block diagram

UNIT CODE & TITLE	ELE-107: Electronic Devices	
UNIT DESCRIPTOR	This unit covers concept of Diode and rectifier, Transistors, Diac, Trac, MOSFET Symbol/ circuit diagram, types, working, application and advantages	
DURATION	20 Hours (Theory and demonstration 10 Hrs., Practical Hands on 10 Hrs.)	
LEARNING OUTCOME	PERFORMANCE CRITERIA	RELEVANT KNOWLEDGE
Introduce with Diode	Identify terminals of diodes by visual inspection Describe diode List types of diodes Draw the symbol of diode Understand working of diode in reverse and forward bias Connect diode in forward & reverse bias	Diode and rectifier symbol/ circuit diagram, types, working, application and advantages
Introduce with transistor	Identify transistor by visual inspection List types of transistor Draw the symbol of transistor Identify Emitter, Base and Collector of transistor Identify NPN and PNP transistor with the help of multimeter	Transistors Symbol/ circuit diagram, types, application and advantages
Power Electronics	Identify Diac, Triac MOSFET by visual inspection Give the applications of Diac, Trac MOSFET Draw the symbol of MOSFET, Diac, Trac List types of MOSFET Diac, Triac	Diac, Triac, MOSFET Symbol/ circuit diagram, types, application and advantages

UNIT CODE & TITLE	ELE-108: Electrical measuring instruments	
UNIT DESCRIPTOR	This unit covers concept of Electronic meter, its parts, working principle, types, specification, use and application	
DURATION	20 Hours (Theory and demonstration 10 Hrs., Practical Hands on 10 Hrs.)	
LEARNING OUTCOME	PERFORMANCE CRITERIA	RELEVANT KNOWLEDGE

Introduce with Electronic Meter	List out various part of electronic meters Identify and explain various parts of electronic meter Explain the working principle Electronic meter Explain the types and specification of electronic meters Explain the connection of electronic meter Observe the reading List out the importance and use of electronic meter Practice safety precautions while using in circuits.	Electronic meter, its parts, working principle, types, specification, use and application, Safety precautions while using in circuits
Introduce with Ammeter & voltmeter	Identify and explain various parts of Ammeter and Voltmeter Explain the working principle Ammeter and voltmeter Explain the types and specification of Ammeter and voltmeter Operate and connect, Ammeter and voltmeter Practice safety precautions while using in circuits.	Ammeter & voltmeter, its parts, working principle, types, specification, function, use and application, advantages and disadvantages
Introduce with multimeter	List out various parts of multimeter Identify and explain various parts of multimeter Explain the working principle multimeter Explain the types and specification of multimeter Explain the function of various parts of multimeter Operate and connect multimeter Practice safety precautions while using in circuits.	Multimeter, its parts, working principle, types, specification, function, use and application, advantages and disadvantages

UNIT CODE & TITLE	ELE-109: House Wiring	
UNIT DESCRIPTOR	This unit covers concept of wiring materials, Types & their applications. Series and parallel connections of lamp. Fixing wiring accessories on board. circuit diagram of simple wiring circuits.	
DURATION	20 Hours (Theory and demonstration 10 Hrs., Practical Hands on 10 Hrs.)	
LEARNING OUTCOME	PERFORMANCE CRITERIA	RELEVANT KNOWLEDGE
Introduce Wiring	Identification of various wiring materials	Introduction of Home wiring

Materials	List out wiring material State application of wiring material	materials(Holder, Switch, Wire).Types & their applications
Draw Wiring Circuits & fix wiring accessories on board.	Fix wiring accessories on board by screws Draw circuit diagram of wiring Control one lamp by one switch Control two lamps by one switch (series) Control two lamps by two switch (parallel)	Series and parallel connections of lamp Fixing wiring accessories on board circuit diagram of simple wiring

Competency Based Curriculum for NSQF Level 2 (Class 10)

Sector: Electronics (Electrical Technology)

Objectives:

Upon completion of this course, students will be able to:

- Get familiar with the shop discipline, layout of electrical shop, safety practice.
- Get familiar with shop discipline layout of electrical shop, safety practice.

Course Structure: This course (vocational qualification package) is a planned sequence of instructions consisting of the following modules, called as Units.

Sn	Unit Code	Unit Title	Theory	Practical	Total
1	ELE-201	Repair and Maintenance of heating appliances (Electric Iron Water Heaters/ Geyser)	10	10	20
2	ELE-202	Repair and Installation of Electric Bell	04	04	08
3	ELE-203	Repair and Installation of Electric/Electronic tube light	8	8	24
4	ELE-204	Single phase transformer – Study and Testing	10	10	20
5	ELE-205	D.C. Power supply – Assembly and Applications	12	12	24
6	ELE-206	Solar cells & Power supply – Applications	10	10	20
7	ELE-207	Repair and Maintenance of Battery & Emergency Light	12	12	24
8	ELE-208	Rules and Installation of Basic house wiring	15	15	30
9	ELE-209	Installation and Testing of Single Phase Motors	10	10	20
10	ELE-210	Repair and Maintenance of Induction cooker /Hot plate	09	09	18
		Total Hours	100	100	200

RELEVANT SKILLS (Generic)

- Reading skill
- Writing skill
- Communication skill
- Language skill
- Behavioral skill
- Observation
- Listing skill
- Handling tools

Teaching and Training Methods: Theory with Demonstration and Practical Hands on

Location for Training: Classroom and Practical Laboratory

UNIT CODE & TITLE	ELE-201(1): Repair and Maintenance of Heating Appliances (Electric Iron)	
UNIT DESCRIPTOR	This unit covers introduction, construction & working principle, Dismantling & procedure, technical specifications of an iron – ISI mark, make, power, voltage, pricelist Testing & Fault finding, Common Faults & remedies of electric iron.	
DURATION	20 Hours (Theory and demonstration 10 Hrs, Practical Hands on 10 Hrs.)	
LEARNING OUTCOME	PERFORMANCE CRITERIA	RELEVANT KNOWLEDGE
Introduce with electric Iron	Identify the parts of iron Explain the working of an iron List out types of an iron	Introduction to electric iron Construction & working principle of an iron
Uses of electric Iron	Explain the the temperature setting for different clothes.	Applications of various type of irons.
Dismantle and assemble Iron	Dismantle the given iron Explain the technical specifications of an iron – ISI mark, make, power, voltage, pricelist of an iron	Dismantling & procedure Technical specifications of an iron – ISI mark, make, power, voltage, pricelist of an iron
Troubleshoot the problems of an Iron	List out Common faults in iron Various types of faults Various types of remedies	Testing & Fault finding Common Faults & remedies.
Repair the faults in iron	Test open circuit, short circuit, earth test & leakage current. Reassemble the given iron.	Testing methods-Open short & earth & leakage faults. Reassembling procedure.
Implement safety measures of an iron	List out Safety Precautions	Safety measures of iron while testing & handling.
Maintain and sell iron	Prepare estimate & billing of an iron.	Performa of estimate & Billing.

UNIT CODE & TITLE	ELE-201(2): Heating Appliances (Water Heater)	
UNIT DESCRIPTOR	This unit covers introduction, construction & working principle, Dismantling & procedure, technical specifications of an iron – ISI mark, make, power, voltage, pricelist Testing & Fault finding, Common Faults & remedies of Water Heaters.	
DURATION	20 Hours (Theory and demonstration 10 Hrs, Practical Hands on 10 Hrs.)	
LEARNING OUTCOME	PERFORMANCE CRITERIA	RELEVANT KNOWLEDGE
Introduce with heating appliances-Water Heaters.	Demonstrate the given appliances List the various types of Water Heaters Check technical specification	Introduction Construction & working principle of Water Heaters Types of Water heater &uses..
Dismantle Water Heaters	Dismantle the given Water Heaters Observe Technical specifications -ISI mark, make, power, voltage, pricelist of	Technical specifications of iron -ISI mark,make,power,voltage,pricelist of Water Heaters

	water heaters	
Troubleshoot the problems in Water Heaters	Test Open circuit, short circuit, earth test and leakage current List out common faults in Water Heaters	Testing & Fault finding Common Faults & remedies
Repair the faults in Water Heaters assemble water heater	Test open circuit, short circuit, earth test and leakage current Reassemble given water heater	Testing methods-Open short & earth & leakage faults.
Implement safety measures in using Water Heaters	List and practice out safety precautions	Safety measures of Water Heaters while testing & handling
Maintenance and sell Water Heaters	Prepare estimate & billing of Water Heaters	Performa of estimate & Billing

UNIT CODE & TITLE	ELE-201(3): Heating Appliances (Geyser)	
UNIT DESCRIPTOR	This unit covers introduction, construction & working principle, Dismantling & procedure, technical specifications of an iron – ISI mark, make, power, voltage, pricelist Testing & Fault finding, Common Faults & remedies of Geysers.	
DURATION	20 Hours (Theory and demonstration 10 Hrs, Practical Hands on 10 Hrs.)	
LEARNING OUTCOME	PERFORMANCE CRITERIA	RELEVANT KNOWLEDGE
Introduce with heating appliances-Geysers.	Identify the parts of Geyser Explain the working of Geyser List various types of Geysers Check technical specification	Introduction, technical specifications of iron -ISI, mark, make, power, voltage, pricelist of Geysers Construction and working principle of Geysers Types of Geysers Thermostat working and uses
Uses of Electric Geysers	Study the temperature setting of different type of Geysers	Applications of various type of Geysers
Dismantle given Geysers	Dismantle the given geyser study parts of geyser. Understand Technical specifications of Geyser-ISI Mark,make,power etc. Understand working of thermostat	Construction and working principle of Geysers Types of Geysers Thrmostate working and uses
Troubleshoot the problems in Geysers	Determine and list common faults in Geysers	Testing andFault finding. Common Faults and remedies.
Repair the faults in Geysers reassemble Geysers	Test open circuit, short circuit, earth test and leakage current. Repair the given geyser Reassemble the geyser	Testing methods-Open short & earth & leakage faults Repairing and reassembling procedure of geyser
Implement safety measures in using Geysers	List and practice safety precautions while handling	Safety measures and Precautions of Geysers while testing and handling
Maintenance and sell of Geysers	Prepare estimate and billing of repairing Geysers	Performa of estimate & Billing.

UNIT CODE & TITLE	ELE-202: Repair and Installation of Electric Bell	
UNIT DESCRIPTOR	This is the electric bells requires for every students to enter into the field of electrical. It covers Introduction, Working principle, Application Technical specifications, Types-ding dong, continuous ringing Electronic buzzer Construction, Installation, Fault finding & testing.	
DURATION	8 Hours (Theory and demonstration 4 Hrs, Practical Hands on 4Hrs.)	
LEARNING OUTCOME	PERFORMANCE CRITERIA	RELEVANT KNOWLEDGE
Introduce with Electric bell	Identify and differentiate the electric and electronic bells List out its specification List out the types of various bells	Introduction, working principle, application and technical specifications of electric bell
Install and connect bell	Read the installation instructions Install bell with bell push Make connections of bell	Types-ding dong, continuous ringing Electronic buzzer Construction
Test and fault finding in electric bell	Test the electric bell for its proper functioning Find out the faults in the non-working bell	Proper functioning of electric bell Faults and repairs of eletric bell

UNIT CODE & TITLE	ELE-203: Repair and Installation of Electric/ Electronic tube light	
UNIT DESCRIPTOR	This is the electric tube a light requires for every student to enter into the field of electrical. It covers Introduction of lighting appliances, Circuit diagram of Fluorescent tube with electronic choke& starter Introduction of CFL lamp, LED lamp or tube Testing & fault finding with series test lamp ,Repairing Pricelist	
DURATION	16 Hours (Theory and demonstration 8 Hrs, Practical Hands on 8 Hrs.)	
LEARNING OUTCOME	PERFORMANCE CRITERIA	RELEVANT KNOWLEDGE
Introduce Electric/ Electronic chock tube light	List out various lighting equipments Identify various parts of tube light	Introduction of lighting appliances
Make connections	Make Connection of fluorescent tube with choke and starter	Circuit diagram of Fluorescent tube with electronic choke& starter
Connect with electronic choke	Connect the tube with electronic choke Connect CFL and LED Lamps	Introduction of CFL lamp, LED lamp or tube
Test and find fault	Test, the tube light	Testing and fault finding with series test lamp
Repaire CFL and LED lamp	Find the fault and repair CFL lamp and LED lamp	Repairing Pricelist

UNIT CODE & TITLE	ELE-204: Single phase transformer – Study and Testing	
UNIT DESCRIPTOR	This is the Single phase transformer requires for every students to enter into the field of electrical. It covers Working Principle & construction of transformer, Types of single phase transformer according to construction, voltage application, Testing of transformer, Rewinding	
DURATION	20 Hours (Theory and demonstration 10Hrs,Practical Hands on 10 Hrs.)	
LEARNING OUTCOME	PERFORMANCE CRITERIA	RELEVANT KNOWLEDGE
Introduce single phase transformer	Explain the parts of transformer State working principle of transformer	Working Principle & construction of transformer
Primery and secondary winding transformer	List out types of transformer Connect, step down and step up transformer	Types of single phase transformer according to construction, voltage application
Applications of transformer	State application of transformer Explain working of auto transformer	Working of auto transformer
Measure voltages	Measure primary & secondary voltages	Measurement of primary & secondary voltages
Testing of transformer	Test winding of transformers	Testing of transformer
Rewinding of Transformer	Rewind shell type transformer	Rewinding of Transformer

UNIT CODE & TITLE	ELE-205: D.C. Power supply – Assembly and Applications	
UNIT DESCRIPTOR	This is the D C Power Supply requires for every students to enter into the field of electrical. It covers Introduction & application of power supply. Identification of different parts.Circuit diagram of centre & bridge rectifier. Testing & fault finding	
DURATION	24 Hours (Theory and demonstration 12 Hrs, Practical Hands on 12 Hrs.)	
LEARNING OUTCOME	PERFORMANCE CRITERIA	RELEVANT KNOWLEDGE
D.C. Power Supply Introduction	Identify different parts of transformer Explain the working of half wave rectifier, bridge rectifier Explain the working of full wave rectifier State the applications of transformer	Introduction & application of power supply
Connection diagram	Draw the connection diagram	Circuit diagram of centre & bridge rectifier
Prepare DC power supply	Explain the connection of power supply	
Testing and fault finding	Tests and find faults	Testing & fault finding

UNIT CODE & TITLE	ELE-206: Solar cells & Power supply – Applications	
UNIT DESCRIPTOR	Introduction of solar cell & solar panel, Battery & their care & maintenance. Installation of solar cell system.	
DURATION	20 Hours (Theory and demonstration 10 Hrs, Practical Hands on 10 Hrs.)	
LEARNING OUTCOME	PERFORMANCE CRITERIA	RELEVANT KNOWLEDGE
Solar cells & Power supply Identification of different parts solar cells	Explain the construction of solar cells Identify different parts	Introduction of solar cell & solar panel
Connect the solar panel	Explain Connection of the solar panel with battery and load	Connection diagrams
Battery and their maintenance	Carry maintenance of solar cells	Battery and their care and maintenance

UNIT CODE & TITLE	ELE-207: Repair and Maintenance of Battery & Emergency Light	
UNIT DESCRIPTOR	This unit covers an introduction, construction, circuit diagram, charging and discharging, Care and maintenance. Connections and application in emergency light, Maintenance	
DURATION	24 Hours (Theory and demonstration 12Hrs, Practical Hands on 12 Hrs.)	
LEARNING OUTCOME	PERFORMANCE CRITERIA	RELEVANT KNOWLEDGE
Battery and Emergency Light Introduction	Explain the lead acid battery Application of battery in emergency light unit and its connections	Introduction Construction
Lead Acid Battery – Various parts, charging methods	Draw the circuit diagram of emergency light	Circuit diagram
Care and maintenance	List out procedure for Maintenance of lead acid battery	Charging and discharging Care and maintenance
Safety Precautions	State Safety Precautions	Connections & application in emergency light, maintenance

UNIT CODE & TITLE	ELE-208: Rules and Installation of Basic house wiring	
UNIT DESCRIPTOR	This unit covers introduction, BIS Rules, layout wiring materials, switches, holders, types of wires, earthing materials, sockets, boards, ELCB, MCB, etc. Wiring circuits series, parallel, staircase wiring insulation test by megger series testing board, estimation and costing.	
DURATION	30 Hours (Theory and demonstration 15 Hrs, Practical Hands on 15 Hrs.)	
LEARNING OUTCOME	PERFORMANCE CRITERIA	RELEVANT KNOWLEDGE
Basic House Wiring Wiring accessories	List out BIS Rules of wiring	Introduction, BIS Rules Layout wiring materials, Switches,

		Holders
simple wiring diagrams	Draw simple wiring diagrams	Types of wires, , Sockets, Boards, ELCB, MCB, etc.
layout of wiring diagram	Draw layout diagram of wiring Install various types of wiring with M.C.B./ ELCB	Wiring circuits-series, parallel, staircase wiring
Earthing &types Installation		Earthing materials Insulation test by megger series testing board
Prepare the estimate and bill test of wiring, wiring joints	Prepare estimate wiring Test insulation resistance of wiring installation	Estimation and costing Testing of wiring

UNIT CODE & TITLE	ELE-209: Installation and Testing of Single Phase Motors	
UNIT DESCRIPTOR	This unit covers introduction, types-split phase motor, capacitor motors, shaded pole motor, universal motor, repulsion motor, construction of motor.	
DURATION	20 Hours (Theory and demonstration 10 Hrs, Practical Hands on 10 Hrs.)	
LEARNING OUTCOME	PERFORMANCE CRITERIA	RELEVANT KNOWLEDGE
Introduce with single phase motors	List out different types of single phase motors Explain the working principle of motors Draw and explain the connection diagram and circuit diagram	Introduction Types-split phase motor, capacitor motors, shaded pole motor, universal motor, repulsion motor Construction of motor
Connect and start single phase motors	Explain the parts of motor Connect the motor to supply List out various applications of motor. Observe starting and running of single phase motors List out various applications of motor	Identify various parts of motor Study the parts and connections Applications of motor

UNIT CODE & TITLE	ELE-210: Repair and Maintenance of Induction cooker/ Hot plate	
UNIT DESCRIPTOR	This unit covers introduction, construction and working principle, dismantling and procedure, technical specifications of an induction cooker/ hot plate – ISI mark, make, power, voltage, pricelist, testing and fault finding, common faults and remedies of Induction cooker /hot plate.	
DURATION	18 Hours (Theory and demonstration 9 Hrs,Practical Hands on 9 Hrs.)	
LEARNING OUTCOME	PERFORMANCE CRITERIA	RELEVANT KNOWLEDGE
Introduce with Induction cooker /hot plate	Identify the parts of induction cooker / hot plate Explain the working of an induction	Introduction, construction and working principle of an Induction cooker /hot plate

	cooker/ hot plate List out types of an induction cooker/ hot plate	
Uses of induction cooker/ hot plate	Explain the use of induction cooker/ hot plate	Applications of induction cooker/ hot plate
Dismantle and assemble Induction cooker /hot plate	Dismantle the given induction cooker / hot plate Explain the technical specifications of induction cooker/ hot plate-ISI mark, make, power, voltage, pricelist of Induction cooker /hot plate	Dismantling & procedure. Technical specifications of an Induction cooker /hot plate-ISI mark, make, power, voltage, pricelist of Induction cooker /hot plate
Troubleshoot the problems of induction cooker/ hot plate	List out common faults in induction cooker/ hot plate List out types of faults and remedies	Testing & Fault finding. Common Faults & remedies. Various types of faults and remedies
Repair the faults in induction cooker/ hot plate	Test open circuit, short circuit, earth test and leakage current Reassemble the given induction cooker/ hot plate	Testing methods-Open short & earth & leakage faults Reassembling procedure.
Implement safety measures of induction cooker/ hot plate	List out safety precautions	Safety measures of induction cooker / hot plate while testing & handling
Maintain and sell induction cooker/ hot plate	Prepare estimate and billing of induction cooker/ hot plate	Performa of estimate and billing