

# CURRICULUM

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## **Building Electrician** *(A Competency Based, Short-term Curriculum)*



Council for Technical Education and Vocational Training  
**CURRICULUM DEVELOPMENT DIVISION**

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## Introduction

The competency based and market oriented curriculum for **Building Electrician** is designed to produce employable workforce equipped with knowledge, skills and attitudes related to the occupation. In this curriculum, the trainees will practice skills of electrical works in the training workshop and building construction industries. Once the trainees acquired the competencies they will have ample opportunity for employment and self-employment through which they will contribute in the national streamline of poverty reduction in the country. The skills and knowledge included in this curriculum improve their knowledge and skills and make them competent building electrician needed for the occupation. *The major feature of the curriculum is to incorporate the drop-out youths who have only primary level schooling experience.*

## Aim

The main aim of this program is to produce employable **building electricians** who could provide house wiring services in the public and residential buildings of the construction industries in the country and abroad.

## Objectives

After completion of training the trainees will be able to:

1. State the concept of electricity
2. Perform basic calculation
3. Apply electrical instruments for measuring resistance, voltage, current and power
4. Identify and interpret electrical symbols and codes
5. Install and connect accessories, fittings, protective devices and distribution board
6. Install and control various pattern of wiring system.
7. Install and connect earthing electrode
8. Repair and replace components of damaged wiring system
9. Control/install electricity generation in three phase
10. Carryout a complete wiring system
11. Apply simple mathematical technique related occupation
12. Be familiar with First Aid and HIV/AIDS
13. Be familiar with occupational health and apply safe working technique
14. Apply Communication and Small Enterprise Development skills

## Course Description

This curricular programme is based on the job required to be performed by a **Building Electrician**. Therefore, this curriculum is designed to equip trainees with the skills and knowledge on Basic House Wiring. This course intends to provide skills and knowledge on house wiring works related to the occupation. This course deals with concept of wiring, electrical instruments and their application, various calculations, electrical drawing interpretation, symbol identification, design and installation of various pattern of wiring system, repair and replacement of damaged wiring components and installation and connection of earthing electrode. *It also includes Applied mathematics, Occupational health and safety, First aid, HIV/AIDS, Communication and Small Enterprise Development as sub modules under common module with the view to impart fundamental skills for livelihood.*

## Duration

The total duration of the course extends over 390 hours

### **Target Group**

The target group for this training program will be all interested individuals with educational prerequisite of minimum class five pass. Preference will be given to the individuals of rural, poor, female, Dalit, Janjati, Disadvantaged Groups (DAGs) and conflict affected people.

### **Target location**

The target group for this training program will be all over Nepal.

### **Group Size**

The group size of this training program will be maximum 30, provided all necessary resources to practice the tasks/ competencies as specified in this curriculum.

### **Medium of Instruction**

The medium of instruction for this program will be Nepali or English or both

### **Pattern of Attendance**

The trainees should have 80% attendance in theory classes and 90% in practical/ performance to be eligible for internal assessments and final examinations.

### **Focus of Curriculum**

This is a competency-based curriculum. This curriculum emphasizes on competency performance. 80% time is allotted for performance and remaining 20% time is for related technical knowledge. So, the main focus will be on performance of the specified competencies in the curriculum.

### **Entry Criteria**

Individuals who meet the following criteria will be allowed to enter this curricular program:

- Minimum of five class pass or equivalent
- Physically and mentally fit
- Minimum of 15 years of age
- Should pass entrance examination

### **Instructional Media and Materials**

The following instructional media and materials are suggested for the effective instruction and demonstration.

- **Printed Media Materials** (Assignment sheets, Case studies, Handouts, Information sheets, Individual training packets, Procedure sheets, Performance Check lists, Textbooks etc.).
- **Non-projected Media Materials** (Display, Models, Flip chart, Poster, Writing board etc.).
- **Projected Media Materials** (Opaque projections, Overhead transparencies, Slides etc.).
- **Audio-Visual Materials** (Audiotapes, Films, Slide-tape programs, Videodiscs, Videotapes etc.).
- **Computer-Based Instructional Materials** (Computer-based training, Interactive video etc.).

### **Teaching Learning Methodologies**

The methods of teachings for this program will be a combination of several approaches. Such as Illustrated Lecture, Group Discussion, Demonstration, Simulation, Guided practice, Practical experiences, Fieldwork and Other Independent learning.

- Theory: Lecture, Discussion, Assignment, Group work.
- Practical: Demonstration, Observation, Guided practice and Self-practice.

### **Follow up Provision**

**First follow up:** Six months after the completion of the program

**Second follow up:** Six months after the completion of the first follow up

**Follow up cycle:** In a cycle of one year after the completion of the second follow up for five years

## **Grading System**

The trainees will be graded as follows based on the marks in percentage secured by them in tests/ evaluations.

- Distinction: Passed with 80% or above
- First Division: passed with 75% or above
- Second Division: passed with 65% or above
- Third Division: passed with 60% or above

## **Students Evaluation Details**

- Continuous evaluation of the trainees' performance is to be done by the related instructor/ trainer to ensure the proficiency over each competency under each area of the whole course.
- Related technical knowledge learnt by trainees will be evaluated through written or oral tests as per the nature in the institutional phase of training.
- Trainees must secure minimum marks of 60% in an average of both theory and practical evaluations.
- The entrance test will be administered by the concerned training institute.

## **Trainers' Qualification (Minimum)**

- Diploma in electrical engineering or equivalent in related field
- Good communicative and instructional skills
- Experience in related field

## **Trainer-Trainees Ratio**

- In theory classes 1(trainer): 20 (trainees)
- In practical classes (in workshop and laboratory) 1(trainer): 10 (trainees)

## **Suggestions for Instruction**

1. **Select objectives**
  - Write objectives of cognitive domain.
  - Write objectives of psychomotor domain.
  - Write objectives of affective domain
2. **Select Subject matter**
  - Study subject matter in detail.
  - Select content related to cognitive domain.
  - Select content related to psychomotor domain.
  - Select content related to affective domain.
3. **Select Instructional Methods**
  - Teacher centered methods: like lecture, demonstration, question answers inquiry, induction and deduction methods.
  - Student initiated methods like experimental, field trip/excursion, discovery, exploration, problem solving, and survey methods.
  - Interaction methods like discussion, group/team teaching, microteaching and exhibition.
  - Dramatic methods like role play and dramatization
4. Select Instructional method (s) on the basis of objectives of lesson plans and KAS domains.
5. Select appropriate educational materials and apply at right time and place.
6. Evaluate the trainees applying various tools to correspond the KAS domains.
7. Make plans for classroom / field work / workshop organization and management.
8. Coordinate among objectives, subject matter and instructional methods.
9. Prepare lesson plan for theory and practical classes.
10. Deliver /conduct instruction / program.
11. Evaluate instruction/ program.

### **Special suggestion for the performance evaluation of the trainees**

1. Perform task analysis.
2. Develop a detail task performance checklist.
3. Perform continuous evaluation of the trainees by applying the performance checklist.

### **Suggestion for skill training**

1. Demonstrate task performance in normal speed.
2. Demonstrate slowly with verbal description of each and every step in the sequence of activity of the task performance using question and answer techniques.
3. Repeat 2 for the clarification on trainees demand if necessary.
4. Perform fast demonstration of the task.

### **Provide trainees the opportunities to practice the task performance demonstration**

1. Provide opportunity to trainees to have guided practice.
2. Create environment for practicing the demonstrated task performance.
3. Guide the trainees in each and every step of task performance.
4. Provide trainees to repeat and re-repeat as per the need to be proficient on the given task performance.
5. Switch to another task demonstration if and only trainees developed proficiency in the task performance.

### **Other suggestions**

1. Apply principles of skill training.
2. Allocate 20% time for theory classes and 80% time for task performance while delivering instructions.
3. Apply principles of learning relevant to the learners' age group.
4. Apply principles of intrinsic motivation.
5. Facilitate maximum trainees' involvement in learning and task performance activities.
6. Instruct the trainees on the basis of their existing level of knowledge, skills and attitude.

### **Certificate Requirements**

The related training institute will provide the certificate of **“Building Electrician”** to those trainees who successfully complete all the requirements as prescribed by the curriculum.

### **Skill Testing Provision**

The graduates who have completion certificate of **“Building Electrician”** may sit in the skill testing examination of **Level one (Level- 1)** as provisioned and administered by the National Skill Testing Board.

### **Physical Facilities**

The theory class rooms at least should have area of 10 square feet per trainee and in the workshop it should be at least of 30 square feet per trainees. All the rooms and laboratory should be well illuminated and ventilated.

*Well equipped workshop with adequate space* 1 (No.)

*Well furnished class room with adequate space* 1 (No.)

*Office room equipped with modern facilities* 1 (No.)

*Principle room equipped with modern facilities* 1 (No.)

*Reception room equipped with modern facilities* 1 (No.)

## Tools and Equipment

SN	Tools Name 1	Tools Name 2	Tools Name 3
1	Side cutting pliers	Bench vise	Measuring tape
2	Nipper	Metal cutting saw	Saw
3	Needle nose pliers, straight	High speed grinding wheel cutting tool	Gimlet
4	Screwdrivers, electricians	Prick knife	Chisel, wood
5	Screwdrivers, standards	Files Pipe reamers	Planner, wood
6	Screwdrivers, phillips	Facing tool	Hammers
7	Screwdrivers sets	Thread cutting toolBenders	Bar
8	Screwdriver, automatics	Cutters	Tool box
9	Electricians knives	Fish tape (for pulling wires)	Plumb line
10	Tool holders and tool bag	Chisels	Wire grip
11	Pliers, combinations	Drive-it gun	Safety belt
12	Water pump pliers	Center punch	Punner (punning rod)
13	Wrenches Socket wrench Adjustable wrench Pipe wrench	Drills Concrete drills Straight sank drill Metal drill	Shovel
14	Spanners Opened ended spanners Set spanners	Hole saw	Pick
15	Crimping tools	Wood-boring bit	Puller
16	Soldering iron	Pit screw anger	Ladders
17	Bolt clipper	Brace	Folding rule
18	Cable cutter	Electric drill	Concave blade rule
19	Stripper Wire stripper VVE cable stripper	Electrician' drum (distribution panal)	Tape measure
20	Pipe vise	Die and die stock	Wire gauge
21	Megger	Earth tester	Votlmeter
22	Ammeter	Ohmmeter	Wattmetr Multimeter

## Course Structure of Building Electrician

### Part A. Specialized module

S.N.	Module	Nature	Time (hrs)	Full marks
1	House Wiring	T+P	320	250
	<b>Total</b>		<b>320</b>	<b>250</b>

### Part B. Common module

S.N.	Sub-modules	Nature	Time (hrs)	Full marks
1	Applied Mathematics	T+P	20	50
2	Occupational Health & Safety	T+P	10	
3	First Aid	T+P	5	
4	HIV/AIDS	T+P	5	
5	Communication	T+P	10	
6	Small Enterprise Development	T+P	20	
	<b>Total</b>		<b>70</b>	<b>50</b>
	<b>Grand total (Part A &amp;B)</b>		<b>390</b>	<b>300</b>



## *Part: A Specialized Module*

# House Wiring

### **Description:**

This module intends to provide skills and knowledge on house wiring works related to the occupation. This module deals with Concept of wiring, Electrical instruments and their application, Symbols and codes identification, Various calculations, Bench work, Electrical drawing reading, interpretation and drawing, Design and installation of various pattern of wiring system, Repairing and replacement of damaged wiring components and Installation and connection of earthing electrode.

### **Tasks:**

1. Explain the concept of electricity
2. Follow safety measures
3. Identify/enumerate/handle tools and instruments
4. Identify /draw electrical symbols and codes
5. Apply problem-solving techniques stating the Ohm's law
6. Calculate current/voltage/resistance
7. Measure resistance using Ohmmeter
8. Measure voltage using Voltmeters
9. Measure current using Ampere meter
10. Apply Kirchhoff current law (KCL) in a given circuits
11. Apply Kirchhoff's Voltage Law (KVL) of a closed loop circuit
12. Apply Voltage Divider Rule
13. Construct series circuit for analysis
14. Construct parallel circuit for analysis
15. Construct series-parallel circuit for analysis
16. Compute line voltage/phase voltage/ line current/ phase current in star/wye connection
17. Compute line voltage/phase voltage/ line current/ phase current in delta connection
18. Perform straight joint of solid wire/cable
19. Perform "T" joint of solid wire/cable
20. Perform Married joint of solid wire/cable
21. Perform Britannia joint of solid wire/cable
22. Make wire/cable eyelet
23. Interpret electrical drawings
24. Draw free hand plan/schematic diagram
25. Draw layout diagram
26. Draw wiring diagram.
27. Install one lamp controlled from one point using T-connection and looping methods in wooden/plastic Listics
28. Install two lamps controlled by individual Switches from two different points using loop in methods (system)
29. Install three lamps and one Socket outlet (Receptacle) controlled by Individual Switches
30. Install one lamp, one Fan and one Socket Controlled by Individual Switches
31. Install stair-case wiring circuit switching on and off from ground floor and first floor (Two way switch controlled from two different positions)
32. Install an electric bell at our different locations using 4 electromagnetic bell indicators and four push switches different places
33. Install a bell circuit with return messages in wooden/plastic batten wiring system.

34. Install a stairway lighting installation controlling the light from three different switching points using (1) Intermediate Switch (2) two way switches as intermediate switch, wooden batten/plastic wiring system
35. Install outdoor lighting in garden/ trees/' shrubs/ flowers/ decks/ walkways and existing (project work)
36. Repair / replace main circuit / branch- circuit's junction boxes of wiring system
37. Repair / replace Fluorescent lighting wiring
38. Repair / replace switch of wiring system
39. Repair / replace socket outlets / plugs of the wiring system
40. Perform troubleshooting of the lamps/tubes/doorbells
41. Repair / replace ceiling rose
42. Repair / replace protective devices
43. Install / connect earthing electrode
44. Lay PVC pipe for conceal wiring
45. Draw wire/cable through PVC pipe using fish wire
46. Install/ connect accessories/fittings/protective devices/ distribution board
47. Install SMART HOUSE wiring system (project work)
48. Carry out the rural electrification of a small villages (project work)
49. Install solar electrical systems (project work)

## Task Analysis

**TASK NO: 1** Explain the concept of electricity.

Time : 2 hrs  
Theory : 2 hrs  
Practical: hrs

Performance steps	Terminal Performance Objectives	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Define electricity</li> <li>2. Enlist nature of electricity</li> <li>3. Define electricity.</li> <li>4. Describe history of electricity</li> <li>5. Enlist importance of electricity.</li> <li>6. Enlist uses of electricity.</li> <li>7. Enlist sources of electricity.</li> <li>8. Explain concept of atom</li> <li>9. Describe atomic particle</li> <li>10. Describe atomic structure</li> <li>11. Describe free electron</li> <li>12. Describe charge body and Coulomb</li> <li>13. Define electronic current and conventional flow</li> <li>14. Define voltage</li> <li>15. Enlist sources of EMF</li> <li>16. Define resistance and conductance.</li> </ol>	<p><b><u>Condition (Given):</u></b> Classroom, textbook, manual, poster etc</p> <p><b><u>Task (What):</u></b> Explain the concept of electricity</p> <p><b><u>Standards (How well):</u></b> The concept of electricity including the terminologies explained in sequential order.</p>	<ul style="list-style-type: none"> <li>➤ Introduction of electricity</li> <li>➤ Importance of electricity</li> <li>➤ Nature of electricity</li> <li>➤ History of electricity</li> <li>➤ Uses of electricity.</li> <li>➤ Enlist sources of electricity</li> <li>➤ Concept of the atom</li> <li>➤ Atomic particles</li> <li>➤ Atomic structure</li> <li>➤ Free electrons</li> <li>➤ Charged body and Coulomb</li> <li>➤ Electric current and conventional flow</li> <li>➤ Voltage – The Electric pressure or electromotive force (EMF)</li> <li>➤ Source of EMF</li> <li>➤ Resistance and conductance</li> </ul>

**Tools/equipment:**

**Safety:**

## Task Analysis

**TASK NO: 2 Follow safety measures.**

Time : 4 hrs  
Theory : 2 hrs  
Practical: 2 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1 Select personal protective equipment (PPE) as required</li> <li>2 Wear required safety gears</li> <li>3 Inspect and maintain safe work area</li> <li>4 Follow established procedures for the use and care of tools</li> <li>5 Follow established procedures for the use and care of equipments</li> <li>6 Follow established procedures for the use and care of power operated equipment</li> <li>7 Follow established procedures for the use and care of safety equipments</li> <li>8 Enlist safety signs/notice.</li> <li>9 Enlist preparation for emergency response.</li> <li>10 Identify basic first-aid procedures</li> <li>11 Identify the elements to follow in treating a victim for electrical shock</li> <li>12 Lift objects and materials in accordance with established procedures.</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop/Classroom, safety tools, poster and equipments</p> <p><b><u>Task (What):</u></b> Follow safety measures.</p> <p><b><u>Standards (How well):</u></b> The safety measures followed in sequential order.</p>	<ul style="list-style-type: none"> <li>➤ Introduction</li> <li>➤ Key Terms (KT's) of safety such as: <ul style="list-style-type: none"> <li>▪ Artificial Resuscitation</li> <li>▪ Voltage</li> <li>▪ Current</li> <li>▪ Resistance</li> <li>▪ Electrical circuit</li> <li>▪ Fatigue</li> <li>▪ Ground or Earthing</li> <li>▪ Hazards</li> <li>▪ Lunge</li> </ul> </li> <li>➤ Electric Shock</li> <li>➤ Shock intensity</li> <li>➤ General shop rules</li> <li>➤ Personal safety rules</li> <li>➤ Tools and Equipment safety rules</li> </ul>

**Tools/equipment:**  
**Safety:**

## Task Analysis

**TASK NO: 3 Identify/enumerate/handle tools and instruments.**

Time : 4 hrs

Theory : 2 hrs

Practical: 2 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions.</li> <li>2. Collect necessary tools, instruments and materials.</li> <li>3. Identify tools and instrument used in house wiring system</li> <li>4. Enumerate identified tools and instruments.</li> <li>5. Explain their uses and functions.</li> <li>6. Explain safety and precaution while using them.</li> <li>7. Handle identified and enumerated tools and instruments.</li> <li>8. Explain safety and maintenance of those tools</li> <li>9. Keep records.</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop, various tools, equipment and materials needed for wiring</p> <p><b><u>Task (What):</u></b> Identify/enumerate/handle tools and instruments.</p> <p><b><u>Standards (How well):</u></b> All the tools and instruments needed to house wiring identified, enumerated and handled.</p>	<ul style="list-style-type: none"> <li>➤ Different tools and instruments used in house wiring and their functions</li> <li>➤ Identification procedure</li> <li>➤ Care and maintenance of tools and instruments,</li> <li>➤ Safety and precautions in handling tools and instruments</li> </ul>

**Tools/equipment:** Different tools and instruments

**Safety:** Handle tools and instrument safely.

## Task Analysis

**TASK NO: 4 Identify/draw electrical symbols and codes.**

Time : 5 hrs

Theory : 2 hrs

Practical: 3 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1 Obtain instructions</li> <li>2 Collect instrumental tools, equipments and materials</li> <li>3 Comprehend and interpret the real naming of the electrical and electronics symbols and codes.</li> <li>4 Prepare and interpret drawing and symbols of electrical/electronics systems,.</li> <li>5 Identify and draw general electrical and electronics symbols</li> <li>6 Identify and draw electrical/electronics symbols for systems</li> <li>7 Identify, draw and name Single line and Multi-line representation of electrical/electronic equipments</li> <li>8 Identify, draw and name Single line and Multi-line representation of electrical/electronic Meters and recording instruments</li> <li>9 Identify, draw and name of electrical/electronic lamps and signaling devices symbols</li> <li>10 Identify, draw and name of electrical/electronic Fuses and Fuse-switches symbols</li> <li>11 Identify, draw and name of electrical/electronic switchgear and control gear symbols</li> <li>12 Identify, draw and name of electrical/electronic wiring and wiring components symbols</li> <li>13 Identify, draw and name of electrical/electronic connecting devices symbols</li> <li>14 Keep records.</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Identify/draw electrical symbols and codes.</p> <p><b><u>Standards (How well):</u></b> Electrical/electronics symbols, appearance, coding and color coding. Identified.</p>	<p>➤ <b>Electrical drawing and wiring symbols</b></p> <ul style="list-style-type: none"> <li>▪ Introduction</li> <li>▪ Importance as technician's language</li> <li>▪ Use in electrical and electronics field</li> <li>▪ Orientation of symbols</li> <li>▪ Symbol size</li> <li>▪ Line thickness</li> <li>▪ Connecting and identification of lines</li> <li>▪ Common wiring circuits</li> <li>▪ Single line representation of wiring diagrams</li> </ul>

**Tools/equipment/materials:** Electrical codes of practice, NEA rules and regulations, Electrical specifications, drawing instrument set, drawing board, cello tape.

**Safety:** Handle instrument safely.

## Task Analysis

**TASK NO: 5 Apply problem-solving techniques stating the Ohm's law.** Time : 4 hrs  
 Theory : 2 hrs  
 Practical: 2 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
1 Obtain instructions 2 Collect tools, instruments and materials. 3 Exhibit the implementation of Ohm's Law into the electrical circuits 4 Exhibit the practicing experience of Current Law of Ohm's Law 5 Exhibit the practicing experience of Voltage Law of Ohm's Law 6 Exhibit the practicing experience of Resistance Law of Ohm's Law 7 Drill and apply 20 different exercises of each Law 8 Keep records.	<p><b><u>Condition (Given):</u></b>            Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b>            Apply problem-solving techniques stating the Ohm's law.</p> <p><b><u>Standards (How well):</u></b>            Ohm's law stated.            Relationship among current, voltage and resistance described.</p>	<p>➤ Mathematical expression of Ohm's Law as tools for circuit analysis:</p> <ul style="list-style-type: none"> <li>▪ Expressing current Law using pie-shape chart</li> <li>▪ Explaining the opposite effect of voltage and resistance values change ed in the circuits</li> <li>▪ Expressing Voltage Law using pie-shape chart</li> <li>▪ Explaining the opposite effect of current and resistance values change ed in the circuits</li> <li>▪ Expressing Resistance Law using pie-shape chart</li> <li>▪ Explaining the opposite effect of voltage and current values change ed in the circuits</li> </ul>

**Tools/equipment:**

**Safety:**

## Task Analysis

**TASK NO: 6 Calculate current/voltage/resistance.**

Time : 3 hrs

Theory : 1 hr

Practical: 2 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1 Obtain instructions</li> <li>2 Collect tools, instruments and materials.</li> <li>3 Understand the need for drilling exercise of mathematical problem solving of current, voltage and resistance</li> <li>4 Construct and interpret unknown voltage circuit with the current and resistance values and find voltage</li> <li>5 Comprehend, compute and interpret with fifteen example sets with different values of the same problems</li> <li>6 Construct and interpret unknown current circuit with the voltage and resistance values and find current</li> <li>7 Comprehend, compute and interpret with fifteen example sets with different values of the same problems</li> <li>8 Construct and interpret unknown resistance circuit with the voltage and current values and find resistance</li> <li>9 Comprehend, compute and interpret with fifteen example sets with different values of the same problems</li> <li>9 Keep records.</li> </ol>	<p><b><u>Condition (Given):</u></b> Mathematical problems</p> <p><b><u>Task (What):</u></b> Calculate current/ voltage/ resistance.</p> <p><b><u>Standards (How well):</u></b> The current, voltage and resistance values of the circuits computed and problem solved.</p>	<p>➤ <b>Ohm's Law:</b></p> <ul style="list-style-type: none"> <li>▪ As a old friend of the entire career of electricians and as natural as breathing in the human life</li> <li>▪ Technique of solving the unknown values of current, voltage and resistance in the case of two of these values are given in the circuit parameters</li> </ul>

**Tools/equipment:** Calculator

**Safety:** Use and handle calculator safely.



## Task Analysis

**TASK NO: 7 Measure resistances using Ohmmeter.**

Time : 3 hrs

Theory : 1 hr

Practical: 2 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
1 Obtain instructions 2 Obtain tools equipment & materials. 3 Construct a circuit of resistance with voltage for Tungsten lamp 4 Construct a circuit of resistance with voltage for Carbon filament lamp 5 Ensure the connection of the circuit are safely tight 6 Set the Ohm meter for zero reading scale before connecting it to the supply and circuit 7 Connect the meter to the circuit securely 8 Operate and read Ohm meter. 9 Record read values in the tabulated sheet and tables as instructed 10 Repeat the exercises number of times 10 Keep records.	<p><b><u>Condition (Given):</u></b> Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Measure resistances using Ohmmeter.</p> <p><b><u>Standards (How well):</u></b> Resistance measured using Ohmmeter. Ohmmeter handled.</p>	<p>➤ Theoretical principles:</p> <ul style="list-style-type: none"> <li>▪ Purpose of the experiment</li> <li>▪ Temperature variation and effects on resistance</li> <li>▪ Relationship between the change of materials and temperature changes</li> </ul> <p>➤ Procedure</p> <p>➤ Safety precautions</p>

**Tools/equipment:** Connecting leads, Ohmmeter/multimeter

**Safety:**

- Apply correct connecting technique of Ohmmeter.
- Handle electrical measuring instrument safely.
- Use first aid, if needed.
- Work safely with live line.

## Task Analysis

**TASK NO: 8 Measure voltages using Voltmeters.**

Time : 3 hrs

Theory : 1 hr

Practical: 2 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions</li> <li>2. Obtain tools equipment &amp; materials.</li> <li>3. Construct a voltage circuits with a values of current and resistance</li> <li>4. Ensure the connection of the circuit are safely tight</li> <li>5. Set the volt meter for zero reading scale before connecting it to the supply and circuit</li> <li>6. Connect the meter to the circuit securely</li> <li>7. Operate and read volt meter.</li> <li>8. Record read values in the tabulated sheet and tables as instructed</li> <li>9. Repeat the exercises number of times</li> <li>10. Keep records.</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Measure voltage using Voltmeter</p> <p><b><u>Standards (How well):</u></b> Voltage of the circuit measured using Voltmeter Voltmeter handled.</p>	<p>Introduction:</p> <ul style="list-style-type: none"> <li>▪ Volt meter operation</li> <li>▪ Connection of voltmeter in the circuit</li> <li>▪ Reading of the voltmeter</li> <li>➤ Cause and effect of voltmeter circuit loadings</li> <li>➤ Procedure</li> <li>➤ Safety precautions</li> </ul>

**Tools/equipment:** Connecting leads, Volt meter

**Safety:**

- Apply correct connecting technique of Voltmeter.
- Handle electrical measuring instrument safely.
- Use first aid, if needed.
- Work safely with live line.

## Task Analysis

**TASK NO: 9 Measure current using Ampere meter.**

Time : 3 hrs

Theory : 1 hr

Practical: 2 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions</li> <li>2. Obtain tools equipment &amp; materials.</li> <li>3. Construct a current circuits with a values of voltage and resistance</li> <li>4. Ensure the connection of the circuit are safely tight</li> <li>5. Set the Ampere meter for zero reading scale before connecting it to the supply and circuit</li> <li>6. Connect the meter to the circuit securely</li> <li>7. Operate and read ampere meter.</li> <li>8. Record read values in the tabulated sheet and tables as instructed</li> <li>9. Repeat the exercises number of times</li> <li>10. Keep records.</li> </ol>	<p><b><u>Condition (Given):</u></b> Classrooms Workshop equipped with electrical tools, instruments and required materials.</p> <p><b><u>Task (What):</u></b> Measure current using Ampere meter</p> <p><b><u>Standards (How well):</u></b> Current measured using Ampere meter. Ampere meter handled.</p>	<p>➤ <b>Describe the:</b></p> <ul style="list-style-type: none"> <li>▪ Ammeter operation</li> <li>▪ Connection of ammeter in the circuit</li> <li>▪ Reading of the ammeter</li> </ul> <p>➤ Explaining the cause and effect of ammeter circuit loadings</p> <p>➤ Procedure</p> <p>➤ Safety precautions</p>

**Tools/equipment:** Connecting leads, Ampere meter

**Safety:**

- Apply correct connecting technique of Ampere meter.
- Handle electrical measuring instrument safely.
- Use first aid, if needed.
- Work safely with live line.

## Task Analysis

**TASK NO: 10 Apply Kirchhoff's Current law (KCL) in a given Circuits.**

Time : 3 hrs  
Theory : 1 hr  
Practical: 2 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions</li> <li>2. Obtain tools equipment &amp; materials.</li> <li>3. Construct a circuits connecting with the different instrument and equipment(including 3 rheostat and 3 ammeter) as per the given instruction</li> <li>4. Ensure the connection of the circuit are safely tight</li> <li>5. Set all the three rheostats to the maximum values</li> <li>6. Switch on the supply</li> <li>7. Read and Note down the reading of the three ammeters.</li> <li>8. Change the three rheostats settings to get the different values reading in all three ammeters</li> <li>9. Note down the readings of all ammeters</li> <li>10. Check the sum of reading of two ammeters (entering current) equals to that of third ammeter (leaving current)</li> <li>11. Repeat step 8 for 5 settings of rheostat</li> <li>12. Switch-off the supply</li> <li>13. Keep records.</li> </ol>	<p><b><u>Condition (Given):</u></b> Classrooms Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Apply Kirchhoff's Current law (KCL) in a given Circuits.</p> <p><b><u>Standards (How well):</u></b> The Kirchhoff's law of current applied for examining the algebraic sum of all current entering and leaving any point in a circuit make equal zero.</p>	<p>➤ Mathematical expression of Kirchhoff's Current Law</p> <ul style="list-style-type: none"> <li>▪ Drawing a kirchhoff's current Law circuit diagram</li> <li>▪ Making a verification table of kirchhoff's current law mentioning ammeter (<math>A_1</math>), ammeter (<math>A_2</math>), ammeter (<math>A_3</math>) and (<math>A_1 + A_2</math>) in amperes</li> </ul> <p>➤ Safety precautions</p>

**Tools/equipment:**

**Safety:**

- Handle electrical measuring instrument safely.
- Use first aid, if needed.
- Work safely with live line.

## Task Analysis

**TASK NO: 11 Apply Kirchhoff's Voltage Law (KVL) of a closed loop circuit.**

Time : 4 hrs  
Theory : 2 hrs  
Practical: 2 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions</li> <li>2. Obtain tools equipment &amp; materials.</li> <li>3. Construct a circuits connecting with the different instrument and equipment (including one rheostat of 100 ohms, 5A, one ammeter and 3 voltmeters) as per the given instruction</li> <li>4. Ensure the connection of the circuit are safely tight</li> <li>5. Set the rheostats to the required values</li> <li>6. Switch-on the DC source as supply</li> <li>7. Read and Note down the reading of the ammeter and three volt meters</li> <li>8. Change the value of rheostat settings to get the different values reading in all three volt meters</li> <li>9. Note down the readings of all volt meters several times repeatedly</li> <li>10. Check each time and ensure that the ammeter do not read more than 5A current rating of the rheostat</li> <li>11. Repeat step 7 for 5 settings for the same current rating of the rheostat</li> <li>12. Switch-off the supply</li> <li>13. Keep records.</li> </ol>	<p><b><u>Condition (Given):</u></b> Classrooms Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Apply Kirchhoff's Voltage Law (KVL) of a closed loop circuit</p> <p><b><u>Standards (How well):</u></b> The Kirchhoff's law of voltage applied for examining the algebraic sum of all current entering and leaving any point in a circuit make equal zero.</p>	<ul style="list-style-type: none"> <li>➤ Defining the term of Closed loop:</li> <li>➤ Defining the Kirchhoff's Voltage Law                             <ul style="list-style-type: none"> <li>▪ Drawing a kirchhoff's voltage law circuit diagram or closed loop diagrams</li> <li>▪ Making a verification table of kirchhoff's voltage law mentioning one ammeter ( A1), three volt meters V1, V2 and V3 for reading voltages in the circuits and V1+V2 voltage drops</li> <li>▪ Explaining why Kirchhoff voltage law became a valuable tool for checking the voltage drop in the circuits</li> </ul> </li> <li>➤ Safety precautions</li> </ul>

**Tools/equipment:**

**Safety:**

- Handle electrical measuring instrument safely.
- Use first aid, if needed.
- Work safely with live line.

## Task Analysis

**TASK NO: 12 Apply Voltage Divider Rule**

Time : 3 hrs

Theory : 1 hr

Practical: 2 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions</li> <li>2. Obtain tools equipment &amp; materials.</li> <li>3. Construct a series circuits connecting resistors R<sub>1</sub>, R<sub>2</sub> and R<sub>3</sub> with the values of 560Ω, 470Ω and 330Ω respectively</li> <li>4. Give source voltage of 10 volts DC</li> <li>5. Ensure the connection of the circuit are safely tight</li> <li>6. Switch-on the DC source as supply</li> <li>7. Calculate the current using the current Law function of Ohms Law</li> <li>8. Calculate the total resistance R<sub>t</sub> of the circuit</li> <li>9. Calculate the voltage drop at R<sub>1</sub></li> <li>10. Calculate the voltage drop at R<sub>2</sub></li> <li>11. Calculate the voltage drop at R<sub>3</sub></li> <li>12. Add all voltage drops of three resistances</li> <li>13. Verify the added voltage drops with the source voltage</li> <li>14. Switch-off the supply</li> <li>15. Keep records.</li> </ol>	<p><b><u>Condition (Given):</u></b> Classrooms Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Apply Voltage Divider Rule</p> <p><b><u>Standards (How well):</u></b> The voltage divider rule applied in a series circuit to share and distribute the source voltage themselves according to their relative sizes of resistors</p>	<ul style="list-style-type: none"> <li>➤ Important characteristics of series circuit in voltage divider rule</li> <li>➤ Mathematical expression of the voltage Divider Rule</li> </ul>

**Tools/equipment:**

**Safety:**

- Handle electrical measuring instrument safely.
- Use first aid, if needed.
- Work safely with live line.

## Task Analysis

**TASK NO: 13 Construct series circuit for analysis.**

Time : 4 hrs  
Theory : 2 hrs  
Practical: 2 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions</li> <li>2. Obtain tools equipment &amp; materials.</li> <li>3. Construct a series resistor circuits of <math>R_1</math>, <math>R_2</math> and <math>R_3</math></li> <li>4. Connect a Ohmmeter as to work for total resistance</li> <li>5. Ensure the connection of the circuit are safely tight</li> <li>6. Switch-on or energize the Ohmmeter</li> <li>7. Calculate the total resistance of a series resistive circuit</li> <li>8. Calculate current, voltage drop, and power dissipation in a series resistive circuit</li> <li>9. Troubleshoot a series circuit with an Ohmmeter and a Voltmeter</li> <li>10. Switch-off the Ohmmeter</li> <li>11. Disconnect and disassemble the circuits</li> <li>12. Keep records.</li> </ol>	<p><b><u>Condition (Given):</u></b> Classroom Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Construct series circuit for analysis.</p> <p><b><u>Standards (How well):</u></b> A series circuit with <math>R_1</math>, <math>R_2</math> and <math>R_3</math> constructed for circuit analysis.</p>	<ul style="list-style-type: none"> <li>➤ Introduction: <ul style="list-style-type: none"> <li>▪ Basic Circuit analysis</li> <li>▪ Describing/showing the chart/table of current carrying capacity of a conductor including it's size</li> <li>▪ Describing the interpretation of: <ul style="list-style-type: none"> <li>○ Series resistors and circuits</li> <li>○ Use Ohms Law for series circuit analysis</li> <li>○ One path for current</li> <li>○ Series voltage drop</li> <li>○ The voltage divider</li> </ul> </li> </ul> </li> <li>➤ Definition of power dissipation of the components in a series circuit</li> <li>➤ Troubleshooting with an Ohmmeter</li> <li>➤ Troubleshooting with a Voltmeter</li> <li>➤ Safety precautions</li> </ul>

**Tools/equipment:** Ohmmeter, Voltmeter, Ammeter, calculator etc

**Safety:**

- Handle electrical measuring instrument safely.
- Use first aid, if needed.
- Work safely with live line.

## Task Analysis

**TASK NO: 14 Construct parallel circuit for analysis.**

Time : 3 hrs  
Theory : 1 hr  
Practical: 2 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1 Obtain instructions</li> <li>2 Obtain tools equipment &amp; materials.</li> <li>3 Construct <math>R_1 \parallel R_2 \parallel R_3</math> resistors in a parallel circuit with the supply source terminal A and B</li> <li>4 Ensure the connection of the circuit are safely tight</li> <li>5 Calculate total resistance of parallel circuits</li> <li>6 Calculate branch currents</li> <li>7 Calculate the total currents in a parallel circuits</li> <li>8 Calculate branch currents using a resistance ratio</li> <li>9 Switch-on or energize the Ohmmeter</li> <li>10 Calculate power</li> <li>11 Troubleshoot a parallel circuits using the Ohmmeter and the ammeter</li> <li>12 Switch-off the Ohmmeter</li> <li>13 Disconnect and disassemble the circuits</li> <li>14 Keep records.</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Construct parallel circuit for analysis.</p> <p><b><u>Standards (How well):</u></b> The parallel circuit with <math>R_1 \parallel R_2 \parallel R_3</math> constructed for analyzing the circuits.</p>	<p>➤ Introduction:</p> <ul style="list-style-type: none"> <li>▪ Parallel circuit theory</li> <li>▪ Connection of parallel resistors</li> <li>▪ Use of Ohmmeter for parallel circuit analysis</li> <li>▪ Use of Ohms Law for solving problems</li> <li>▪ The product over the Sum Formula</li> <li>▪ The reciprocal Formula (or conductance Formula)</li> </ul> <p>➤ Safety precautions</p>

**Tools/equipments:** Ohmmeter, Voltmeter, Ammeter, calculator etc

**Safety:**

- Handle electrical measuring instrument safely.
- Use first aid, if needed.
- Work safely with live line.



## Task Analysis

**TASK NO: 15 Construct series-parallel circuit for analysis.**

Time : 3 hrs

Theory : 1 hrs

Practical: 2 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1 Obtain instructions</li> <li>2 Obtain tools equipment &amp; materials.</li> <li>3 Construct a combined overall series circuit and overall parallel circuit connecting with <math>R_1, R_3, R_4</math> in parallel after <math>R_2</math>, and <math>R_5</math> and <math>R_6</math> in series after <math>R_1</math> common junction</li> <li>4 Connect terminals A and B to <math>E_s</math> supply voltage</li> <li>5 Ensure the connection of the circuit are safely tight</li> <li>6 Determine the amount of current flowing through <math>R_4</math></li> <li>7 Determine the amount of current flowing through <math>R_5</math></li> <li>8 Calculate the voltage across the <math>R_3</math></li> <li>9 Determine the correct polarity of the voltage drops across each resistor</li> <li>10 Connect an ammeter to measure total current</li> <li>11 Switch-on or energize the circuit</li> <li>12 Calculate the total resistance of a parallel resistive circuit</li> <li>13 Calculate total resistance in overall series circuits</li> <li>14 Calculate total currents in <math>R_1</math> when supply fed at A and B terminals</li> <li>15 Determine the total current division at <math>R_2</math> and <math>R_3</math></li> <li>16 Switch-off the Ohmmeter</li> <li>17 Disconnect and disassemble the circuits</li> <li>18 Keep records.</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Construct series-parallel circuit for analysis.</p> <p><b><u>Standards (How well):</u></b> The series- parallel circuit with <math>R_1 \parallel R_2 \parallel R_3 \parallel</math> constructed for analyzing the circuits.</p>	<ul style="list-style-type: none"> <li>➤ Introduction: <ul style="list-style-type: none"> <li>▪ Characteristics of overall series circuits</li> <li>▪ Use of “product over the sum” formula for reducing complex circuit to simple series circuits</li> <li>▪ Calculating application of Total Resistance (<math>R_t</math>) of overall series circuits</li> <li>▪ Voltage, Current and Power in Overall series circuits</li> <li>▪ Calculating voltage drop methods in Overall series circuits</li> <li>▪ Solving methods of branch current in Overall series circuits</li> <li>▪ Overall parallel Circuits</li> <li>▪ Identifying Characteristics of overall parallel circuits</li> <li>▪ Solving total resistance in overall parallel circuits</li> <li>▪ Calculating application of Total Resistance (<math>R_t</math>) of overall parallel circuits</li> </ul> </li> <li>➤ Handling a complex circuits: <ul style="list-style-type: none"> <li>▪ Combining parallel resistance</li> <li>▪ Combining series resistance</li> <li>▪ Redrawing the circuits</li> <li>▪ Combining circuits to bring into the simplest form and</li> <li>▪ Illustration process of the circuits</li> </ul> </li> <li>➤ Safety precautions</li> </ul>

**Tools/equipment:** Ohmmeter, Voltmeter, Ammeter, calculator etc

**Safety:**

- Handle electrical measuring instrument safely.
- Use first aid, if needed.
- Work safely with live line.

## Task Analysis

**TASK NO: 16 Compute line voltage/phase voltage/line current /phase current in star/wye connection.**

Time : 5 hrs

Theory : 2 hrs

Practical: 3 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions</li> <li>2. Obtain tools, equipment/instruments and materials</li> <li>3. Clean working table before starting job</li> <li>4. Develop a two-pole, stationary armature, rotating field type three phase alternator diagram neat and cleanly</li> <li>5. Draw a diagram of the Three emfs 120° apart in the sine wave form</li> <li>6. Draw a Three phase voltage diagram in a wye connection system</li> <li>7. Observe mathematically using trigonometry sine angle the voltage in two phases in series apart by 120°</li> <li>8. Prove mathematically relationship of voltage, current and power to the total power in both wye and delta connections</li> <li>9. Determine the interlinking factor of the phase to phase voltage in a Star connection</li> <li>10. Determine the system points between voltage and current in three phase system</li> <li>11. Develop the formula for the line current in a wye connection system</li> <li>12. Develop the formula for the line current in a delta connection system</li> <li>13. Develop the formula for the phase voltage in a wye connection system</li> <li>14. Develop the formula for the phase voltage in a delta connection system</li> <li>15. Develop the formula for total power in VA for three phase circuits</li> <li>16. Develop the formula for total power in watts for three phase circuits</li> <li>17. Keep records.</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> The line voltage/ phase voltage/line current /phase current in star- (Y) connection.</p> <p><b><u>Standards (How well):</u></b> The line voltage, phase voltage, line current and phase current in star (wye) connection is computed</p>	<p>➤ Introduction:</p> <ul style="list-style-type: none"> <li>▪ Generation of EMF               <ul style="list-style-type: none"> <li>○ Single phase emf</li> <li>○ Two phase emf</li> <li>○ Three phase emf</li> </ul> </li> <li>▪ Merit and demerit of polyphase system</li> <li>▪ Generating Phase Displaced Voltages</li> <li>▪ Phase to phase voltage in a Star connection</li> <li>▪ Phase to phase current in a Star connection</li> <li>▪ Apparent power in one conductor of three phase</li> <li>▪ Total apparent power calculation</li> <li>▪ Total active power calculation</li> <li>▪ Total reactive power</li> </ul>

**Tools/equipment:** Calculator

**Safety:**

## Task Analysis

**TASK NO: 17 Compute line voltage/phase voltage/line current and phase current in delta-connection.**

Time : 5 hrs  
Theory : 2 hrs  
Practical: 3 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions</li> <li>2. Obtain tools, equipment/instruments and materials</li> <li>3. Clean working table before starting job</li> <li>4. Develop a two-pole, stationary armature, rotating field type three phase alternator diagram neatly and cleanly</li> <li>5. Draw a diagram of the Three emfs in series to form a closed mesh delta connection system</li> <li>6. Observe mathematically using trigonometry sine angle voltage in two phases which is <math>120^\circ</math> apart by angle</li> <li>7. Prove mathematically relationship of voltage, current and power in the delta connections</li> <li>8. Prove mathematically the relationship of voltage and current in delta connection are different than in a wye connection</li> <li>9. Develop the formula based on the given line voltage of delta connection</li> <li>10. Develop the formula for the line current in a delta connection system</li> <li>11. Develop the formula for the phase voltage in a delta connection system</li> <li>12. Develop the formula for total power in VA for three phase circuits in delta connection</li> <li>13. Develop the formula for total power in watts for three phase circuit in delta connection</li> <li>14. Keep records.</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Compute line voltage/phase voltage/ line current/ phase current in delta-connection</p> <p><b><u>Standards (How well):</u></b> Compute line voltage, phase voltage, line current and phase current in delta-connection computed.</p>	<p>➤ Introduction:</p> <ul style="list-style-type: none"> <li>▪ Generation of EMF               <ul style="list-style-type: none"> <li>○ Single phase emf</li> <li>○ Two phase emf</li> <li>○ Three phase emf</li> </ul> </li> <li>▪ Merit and demerit of polyphase system</li> <li>▪ Delta <math>\Delta</math> or Mesh connection systems</li> <li>▪ Phase to phase current (<math>I_1, I_2</math> and <math>I_3</math>)</li> <li>▪ Phase to phase voltage in a Delta connection system</li> <li>▪ Calculation of power in delta-connection               <ul style="list-style-type: none"> <li>○ Apparent power in one conductor of three phase</li> <li>○ Total apparent power (S)</li> <li>○ Total active power (P)</li> <li>○ Total reactive power (Q)</li> </ul> </li> </ul> <p>➤ Comparison between Star-and Delta-connection</p>

**Tools/equipment:** Calculator

**Safety:**

## Task Analysis

**TASK NO: 18 Perform straight joint of solid wire/cable.**

Time : 5 hrs

Theory : 2 hrs

Practical: 3 hrs

Performance Steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain the required drawing.</li> <li>2. Study the drawing.</li> <li>3. Obtain the required tools.</li> <li>4. Obtain the required wire/cable piece.</li> <li>5. Measure and mark the wire/cable piece according to the drawing.</li> <li>6. Grip the cable in the cutting jaws of a pliers/knife securely</li> <li>7. Give slight pressure on the insulation with take for not to cut and damage over the conductor</li> <li>8. Skin the insulation of wire/cable by electrician knife/cutting pliers/wire stripper.</li> <li>9. Remove the insulation of wire/cable by pliers/wire stripper.</li> <li>10. Wrap one piece of conductor on the other to make straight joint</li> <li>11. Repeat the same process/operation on the side of conductor giving equal number of turns on the other side</li> <li>12. Round off the ends of the conductor with flat nose by keeping cotton waste between them to protect from scratch over the conductor</li> <li>13. Complete the straight joint</li> <li>14. Restore the tools/material.</li> <li>15. Clean the work place.</li> <li>16. Keep records.</li> </ol>	<p><b><u>Condition (Given):-</u></b> Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):-</u></b> Perform straight joint of solid wire/cable.</p> <p><b><u>Standard (How well):-</u></b> The straight joint of solid wire/ cable performed as per requirements.</p>	<ul style="list-style-type: none"> <li>➤ Introduction to wire/cable joint</li> <li>➤ Parts of cable</li> <li>➤ Conductor</li> <li>➤ Insulation covering</li> <li>➤ Protective covering</li> <li>➤ Stranded cable</li> <li>➤ Advantage of stranded cables</li> <li>➤ Types of joint</li> <li>➤ Voltage grade of cable</li> <li>➤ Measurement of joint</li> <li>➤ Technique of insulation remove from wire/cable using               <ul style="list-style-type: none"> <li>▪ Pliers Skinning</li> <li>▪ Pencil Skinning</li> <li>▪ Snake Skinning</li> <li>▪ Straight Skinning</li> </ul> </li> <li>➤ Procedure</li> <li>➤ Safety precautions</li> </ul>

**Tools /equipment::** Knife, cable stripper, pliers, scriber, measuring tape etc

**Safety:** Don't scathe on wire.

## Task Analysis

**TASK NO: 19 Perform “T” joint of solid wire/cable.**

Time : 5 hrs  
Theory : 2 hrs  
Practical: 3 hrs

Performance Steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain the required drawing.</li> <li>2. Study the drawing.</li> <li>3. Obtain the required tools.</li> <li>4. Obtain the required wire/cable piece.</li> <li>5. Measure and mark the wire/cable piece according to the drawing.</li> <li>6. Grip the cable in the cutting jaws of a pliers/knife securely</li> <li>7. Give slight pressure on the insulation with take for not to cut and damage over the conductor</li> <li>8. Skin the insulation of wire/cable from the center of 20cm</li> <li>9. Remove the insulation of wire/cable in one end of wire about 15cm long in other piece of wire.</li> <li>10. Clean the naked portion of wire</li> <li>11. Keep firm grip of these pieces of wire in “T” shape</li> <li>12. Wrap the piece of wire over the next wire.</li> <li>13. Round off the ends of the conductor with flat nose by keeping with a uniform turning and shape</li> <li>14. Restore the tools/material.</li> <li>15. Clean the work place.</li> <li>16. Keep records.</li> </ol>	<p><b><u>Condition (Given):-</u></b> Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):-</u></b> Perform “T” joint of solid wire/cable.</p> <p><b><u>Standard (How well):-</u></b> T- Joint joints of solid wire or cable performed as per requirements.</p>	<ul style="list-style-type: none"> <li>➤ Introduction to wire/cable joint</li> <li>➤ Parts of cable</li> <li>➤ Conductor</li> <li>➤ Insulation covering</li> <li>➤ Protective covering</li> <li>➤ Stranded cable</li> <li>➤ Advantage of stranded cables</li> <li>➤ Types of joint</li> <li>➤ Voltage grade of cable</li> <li>➤ Measurement of joint</li> <li>➤ Technique of insulation remove from wire/cable using               <ul style="list-style-type: none"> <li>▪ Pliers Skinning</li> <li>▪ Pencil Skinning</li> <li>▪ Snake Skinning</li> <li>▪ Straight Skinning</li> </ul> </li> <li>➤ Procedure</li> <li>➤ Safety precautions</li> </ul>

**Tools /equipment:** Knife, cable stripper, pliers, scribe, measuring tape etc

**Safety:** Don't scathe on wire.

## Task Analysis

**TASK NO: 20 Perform Married joint of solid wire/cable.**

Time : 5 hrs  
Theory : 2 hrs  
Practical: 3 hrs

Performance Steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain the required drawing.</li> <li>2. Study the drawing.</li> <li>3. Obtain the required tools.</li> <li>4. Obtain and prepare the required wire/cable piece.</li> <li>5. Cut two pieces of 6mm<sup>2</sup> three stranded wire of about 15cm long</li> <li>6. Grip the cable in the cutting jaws of a pliers/knife securely</li> <li>7. Give slight pressure on the insulation with take for not to cut and damage over the conductor</li> <li>8. Remove 10cm insulation from one side of both wires</li> <li>9. Open the strand or separate each wire</li> <li>10. Clean the naked portion of wire</li> <li>11. Retwist the wire of about 3cm inside from the insulation and left 7cm strand opened</li> <li>12. Place the two piece of wires closed together against over each other as per instruction</li> <li>13. Wrap left hand wire over the right hand side naked wires in clockwise direction</li> <li>14. Wrap right hand wire over the other side naked wires in anti clockwise direction</li> <li>15. Round of the ends of the wires in the form of circle with flat nose pliers smoothly without any injury over the wire surface.</li> <li>16. Restore the tools/material.</li> <li>17. Clean the work place.</li> <li>18. Keep records.</li> </ol>	<p><b><u>Condition (Given):-</u></b> Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):-</u></b> Perform Married of solid wire/cable.</p> <p><b><u>Standard (How well):-</u></b> Married joint of solid wire or cable performed as per requirements.</p>	<ul style="list-style-type: none"> <li>➤ Introduction to wire/cable joint</li> <li>➤ Parts of cable</li> <li>➤ Conductor</li> <li>➤ Insulation covering</li> <li>➤ Protective covering</li> <li>➤ Stranded cable</li> <li>➤ Advantage of stranded cables</li> <li>➤ Types of joint</li> <li>➤ Voltage grade of cable</li> <li>➤ Measurement of joint</li> <li>➤ Technique of insulation remove from wire/cable using                             <ul style="list-style-type: none"> <li>▪ Pliers Skinning</li> <li>▪ Pencil Skinning</li> <li>▪ Snake Skinning</li> <li>▪ Straight Skinning</li> </ul> </li> <li>➤ Procedure</li> <li>➤ Safety precautions</li> </ul>

**Tools /Equipment:** Knife, cable stripper, pliers, scriber, measuring tape etc

**Safety:** Don't scathe on wire.

## Task Analysis

**TASK NO: 21 Perform Britannia joint of solid wire/cable.**

Time : 5 hrs

Theory : 2 hrs

Practical: 3 hrs

Performance Steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain the required drawing.</li> <li>2. Study the drawing.</li> <li>3. Obtain the required tools.</li> <li>4. Obtain the required wire/cable piece.</li> <li>5. Cut two pieces of hard drawn 8 SWG wires of 30 cm</li> <li>6. Make straight and clean these wires</li> <li>7. Bend 1.5 cm from one end of each wire at right angle</li> <li>8. Place the wire side by side with bent portion facing opposite to each other at the distance of 10 cm from one end of each wire at right angle</li> <li>9. Hold the wire on the vice and grip gently to avoid scratches on the surface of the wires</li> <li>10. Take the bind wire and make it straight</li> <li>11. Wrap the binding wires from 2 cm behind from where joint start</li> <li>12. Continue binding process over the entire length of the joint</li> <li>13. Finish the binding at about 2 cm ahead of the next bent portion</li> <li>14. Restore the tools/material.</li> <li>15. Clean the work place.</li> <li>16. Keep records.</li> </ol>	<p><b><u>Condition (Given):-</u></b> Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):-</u></b> Perform Britannia joint of solid wire/cable.</p> <p><b><u>Standard (How well):-</u></b> Britannia joint of solid wire/cable performed as per requirements.</p>	<ul style="list-style-type: none"> <li>➤ Introduction to wire/cable joint</li> <li>➤ Parts of cable</li> <li>➤ Conductor</li> <li>➤ Insulation covering</li> <li>➤ Protective covering</li> <li>➤ Stranded cable</li> <li>➤ Advantage of stranded cables</li> <li>➤ Types of joint</li> <li>➤ Voltage grade of cable</li> <li>➤ Measurement of joint</li> <li>➤ Technique of insulation remove from wire/cable using               <ul style="list-style-type: none"> <li>▪ Pliers Skinning</li> <li>▪ Pencil Skinning</li> <li>▪ Snake Skinning</li> <li>▪ Straight Skinning</li> </ul> </li> <li>➤ Procedure</li> <li>➤ Safety precautions</li> </ul>

**Tools /Equipment:** Knife, cable stripper, pliers, scriber, measuring tape etc

**Safety:** Don't scathe on wire.

## Task Analysis

**TASK NO: 22 Make wire/cable eyelet.**

Time : 5 hrs

Theory : 2 hrs

Practical: 3 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1 Obtain instructions.</li> <li>2 Obtain necessary tools, equipment &amp; materials.</li> <li>3 Cut 50 cm long PVC cable or GI bare conductor from the stocks</li> <li>4 Clean dirt, dust and insulation, if presents</li> <li>5 Open the strand up to 7 cm long from any side of the conductor</li> <li>6 Bend the cleaned conductor up to 15cm from the opened side in the shape of eye and place open conductors in parallel on the twisted conductors as well as on the remaining open conductors one by one</li> <li>7 Make it eye shape after complete the joint making</li> <li>8 Restore the tools/material.</li> <li>9 Clean the work place.</li> <li>10 Keep records.</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Make wire/cable eyelet.</p> <p><b><u>Standards (How well):</u></b> The wire or cable made in the eye shape joint as per requirements.</p>	<ul style="list-style-type: none"> <li>➤ Introduction to wire/cable joint</li> <li>➤ Parts of cable</li> <li>➤ Conductor</li> <li>➤ Insulation covering</li> <li>➤ Protective covering</li> <li>➤ Stranded cable</li> <li>➤ Advantage of stranded cables</li> <li>➤ Types of joint</li> <li>➤ Voltage grade of cable</li> <li>➤ Measured of joint</li> <li>➤ Technique of insulation remove from wire/cable using</li> <li>➤ Procedure</li> <li>➤ Safety precautions</li> </ul>

**Tools/equipment:** Knife, cable stripper, pliers, scriber, measuring tape etc

**Safety:** Don't scathe on wire.



## Task Analysis

**TASK NO: 23 Interpret electrical drawings.**

Time : 4 hrs  
Theory: 1 hr  
Practical: 3 hrs

Performance steps	Terminal Performance Objectives	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1 Receive instructions</li> <li>2 Obtain electrical drawing</li> <li>3 Collect measuring instruments &amp; materials.</li> <li>4 Identify location of accessories and fittings.</li> <li>5 Ensure cable route.</li> <li>6 Keep records.</li> </ol>	<p><b><u>Condition (Given):</u></b> Electrical drawings, measuring instrument and materials.</p> <p><b><u>Task (What):</u></b> Interpret electrical drawings.</p> <p><b><u>Standards (How well):</u></b> Electrical drawings interpreted. Location of accessories and fittings identified.</p>	<ul style="list-style-type: none"> <li>➤ Symbols of accessories and fittings</li> <li>➤ Identification of current capacity of accessories, fittings and protective devices</li> <li>➤ Interpretation technique of drawing</li> <li>➤ Safety precautions</li> </ul>

**Tools/equipment:** Electrical codes of practice, NEA rules and regulations, Electrical specifications, drawing instrument set, drawing board, cello tape.

**Safety:** Handle drawing instruments safely.

## Task Analysis

**TASK NO: 24 Draw free hand plan/schematic diagram.**

Time : 4 hrs  
Theory : 1 hr  
Practical: 3 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions</li> <li>2. Prepare drawing instrument.</li> <li>3. Fix drawing sheet on the drawing board</li> <li>4. Draw boarder line on the drawing sheet.</li> <li>5. Collect building drawing</li> <li>6. Decide the schemata to be drawn</li> <li>7. Draw electrical free-hand plan/schematic diagram of building (Master bed room, Living room, Kitchen, bed room, include bath room &amp; toilet)</li> <li>8. Apply the standard sign and symbols.</li> <li>1. Clean the drawing.</li> <li>9. Remove drawing sheet from board.</li> <li>10. Keep records</li> </ol>	<p><b><u>Condition (Given):</u></b> Building drawings, well equipped drawing class room and drawing equipment</p> <p><b><u>Task (What):</u></b> Draw free hand plan/schematic diagram.</p> <p><b><u>Standards (How well):</u></b> Free hand plan and schematic diagram drawn as per instruction.</p>	<ul style="list-style-type: none"> <li>➤ Free-hand plan/schematic diagram               <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Uses</li> <li>• Advantage</li> <li>• Types</li> <li>• Importance</li> </ul> </li> <li>➤ Procedure</li> <li>➤ Safety precautions</li> </ul>

**Tools/equipment:** Drawing instruments

**Safety:**

## Task Analysis

**TASK NO: 25 Draw layout diagram.**

Time : 4 hrs  
Theory : 1 hr  
Practical: 3 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions</li> <li>2. Prepare drawing instrument.</li> <li>3. Fix drawing sheet on the drawing board</li> <li>4. Draw boarder line on the drawing sheet.</li> <li>5. Collect building drawing</li> <li>6. Decide the layout diagram to be drawn.</li> <li>7. Draw electrical layout diagram of building (Master bed room, Living room, Kitchen, bed room, include bath room &amp; toilet)</li> <li>1. Apply the standard sign and symbols.</li> <li>2. Clean the drawing.</li> <li>8. Remove drawing sheet from board.</li> <li>9. Keep records</li> </ol>	<p><b><u>Condition (Given):</u></b> Building drawings, well equipped drawing class room and drawing equipment</p> <p><b><u>Task (What):</u></b> Draw layout diagram</p> <p><b><u>Standards (How well):</u></b> Electrical layout diagram drawn as per instruction.</p>	<ul style="list-style-type: none"> <li>➤ Electrical layout diagram               <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Uses</li> <li>• Advantage</li> <li>• Types</li> <li>• Importance</li> </ul> </li> <li>➤ Procedure</li> <li>➤ Safety precautions</li> </ul>

**Tools/equipment:** Drawing instruments

**Safety:**

## Task Analysis

**TASK NO: 26 Draw wiring diagram.**

Time : 4 hrs  
Theory : 1 hr  
Practical: 3 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions</li> <li>2. Prepare drawing instrument.</li> <li>3. Fix drawing sheet on the drawing board</li> <li>4. Draw boarder line on the drawing sheet.</li> <li>5. Collect building Drawing</li> <li>6. Decide the wiring diagram to be drawn.</li> <li>7. Draw electrical wiring diagram of building (Master bed room, Living room, Kitchen, bed room, include bath room &amp; toilet)</li> <li>11. Apply the standard sign and symbols.</li> <li>2. Clean the drawing.</li> <li>12. Remove drawing sheet from board.</li> <li>8. Keep records</li> </ol>	<p><b><u>Condition (Given):</u></b> Building drawings, well equipped drawing class room and drawing equipment</p> <p><b><u>Task (What):</u></b> Draw wiring diagram</p> <p><b><u>Standards (How well):</u></b> Electrical wiring diagram drawn as per instruction.</p>	<ul style="list-style-type: none"> <li>➤ Electrical wiring diagram               <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Uses</li> <li>• Advantage</li> <li>• Types</li> <li>• Importance</li> </ul> </li> <li>➤ Procedure</li> <li>➤ Safety precautions</li> </ul>

**Tools/equipment:** Drawing instruments

**Safety:**

## Task Analysis

**TASK NO: 27 Install one lamp control from one point using T-connection and looping methods in wooden/plastic Listics**

Time : 8 hrs  
Theory : 2 hrs  
Practical: 6 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1 Obtain instructions.</li> <li>2 Obtain necessary tools, equipment &amp; materials.</li> <li>3 Make a lay out diagram using thread-dipped in chalk-power as instructed.</li> <li>4 Draw a circuit diagram in the drawing paper in a clean and neat manner</li> <li>5 Fix loosely wooden/plastic Listics vertically and horizontally on the board using poker and screwdriver</li> <li>6 Lay and fix wires in the Listics as per developed circuit diagram</li> <li>7 Prepare wooden blocks for batten Holder and switch</li> <li>8 Fix wooden blocks at their position as per lay out</li> <li>9 Connect wires with switch and lamp holder tightly and securely</li> <li>10 Check the circuit with series test lamp</li> <li>11 Clean the workshop neatly</li> <li>12 Make a report of the work progress</li> <li>13 Keep records.</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Install/control one lamp control from one point using T-connection and looping methods in wooden/plastic Listics.</p> <p><b><u>Standards (How well):</u></b> One lamp control from one point installed using T-connection and looping methods in wooden/plastic Listics</p>	<ul style="list-style-type: none"> <li>➤ Introduction <ul style="list-style-type: none"> <li>▪ Methods of wiring</li> <li>▪ System of wiring <ul style="list-style-type: none"> <li>○ T-system connection</li> <li>○ Loop system connection</li> <li>○ Advantages of loop in system</li> <li>○ Disadvantages of loop in system</li> </ul> </li> </ul> </li> <li>➤ Types of Diagrams: <ul style="list-style-type: none"> <li>▪ Circuit diagram or schematic diagram</li> <li>▪ Wiring Diagram</li> <li>▪ Layout diagram</li> </ul> </li> <li>➤ Wiring materials and Accessories</li> <li>➤ Wire and Cable</li> <li>➤ Insulating materials</li> <li>➤ Types of cables used in house wiring</li> <li>➤ Lighting Accessories and Fittings</li> <li>➤ Testing of Wiring Installation</li> <li>➤ Procedure</li> <li>➤ Safety precautions</li> </ul>

**Tools/equipment:** Set of wiring tool kit, control accessories, lighting fittings, fixing hardwires and wiring materials.

**Safety:**

- Use hand tools, sharpened tools and instruments safely.
- Apply of safe practice technique.
- Use first aid, if needed.
- Work safely with live line.

## Task Analysis

**TASK NO: 28 Install Two lamps controlled by individual Switches from two different points using loop in methods (system)**

Time : 8 hrs  
Theory : 2 hrs  
Practical: 6 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions.</li> <li>2. Obtain necessary tools, equipment &amp; materials.</li> <li>3. Make a lay out diagram using thread-dipped in chalk-power as instructed.</li> <li>4. Draw a circuit diagram in the drawing paper in a clean and neat manner</li> <li>5. Fix loosely wooden/plastic Listics vertically and horizontally on the board using poker and screwdriver</li> <li>6. Lay and fix wires in the Listics as per developed circuit diagram</li> <li>7. Prepare wooden blocks for batten Holders and switches</li> <li>8. Fix wooden blocks at their position as per lay out</li> <li>9. Tighten all wooden listics securely</li> <li>10. Connect wires with switches and lamp holders tightly and securely</li> <li>11. Check the circuit with series test lamp</li> <li>12. Clean the workshop neatly</li> <li>13. Make a report of the work progress</li> <li>14. Keep records.</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Install/control Two lamps controlled by individual Switches of two different points using loop in methods (system)</p> <p><b><u>Standards (How well):</u></b> The connection of Two lamps installed and controlled by individual Switches from two different points using loop in methods (system)</p>	<ul style="list-style-type: none"> <li>➤ Introduction</li> <li>➤ Types of Diagrams: <ul style="list-style-type: none"> <li>▪ Circuit diagram or schematic diagram</li> <li>▪ Wiring Diagram</li> <li>▪ Layout diagram</li> </ul> </li> <li>➤ Wiring materials and Accessories</li> <li>➤ Wire and Cable</li> <li>➤ Insulating materials</li> <li>➤ Types of cables used in house wiring</li> <li>➤ Lighting Accessories and Fittings</li> <li>➤ Testing of Wiring Installation</li> <li>➤ Procedure</li> <li>➤ Safety precautions</li> </ul>

**Tools/equipment:** Set of wiring tool kit, control accessories, lighting fittings, fixing hardwires and wiring materials.

**Safety:**

- Use hand tools, sharpened tools and instruments safely.
- Apply of safe practice technique.
- Use first aid, if needed.
- Work safely with live line.

## Task Analysis

**TASK NO: 29 Install three lamps and one Socket outlet (Receptacle) controlled by Individual Switches.**

Time : 8 hrs  
Theory : 2 hrs  
Practical: 6 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions</li> <li>2. Obtain required tools, equipments and materials</li> <li>3. Make a lay out diagram using thread-dipped in chalk-power as instructed.</li> <li>4. Draw a circuit diagram in the drawing paper in a clean and neat manner</li> <li>5. Fix loosely wooden/plastic Listics vertically and horizontally on the board using poker and screwdriver</li> <li>6. Lay and fix wires in the Listics as per developed circuit diagram</li> <li>7. Prepare wooden blocks for batten Holders and switches</li> <li>8. Fix wooden blocks at their position as per lay out</li> <li>9. Tighten all wooden listics securely</li> <li>10. Connect wires with switches and lamp holders tightly and securely</li> <li>11. Check the circuit with series test lamp Clean the workshop neatly</li> <li>12. Make a report of the work progress</li> <li>13. Keep records.</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Install three lamps and one Socket outlet (Receptacle) controlled by Individual Switches.</p> <p><b><u>Standards (How well):</u></b> The three lamps and one Socket outlet (Receptacle) installed and controlled by Individual Switches.</p>	<ul style="list-style-type: none"> <li>➤ Introduction</li> <li>➤ Types of Diagrams: <ul style="list-style-type: none"> <li>▪ Circuit diagram or schematic diagram</li> <li>▪ Wiring Diagram</li> <li>▪ Layout diagram</li> </ul> </li> <li>➤ Wiring materials and Accessories</li> <li>➤ Wire and Cable</li> <li>➤ Insulating materials</li> <li>➤ Types of cables used in house wiring</li> <li>➤ Lighting Accessories and Fittings</li> <li>➤ Socket outlets (Receptacles)</li> <li>➤ Testing of Wiring Installation</li> <li>➤ Procedure</li> <li>➤ Safety precautions</li> </ul>

**Tools/equipment:** Set of wiring tool kit, control accessories, lighting fittings, fixing hardwires and wiring materials.

**Safety:**

- Use hand tools, sharpened tools and instruments safely.
- Apply of safe practice technique.
- Use first aid, if needed.
- Work safely with live line.

## Task Analysis

**TASK NO: 30 Install one lamp, one Fan and one Socket Controlled by Individual Switches.**

Time : 8 hrs  
Theory : 2 hrs  
Practical: 6 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions</li> <li>2. Obtain required tools, equipments and materials</li> <li>3. Make a lay out diagram using thread-dipped in chalk-power as instructed.</li> <li>4. Draw a circuit diagram in the drawing paper in a clean and neat manner</li> <li>5. Fix loosely wooden/plastic Listics vertically and horizontally on the board using poker and screwdriver</li> <li>6. Lay and fix wires in the Listics as per developed circuit diagram</li> <li>7. Prepare wooden blocks for batten Holders and switches</li> <li>8. Fix wooden blocks at their position as per lay out</li> <li>9. Tighten all wooden listics securely</li> <li>10. Connect wires with switches and lamp holders tightly and securely</li> <li>11. Check the circuit with series test lamp Clean the workshop neatly</li> <li>12. Make a report of the work progress</li> <li>13. Keep records.</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Install one lamp, one Fan and one Socket Controlled by Individual Switches</p> <p><b><u>Standards (How well):</u></b> The one lamp, one Fan and one Socket installed and controlled by Individual Switches of different places</p>	<ul style="list-style-type: none"> <li>➤ Types of Diagrams: <ul style="list-style-type: none"> <li>▪ Circuit diagram or schematic diagram</li> <li>▪ Wiring Diagram</li> <li>▪ Layout diagram</li> </ul> </li> <li>➤ Introduction</li> <li>➤ Wiring materials and Accessories</li> <li>➤ Wire and Cable</li> <li>➤ Insulating materials</li> <li>➤ Types of cables used in house wiring</li> <li>➤ Lighting Accessories and Fittings</li> <li>➤ Socket outlets (Receptacles)</li> <li>➤ Electrical Appliance</li> <li>➤ Testing of Wiring Installation</li> <li>➤ Procedure</li> <li>➤ Safety precautions</li> </ul>

**Tools/equipment:** Set of wiring tool kit, control accessories, lighting fittings, fixing hardwires and wiring materials.

**Safety:**

- Use hand tools, sharpened tools and instruments safely.
- Apply of safe practice technique.
- Use first aid, if needed.
- Work safely with live line



## Task Analysis

**TASK NO: 31 Install stair-case wiring circuit switching on and off from ground floor and first floor. (Two way switch controlled from two different positions)**

Time : 8 hrs  
Theory : 2 hrs  
Practical: 6 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions</li> <li>2. Obtain required tools, equipments and materials</li> <li>3. Make a lay out diagram using thread-dipped in chalk-power as instructed.</li> <li>4. Draw a circuit diagram two way wiring connection in the drawing paper in a clean and neat manner</li> <li>5. Fix loosely wooden/plastic Listics vertically and horizontally on the board using poker and screwdriver</li> <li>6. Lay and fix wires in the Listics as per developed circuit diagram</li> <li>7. Prepare wooden blocks for batten Holders and switches</li> <li>8. Fix wooden blocks at their position as per lay out</li> <li>9. Tighten all wooden listics securely</li> <li>10. Connect wires with switches and lamp holders tightly and securely</li> <li>11. Check the circuit with series test lamp for smooth operation</li> <li>12. Clean the workshop neatly</li> <li>13. Make a report of the work progress</li> <li>14. Keep records.</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Install stair-case wiring circuit switching on and off from ground floor and first floor (Two way switch controlled from two different positions)</p> <p><b><u>Standards (How well):</u></b> The stair-case wiring circuit installed and connected switching on and off from ground floor and first floor or two different places as per the instruction or given drawing. (Two way switch controlled from two different positions)</p>	<ul style="list-style-type: none"> <li>➤ Types of Diagrams: <ul style="list-style-type: none"> <li>▪ Circuit diagram or schematic diagram</li> <li>▪ Wiring Diagram</li> <li>▪ Layout diagram</li> </ul> </li> <li>➤ Introduction</li> <li>➤ Wiring materials and Accessories</li> <li>➤ Wire and Cable</li> <li>➤ Insulating materials</li> <li>➤ Types of cables used in house wiring</li> <li>➤ Two way switching and its operations</li> <li>➤ Lighting Accessories and Fittings</li> <li>➤ Socket outlets (Receptacles)</li> <li>➤ Electrical Appliance</li> <li>➤ Testing of Wiring Installation</li> <li>➤ Procedure</li> <li>➤ Safety precautions</li> </ul>

**Tools/equipment:** Set of wiring tool kit, control accessories, lighting fittings, fixing hardwires and wiring materials.

**Safety:**

- Use hand tools, sharpened tools and instruments safely.
- Apply of safe practice technique.
- Use first aid, if needed.
- Work safely with live line

## Task Analysis

**TASK NO: 32** Install an electric bell at four different locations using 4 electromagnetic bell indicators and four push switches different places.

Time : 8 hrs  
Theory : 2 hrs  
Practical: 6 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions</li> <li>2. Obtain required tools, equipments and materials</li> <li>3. Make a lay out diagram using thread-dipped in chalk-power as instructed.</li> <li>4. Draw a circuit diagram electric bell and indicators connection in the drawing paper in a clean and neat manner</li> <li>5. Fix loosely wooden/plastic Listics vertically and horizontally on the board using poker and screwdriver</li> <li>6. Lay and fix wires in the Listics as per developed circuit diagram</li> <li>7. Prepare wooden blocks for batten Holders, switches and four indicator mounting box</li> <li>8. Fix wooden blocks at their position as per lay out</li> <li>9. Tighten all wooden listics securely</li> <li>10. Draw cables from holes provided in the square boxes of push switches</li> <li>11. Draw cables from holes provided in the indicator box of bell indicator</li> <li>12. Connect wires with switches and indicators tightly and securely</li> <li>13. Check and test the circuit with series test lamp before energizing the circuit</li> <li>14. Clean the workshop neatly</li> <li>15. Make a report of the work progress</li> <li>16. Keep records.</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Install an electric bell from four different locations using four bell indicators and four push switches of different places.</p> <p><b><u>Standards (How well):</u></b> An electric bell installed and connected at four different locations using four bell indicators and four push switches of different places.</p>	<ul style="list-style-type: none"> <li>➤ Introduction</li> <li>➤ Types of Diagrams: <ul style="list-style-type: none"> <li>▪ Circuit diagram or schematic diagram</li> <li>▪ Wiring Diagram</li> <li>▪ Layout diagram</li> </ul> </li> <li>➤ Wiring materials and Accessories</li> <li>➤ Wire and Cable</li> <li>➤ Insulating materials</li> <li>➤ Types of cables used in house wiring</li> <li>➤ Two way switching and its operations</li> <li>➤ Lighting Accessories and Fittings</li> <li>➤ Socket outlets (Receptacles)</li> <li>➤ Electrical Appliance</li> <li>➤ Alarming units and indicators including its functions</li> <li>➤ Testing of Wiring Installation</li> <li>➤ Procedure</li> <li>➤ Safety precautions</li> </ul>

**Tools/equipment:** Set of wiring tool kit, control accessories, lighting fittings, fixing hardwires and wiring materials.

**Safety:**

- Use hand tools, sharpened tools and instruments safely.
- Apply of safe practice technique.
- Use first aid, if needed.
- Work safely with live line

## Task Analysis

**TASK NO: 33** Install a bell circuit with return messages in wooden /plastic batten wiring system.

Time : 17 hrs  
Theory : 2 hrs  
Practical: 15 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
1 Obtain instructions 2 Obtain tools, required equipments and materials 3 Make a layout diagram using thread-dipped in chalk-power as instructed. 4 Draw a circuit diagram electric bell in the drawing paper in a clean and neat manner 5 Fix loosely wooden/plastic Listics vertically and horizontally on the board using poker and screwdriver 6 Lay and fix wires in the Listics as per developed circuit diagram 7 Prepare wooden boards and blocks for bell and Two way switch 8 Fix wooden blocks at their position as per lay out 9 Tighten all wooden listics securely 10 Draw cables from holes provided in the square boxes of Two way switches 11 Draw cables from holes provided in the box of bell box 12 Connect wires with switch and tightly and securely 13 Check and test the circuit with series test lamp before energizing the circuit 14 Clean the workshop neatly 15 Make a report of the work progress 16 Keep records.	<p><b><u>Condition (Given):</u></b> Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Install a bell circuit with return messages in wooden and/or plastic batten wiring system</p> <p><b><u>Standards (How well):</u></b> A bell circuit installed with return messages in wooden and/or plastic batten wiring system</p>	<ul style="list-style-type: none"> <li>➤ Introduction</li> <li>➤ Types of Diagrams:               <ul style="list-style-type: none"> <li>▪ Circuit diagram or schematic diagram</li> <li>▪ Wiring Diagram</li> <li>▪ Layout diagram</li> </ul> </li> <li>➤ Wiring materials and Accessories</li> <li>➤ Wire and Cable</li> <li>➤ Insulating materials</li> <li>➤ Types of cables used in house wiring</li> <li>➤ Two way switching and its operations</li> <li>➤ Lighting Accessories and Fittings</li> <li>➤ Socket outlets (Receptacles)</li> <li>➤ Electrical Appliance</li> <li>➤ Alarming units and lamps for return messages lamps including its functions</li> <li>➤ Testing of Wiring Installation</li> <li>➤ Procedure</li> <li>➤ Safety precautions</li> </ul>

**Tools/equipment:** Set of wiring tool kit, control accessories, lighting fittings, fixing hardwires and wiring materials.

**Safety:**

- Use hand tools, sharpened tools and instruments safely.
- Apply of safe practice technique.
- Use first aid, if needed.
- Work safely with live line

## Task Analysis

**TASK No 34 Install a stairway lighting installation controlling the light from Three different switching points using (1)Intermediate Switch (2)Two way switches as intermediate switch, wooden batten/plastic wiring system.** Time : 8 hrs  
Theory : 2 hr  
Practical: 6 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions.</li> <li>2. Obtain required tools, equipment &amp; materials.</li> <li>3. Decide the positions for fuse, two way, intermediate switches and mounting boxes on the board</li> <li>4. Make a layout diagram using thread-dipped in chalk-power as instructed.</li> <li>5. Draw a circuit diagram electric bell in the drawing paper in a clean and neat manner</li> <li>6. Fix loosely wooden/plastic Listics vertically and horizontally on the board using poker and screwdriver</li> <li>7. Lay and fix wires in the Listics as per developed circuit diagram</li> <li>8. Prepare wooden boards and blocks for bell and Two way switch</li> <li>9. Fix wooden blocks at their position as per lay out</li> <li>10. Tighten all wooden listics securely</li> <li>11. Draw cables from holes provided in the square boxes of Two way switches and intermediate switch</li> <li>12. Draw cables from holes provided in the box of switching blocks</li> <li>13. Connect wires with switch and tightly and securely</li> <li>14. Connect live line of the power supply to the master point of the switch terminal</li> <li>15. Connect wires with lamp holder and tightly and securely</li> <li>16. Check and test the circuit with series test lamp before energizing the circuit</li> <li>17. Clean the workshop neatly</li> <li>18. Make a report of the work progress</li> <li>19. Keep records.</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Install a stairway lighting installation controlling the light from three different switching points using (1)Intermediate Switch (2) Two way switches as intermediate switch, wooden batten/plastic wiring system</p> <p><b><u>Standards (How well):</u></b> A stairway lighting installation controlling the light from three different switching points installed using (1)Intermediate Switch (2) Two-way switches as intermediate switch, wooden batten/plastic wiring system</p>	<ul style="list-style-type: none"> <li>➤ Introduction</li> <li>➤ Types of Diagrams: <ul style="list-style-type: none"> <li>▪ Circuit diagram or schematic diagram</li> <li>▪ Wiring Diagram</li> <li>▪ Layout diagram</li> </ul> </li> <li>➤ Wiring materials and Accessories</li> <li>➤ Wire and Cable</li> <li>➤ Insulating materials</li> <li>➤ Types of cables used in house wiring</li> <li>➤ Two way switching and its operations</li> <li>➤ Intermediate switch and its application</li> <li>➤ Lighting Accessories and Fittings</li> <li>➤ Socket outlets (Receptacles)</li> <li>➤ Testing of Wiring Installation</li> <li>➤ Procedure</li> <li>➤ Safety precautions</li> </ul>

**Tools/equipment:** Set of wiring tool kit, control accessories, lighting fittings, fixing hardwires and wiring materials.

**Safety:**

- Use hand tools, sharpened tools and instruments safely.
- Apply of safe practice technique.
- Use first aid, if needed.
- Work safely with live line.

## Task Analysis

**TASK NO: 35 Install outdoor lighting in garden/ trees/' shrubs/ flowers/decks/ walkways and existing (project work).**

Time : 9 hrs  
Theory : 3 hrs  
Practical: 6 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions.</li> <li>2. Obtain required tools, equipment &amp; order for purchasing materials.</li> <li>3. Decide the positions for fuse, switches and mounting boxes and lighting units</li> <li>4. Make a layout diagram using thread-dipped in chalk-power as instructed.</li> <li>5. Draw a circuit diagram of outdoor lights in the drawing paper in a clean and neat manner</li> <li>6. Get required permits for the work to be carried on</li> <li>7. Mark the locations of Fixtures, Outlets and switches in the Garden</li> <li>8. Dig the trenches through a lawn</li> <li>9. Remove the sod (unpleasant thing) with a spade to a depth of 4 inches</li> <li>10. Cut the trenched holes into uniform rectangular shapes</li> <li>11. Make trench through established flower bed, take care and lift out perennials and small shrubs carefully</li> <li>12. Lay out the conduits and materials along the trenches</li> <li>13. Lay out conduit above ground for direct burial cable and Tree cable</li> <li>14. Lay and pull out cables/wires around water and underwater in a pool within 10 feet's (3.93meters) of any garden water element</li> <li>15. Assemble the conduit</li> <li>16. Pull out the wires through the conduit</li> <li>17. Check for adequate burial depth of conduit/cable and correct electrical connections and earthing system and the use of leakage proof materials</li> <li>18. Check and test the system before energizing the circuit</li> <li>19. Backfill the trenches</li> <li>20. Clean up the lawn areas and workplace</li> <li>21. Make a report of the work progress</li> <li>22. Keep records.</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop equipped with electrical tools, instruments and required materials.</p> <p><b><u>Task (What):</u></b> Install outdoor lighting in garden/ trees/' shrubs/ flowers/ decks walkways and existing.</p> <p><b><u>Standards (How well):</u></b> Outdoor lighting installed in garden, trees, shrubs, flowers and decks walkways and existing.</p>	<p>➤ <b>Introduction</b></p> <ul style="list-style-type: none"> <li>▪ The garden and nighttime living area</li> <li>▪ Lighting and the Sense of sight</li> <li>▪ Lighting Terms</li> <li>▪ Light Levels of Brightness</li> <li>▪ The History outdoor lighting</li> <li>▪ Modern prospective on lighting</li> </ul> <p>➤ <b>Tools and Techniques</b></p> <ul style="list-style-type: none"> <li>▪ Down lighting &amp; Safety lighting</li> <li>▪ Uplighting &amp; Security lighting</li> <li>▪ Diffused lighting &amp; Moonlighting</li> <li>▪ Area lighting &amp; Grazing light</li> <li>▪ Cross lighting &amp; Spotlighting</li> <li>▪ Silhouetting &amp; Shadowing</li> <li>▪ Contour lighting &amp; Fill lighting</li> <li>▪ Background lighting &amp; Vista lighting</li> <li>▪ Perspective lighting &amp; Water lighting for Garden, pools, Fountains and Streams</li> <li>▪ Water lighting for swimming pools &amp; Mirror lighting</li> </ul> <p>➤ Use of materials for outdoor lightings</p> <p>➤ Procedure</p> <p>➤ Safety precautions</p>

**Tools/equipment:** Set of wiring tool kit, control accessories, lighting fittings, fixing hardwires, wiring materials and power socket

**Safety:**

- Use hand tools, sharpened tools and instruments safely.
- Apply of safe practice technique.
- Use first aid, if needed.
- Work safely with live line.

## Task Analysis

**TASK NO: 36 (Page 1) Repair / replace main circuit / branch- circuit's junction box of wiring system.**

Time : 8 hrs

Theory : 2 hrs

Practical: 6 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions</li> <li>2. Obtain required tools, equipment &amp; materials.</li> <li>3. Inspect visually for the potential location of various faults</li> <li>4. Check cut-off supply or failure of supply</li> <li>5. Check fuse units in the distribution board or main switch</li> <li>6. Check loose connection at the terminals of main switch contact points</li> <li>7. Check loose connection at the terminals of lamp holder, ceiling rose, switches and socket outlets</li> <li>8. Check the broken filaments of tube lights</li> <li>9. Check the broken ends/wires at any point/wiring/terminals of various device</li> <li>10. Check the disconnections of wire ends from the terminals of lamp holders, ceiling rose, switches and socket outlets</li> <li>11. Check the discontinuity of the element, cords in the appliances used in the circuit</li> <li>12. Observe the physical condition of insulation, mechanical injury on the insulation skin, long exposure of wires, touching wires together at the terminals of holder, ceiling rose, junction boxes, socket outlet and or in the circuit wiring</li> <li>13. Check for bad earthing or damaged earth wires or loose connection of earthing</li> <li>14. Repair cut-off supply or failure of supply</li> <li>15. Repair/replace fuse units in the distribution board or main switch</li> <li>16. Repair loose connection at the terminals of main switch contact points</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Repair / replace main circuit / branch- circuit's junction box of wiring system.</p> <p><b><u>Standards (How well):</u></b> Main circuit, branch-circuit's junction box of wiring system repaired and replaced.</p>	<ul style="list-style-type: none"> <li>➤ Identification <ul style="list-style-type: none"> <li>▪ Location of various faults</li> <li>▪ Open circuit faults</li> <li>▪ Short circuit faults</li> <li>▪ Earth or Leakage faults</li> </ul> </li> <li>➤ Testing of wiring Installation <ul style="list-style-type: none"> <li>▪ Insulation Resistance between conductors</li> <li>▪ Insulation Resistance between conductors to Earth</li> <li>▪ Polarity of Switches</li> <li>▪ Open and short circuit test</li> <li>▪ Testing of Earth continuity</li> </ul> </li> <li>➤ Maintenance of lighting Installation</li> <li>➤ Procedure</li> <li>➤ Safety precautions</li> </ul>

## Task Analysis

Performance steps	Terminal Performance Objective	Related Technical Knowledge
17. Replace main switch 18. Change/Replace tube lights 19. Repair/Adjust/Align broken ends/wires at any point/wiring/terminals of various device 20. Repair disconnections of wire ends from the terminals of lamp holders, ceiling rose, switches and socket outlets 21. Repair/Replace the discontinuity of the element, cords in the appliances used in the circuit 22. Repair/Replace wires, touching wires together at the terminals of holder, ceiling roses, junction boxes, socket outlet and or in the circuit wiring 23. Repair bad earthing or damaged earth wires or loose connection of earthing 24. Test the circuits 25. Operate the circuit 26. Make a report		

**Tools/equipment:** Set of wiring tool kit, control accessories, lighting fittings, fixing hardwares and wiring cables and materials, and fixing boxes.

**Safety:**

- Use hand tools, sharpened tools and instruments safely.
- Apply of safe practice technique.
- Use first aid, if needed.
- Work safely with live line.

## Task Analysis

**TASK NO: 37 Repair / replace Fluorescent lighting wiring.**

Time : 9 hrs

Theory : 3 hrs

Practical: 6 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions</li> <li>2. Obtain required tools, equipment and materials</li> <li>3. Inspect visually for the potential location of various faults</li> <li>4. Check cut-off supply or failure of supply</li> <li>5. Check fuse units in the distribution board or main switch</li> <li>6. Check loose connection at the terminals of main switch contact points</li> <li>7. Check loose/frayed connection at the terminals of lamp holder/plug, ceiling rose, switches and socket outlets</li> <li>8. Check the broken filaments of tube lights</li> <li>9. Check starter spring contacts terminals using series test lamp</li> <li>10. Check tube flickers 'On' and 'off'</li> <li>11. Check blackened new tube</li> <li>12. Repair cut-off supply or failure of supply</li> <li>13. Repair/Replace fuse units in the distribution board or main switch</li> <li>14. Repair loose connection of main switch contact points</li> <li>15. Repair loose connection of lamp holder, ceiling rose, switches and socket outlets</li> <li>16. Replace tube lights</li> <li>17. Adjust/Align/Replace starter contacts using series test lamp</li> <li>18. Test and replace tube</li> <li>19. Check, rectify and/replace tube</li> <li>20. Keep records.</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Repair / replace Fluorescent lighting wiring.</p> <p><b><u>Standards (How well):</u></b> Fluorescent lighting wiring and tube repaired and replaced.</p>	<ul style="list-style-type: none"> <li>➤ Introduction <ul style="list-style-type: none"> <li>▪ Working principle of fluorescent light</li> <li>▪ Construction of fluorescent tube light</li> <li>▪ Various Components of fluorescent light <ul style="list-style-type: none"> <li>○ Choke or Ballast</li> <li>○ Starter</li> <li>○ Tube</li> </ul> </li> </ul> </li> <li>➤ Checking methods of tube light, choke and starter</li> <li>➤ Use of series test lamp for testing</li> <li>➤ Types of common faults in fluorescent tube <ul style="list-style-type: none"> <li>▪ Tube flickers</li> <li>▪ Only tube filaments glow</li> <li>▪ Tube burnt out shortly</li> <li>▪ Tube ends blackened</li> <li>▪ Tube glows when switch is off</li> </ul> </li> <li>➤ Function of starter</li> <li>➤ Function of small capacitor of starter</li> <li>➤ Function of resistor of starter</li> <li>➤ Testing of Electrical Installation</li> <li>➤ Procedure</li> <li>➤ Safety precautions</li> </ul>

**Tools/equipment:** : Set of wiring tool kit, control accessories, lighting fittings, fixing hardwares and wiring cables and materials, fixing boxes test lamp/phase tester.

**Safety:**

- Use hand tools, sharpened tools and instruments safely.
- Use first aid, if needed.
- Work safely with live line.



## Task Analysis

**TASK NO: 38 Repair / replace switch of wiring system..**

Time : 9 hrs

Theory: 3 hrs

Practical: 6 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions</li> <li>2. Obtain required tools, equipment and materials</li> <li>3. Inspect visually for the potential location of various faults</li> <li>4. Check cut-off supply or failure of supply</li> <li>5. Check bulb</li> <li>6. Flip on and check out the switch</li> <li>7. Cut off the power</li> <li>8. Remove the wall plate over the switch</li> <li>9. Test voltage using voltage tester to ensure no power is coming to switch</li> <li>10. Unscrew and pull the switch out of the box</li> <li>11. Check the switch for malfunctioning using continuity tester</li> <li>12. Check and tighten the loose connection at the terminal of switch, if screw loosely connected.</li> <li>13. Disconnect the old switch from line wires</li> <li>14. Remove old switch</li> <li>15. Remove (strip-off) insulation and clean the ends of wires</li> <li>16. Bend and clip-off the ends of the wire to the switch terminals</li> <li>17. Install switch vertically straight in angle</li> <li>18. Install switch in recessed box</li> <li>19. Adjust/align the ears of mounting yoke of the switch to keep switch flush with the wall</li> <li>20. Test switch for smooth operation</li> <li>21. Clean the workplace</li> <li>22. Make a report</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Repair / replace switch of wiring system.</p> <p><b><u>Standards (How well):</u></b> The switch of wiring system repaired and replaced.</p>	<ul style="list-style-type: none"> <li>➤ Introduction</li> <li>➤ Classification of switches <ul style="list-style-type: none"> <li>▪ One way switch</li> <li>▪ Two way switch</li> <li>▪ Intermediate switch</li> <li>▪ Double pole main switch</li> <li>▪ Push Button switch</li> <li>▪ Table lamp switch</li> <li>▪ Bed switch</li> <li>▪ Tumbler/surface switch</li> <li>▪ Flush switch</li> <li>▪ Dimmer switch</li> <li>▪ Clock switch</li> </ul> </li> <li>➤ Procedure</li> <li>➤ Safety precautions</li> </ul>

**Tools/equipment:** Set of wiring tool kits, fixing hardwares and wiring cables and materials, controlling accessories, fixing boxes test lamp/phase tester.

**Safety:**

- Use hand tools, sharpened tools and instruments safely.
- Apply of safe practice technique.
- Use first aid, if needed.
- Work safely with live line.

## Task Analysis

**TASK NO: 39 Repair / replace socket outlets / plugs of the wiring system..**

Time : 9 hrs  
Theory : 3 hrs  
Practical: 6 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions.</li> <li>2. Obtain required tools, equipment and materials.</li> <li>3. Inspect visually for the potential location of various faults.</li> <li>4. Shut-off power to the socket outlet.</li> <li>5. Check Socket outlet.</li> <li>6. Remove the wall plate over the Socket outlet.</li> <li>7. Test voltage using voltage tester to ensure no power is coming to Socket outlet.</li> <li>8. Unscrew and pull the Socket outlet out of the box.</li> <li>9. Check the Socket outlet for malfunctioning using continuity tester.</li> <li>10. Check and tighten the loose connection at the terminal of Socket outlet , if screw loosely connected.</li> <li>11. Disconnect the old Socket outlet from power lines.</li> <li>12. Remove old Socket outlet.</li> <li>13. Remove (strip-off) insulation and clean the ends of wires.</li> <li>14. Bend and clip-off the ends of the wire to the Socket outlet terminals</li> <li>15. Install Socket outlet vertically straight in angle.</li> <li>16. Install Socket outlet in recessed box</li> <li>17. Adjust/align the ears of mounting yoke of the Socket outlet to keep Socket outlet flush with the wall.</li> <li>18. Test Socket outlet for smooth operation</li> <li>19. Clean the workplace.</li> <li>20. Make a report.</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Repair / replace socket outlets / plugs of the wiring system.</p> <p><b><u>Standards (How well):</u></b> The socket outlets, plugs of the wiring system repaired and replaced.</p>	<ul style="list-style-type: none"> <li>➤ Introduction</li> <li>➤ Types of Socket outlets/Receptacles</li> <li>➤ Types of Plugs</li> <li>➤ Switch socket combination <ul style="list-style-type: none"> <li>▪ 220volts, 5A two pin sockets</li> <li>▪ 220volts, 5A two pin sockets</li> <li>▪ 220volts, 5A three pin sockets</li> <li>▪ 220volts, 15A three pin power sockets</li> <li>▪ Screw terminal plug</li> <li>▪ Polarized Three prong plug</li> <li>▪ Self-connecting plug</li> <li>▪ Appliance plug</li> </ul> </li> <li>➤ Components of the socket outlet: <ul style="list-style-type: none"> <li>▪ Ground connecting terminal</li> <li>▪ Power wire connecting terminal</li> <li>▪ Neutral wire connecting terminal</li> </ul> </li> <li>➤ Components of the socket outlet: <ul style="list-style-type: none"> <li>▪ Ground connecting terminal</li> <li>▪ Power wire connecting terminal</li> <li>▪ Neutral wire connecting terminal</li> </ul> </li> <li>➤ Earthing</li> <li>➤ Earth Electrodes</li> <li>➤ Earth conductors</li> <li>➤ Procedure</li> <li>➤ Safety precautions</li> </ul>

**Tools/equipment:** Set of wiring tool kits, fixing hardwares and wiring cables and materials, fixing boxes test lamp/phase tester.

**Safety:**

- Use hand tools, sharpened tools and instruments safely.
- Apply of safe practice technique.
- Use first aid, if needed.
- Work safely with live line

## Task Analysis

**TASK NO: 40 Perform troubleshooting of the lamps/tubes/doorbells.**

Time : 12 hrs  
Theory: 3 hrs  
Practical: 9 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions</li> <li>2. Obtain required tools, testing equipments and materials</li> <li>3. Inspect visually for the potential location of various faults</li> <li>4. Shut-off power to the lamps and doorbells</li> <li>5. Check lamps for the cause of flickering and no light 'on'</li> <li>6. Remove bulb from the holder</li> <li>7. Put lamp another holder for lighting</li> <li>8. Test voltage using voltage tester to ensure no power is coming to lamps and doorbells</li> <li>9. Disconnect the power line or Turn off the switch for line coming to lamp</li> <li>10. Disassemble the lamp holder</li> <li>11. Check the burnt or damaged, frayed cord/cable</li> <li>12. Repair, Replace and reconnect cable/wire to lamp</li> <li>13. Clean the terminals of the lamp holder</li> <li>14. Reassemble the lamp</li> <li>15. Check the bell</li> <li>16. Check the push button switch</li> <li>17. Check frayed, damaged and /or burnt out wires</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Perform troubleshooting of the lamps/tubes/doorbells</p> <p><b><u>Standards (How well):</u></b> The troubleshooting of the lamps, tube and doorbells connection systems rectified and removed the all malfunctions of the circuits.</p>	<ul style="list-style-type: none"> <li>➤ Introduction of lamps</li> <li>➤ Introduction of Bells <ul style="list-style-type: none"> <li>▪ Working principles of Bells</li> </ul> </li> <li>➤ Types of Bells <ul style="list-style-type: none"> <li>▪ Single stroke bells</li> <li>▪ Vibrating bells</li> </ul> </li> <li>➤ Main Components of Electric Bells</li> <li>➤ Dismantling and Reassembling methods of bells and lamps</li> <li>➤ Kinds of faults in the bells <ul style="list-style-type: none"> <li>▪ Open circuit in bells and lamps</li> <li>▪ Short circuit in bells and lamps</li> <li>▪ Improper adjustment of screws</li> <li>▪ Earth faults or insulation scratches or bare wire in lamps touches with metal body and pin in the holder pressed down in lamps</li> <li>▪ Burnt contacts, Broken switch, Broken plug top, Broken holder, Missing screws in lamps</li> <li>▪ Clapper defects in bells</li> <li>▪ Low tension of contact strips/armature in bells</li> <li>▪ Rusted spots in the iron core in the bells</li> </ul> </li> <li>➤ Procedure</li> <li>➤ Safety precautions</li> </ul>

## Task Analysis

Performance steps	Terminal Performance Objective	Related Technical Knowledge
18. Check frayed, damaged and /or burnt out wires 19. Ensure that the fuse/circuit breaker functioning in proper manner 20. Repair any breaks by connecting wire to bell circuit 21. Check the clapper of doorbell 22. Clean the gummed up clapper for thorough and sound bell 23. Remove the cover 24. Clean the contacts by scraping terminal screws and bare metal 25. Replace the bell 26. Clean the workplace 27. Make a report		<ul style="list-style-type: none"> <li>➤ Testing and Repairing of lamps:               <ul style="list-style-type: none"> <li>▪ Continuity and Short circuit test</li> <li>▪ Open test</li> <li>▪ Earth test</li> </ul> </li> <li>➤ Application of safety precautions while doing work</li> <li>➤ Procedure</li> <li>➤ Safety precautions</li> </ul>

**Tools/equipment:** Set of wiring tool kits, fixing hardwires, wiring cables and materials, fixing boxes, lamp set and/or individual parts of the lamps, test lamp/phase tester.

**Safety:**

- Use hand tools, sharpened tools and instruments safely.
- Apply of safe practice technique.
- Use first aid, if needed.
- Work safely with live line.

## Task Analysis

**TASK NO: 41. Repair / replace ceiling rose.**

Time : 11 hrs

Theory : 2 hrs

Practical: 9 hrs

Performance steps	Terminal Performance Objective	➤ Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions</li> <li>2. Obtain required tools, equipments and materials</li> <li>3. Inspect visually for the potential location of various faults</li> <li>4. Identify the types of ceiling (Plasterboard or old house with lath plaster)</li> <li>5. Check ceiling bulb for its conditions</li> <li>6. Flip on and check out the switch and ceiling circuit</li> <li>7. Shut off power</li> <li>8. Remove the wall plate of switch and ceiling</li> <li>9. Inspect and Test voltage using voltage tester to make sure power is is shut off</li> <li>10. Inspect and Test continuity using ohmmeter to make sure circuit has continuity</li> <li>11. Check terminal screw and tighten or replace ceiling rose, if old and frayed and broken</li> <li>12. Test switch and ceiling for smooth operation</li> <li>13. Clean the workplace</li> <li>14. Make a report</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Repair / replace ceiling rose.</p> <p><b><u>Standards (How well):</u></b> Ceiling rose repaired and replaced.</p>	<p>➤ Introduction</p> <ul style="list-style-type: none"> <li>▪ Types of ceiling boxes and ceiling Roses</li> <li>▪ Methods of ceiling boxes installation</li> <li>▪ Methods of ceiling boxes installation from below with plasterboard</li> <li>▪ Methods of ceiling boxes installation from below in Lath and plaster</li> <li>▪ Tying ceiling rose into the ceiling fixture</li> <li>▪ Advantage and disadvantage of using ceiling rose</li> </ul> <p>➤ Procedure</p> <p>➤ Safety precaution</p>

**Tools/equipment:** Set of wiring tool kits, fixing hardwires and wiring cables and materials, fixing boxes test lamp/phase tester.

**Safety:**

- Use hand tools, sharpened tools and instruments safely.
- Apply of safe practice technique.
- Use first aid, if needed.
- Work safely with live line.

## Task Analysis

**TASK NO: 42 Repair / replace protective devices.**

Time : 7 hrs

Theory : 1 hr

Practical: 6 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions</li> <li>2. Obtain required tools, equipments and materials</li> <li>3. Inspect visually for the potential location of various faults</li> <li>4. Identify the types of protective devices</li> <li>5. Check fuses or circuit breakers for its conditions</li> <li>6. Identify the causes of overload and tripping</li> <li>7. Check the line circuit, if it is short circuited repair/replace shorted wire.</li> <li>8. Cut all power and remove suspected fuse/breaker.</li> <li>9. Check continuity test using continuity tester.</li> <li>10. Repair and correct the over load problem.</li> <li>11. Install new fuse/reset breaker.</li> <li>12. Turn the main power back on.</li> <li>13. Test for its smooth operation.</li> <li>14. Clean the workplace.</li> <li>15. Make a report.</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Repair/replace protective devices.</p> <p><b><u>Standards (How well):</u></b> Protective devices repaired and replaced.</p>	<ul style="list-style-type: none"> <li>➤ Introduction of Electricity</li> <li>➤ Definition of electricity</li> <li>➤ Electrical circuits</li> <li>➤ Lighting circuits</li> <li>➤ Small appliance circuit</li> <li>➤ Fuses and its types</li> <li>➤ Overload</li> <li>➤ Circuit Breakers</li> <li>➤ Earthing system</li> <li>➤ Procedure</li> <li>➤ Safety precaution</li> </ul>

**Tools/equipment:** Set of wiring tool kits, fixing hardwares and wiring cables and materials, fixing boxes, fuses and protective devices, test lamp/phase tester.

**Safety:**

- Use hand tools, sharpened tools and instruments safely.
- Apply of safe practice technique.
- Use first aid, if needed.
- Work safely with live line.

## Task Analysis

**TASK NO: 43** Install / connect earthing electrode.

Time : 11 hrs

Theory : 2 hr

Practical: 9 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Receive instructions</li> <li>2. Collect necessary tools, equipment &amp; materials.</li> <li>3. Select the place for earthing.</li> <li>4. Get permits if required.</li> <li>5. Mark the place for digging hole.</li> <li>6. Dig holes of about 90cm (round shape) and 5m depth.</li> <li>7. Make surface plane at the bottom plane</li> <li>8. Assemble pipe, earth plate and earth conductor together with nuts and bolt.</li> <li>9. Install earthing unit.</li> <li>10. Put charcoal and salt in alternate layer</li> <li>11. Fill the soil back.</li> <li>12. Connect funnel to the earthing pipe at the top of the surface.</li> <li>13. Pour water through funnel.</li> <li>14. Test Earthing system using megger.</li> <li>15. Clean up the area.</li> <li>16. Make a report.</li> </ol>	<p><b><u>Condition (Given):</u></b> Wire/cable, fish wire and pulling devices</p> <p><b><u>Task (What):</u></b> Install / connect earthing electrode.</p> <p><b><u>Standards (How well):</u></b> Earthing electrode installed and connected as per specification.</p>	<ul style="list-style-type: none"> <li>➤ Introduction</li> <li>➤ Purpose of earthing</li> <li>➤ Importance of earthing</li> <li>➤ Types of earthing <ul style="list-style-type: none"> <li>▪ System earthing</li> <li>▪ Equipment earthing</li> </ul> </li> <li>➤ Methods of earthing <ul style="list-style-type: none"> <li>▪ Pipe or rod earthing</li> <li>▪ Plate earthing</li> </ul> </li> <li>➤ Earthing materials <ul style="list-style-type: none"> <li>▪ Charcoal</li> <li>▪ Salt</li> <li>▪ Water</li> <li>▪ Clamps</li> <li>▪ Pipes</li> <li>▪ Conductors</li> </ul> </li> <li>➤ Terminology of earthing: <ul style="list-style-type: none"> <li>▪ Earth wire</li> <li>▪ Earth electrodes(strip electrodes)</li> <li>▪ Earthing lead</li> <li>▪ Leakage</li> </ul> </li> <li>➤ Use of insulation testing meter</li> <li>➤ Use of megger</li> <li>➤ Advantage of earthing</li> <li>➤ Procedure</li> <li>➤ Safety precaution</li> <li>➤ Electrical code of practice or NEA rules for earthing</li> </ul>

**Tools/equipment:** Set of wiring tool kits, fixing hardware and wiring cables and materials, spade, shovel, pick, earth electrodes, pipe, salt, charcoal, sand clay earth electrode plate as per specifications.

**Safety:**

- Use hand tools, sharpened tools and instruments safely.
- Apply of safe practice technique.
- Use first aid, if needed.
- Work safely with live line.

## Task Analysis

**TASK NO: 44 Lay PVC pipe for conceal wiring.**

Time : 10 hrs

Theory : 1 hr

Practical: 9 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions</li> <li>2. Obtain required tools, equipment &amp; materials.</li> <li>3. Select cubicles</li> <li>4. Mark the wiring routes</li> <li>5. Groove the routes in smooth and required depth.</li> <li>6. Lay PVC conduit pipe along the grooves</li> <li>7. Install mounting and junction boxes as per layout diagram</li> <li>8. Install DB board as per layout diagram.</li> <li>9. Install meter box as per layout diagram.</li> <li>10. Insert wires through PVC pipes.</li> <li>11. Connect wires into the junction, switch, DB and energy meter</li> <li>12. Back fill grooves using cement mortar.</li> <li>13. Clean work place</li> <li>14. Make report</li> </ol>	<p><b><u>Condition (Given):</u></b> Wire/cable, PVC pipes and pulling devices along with equipped work place</p> <p><b><u>Task (What):</u></b> Lay PVC pipe for conceal wiring.</p> <p><b><u>Standards (How well):</u></b> PVC pipe for conceal wiring laid as per requirement and specification.</p>	<ul style="list-style-type: none"> <li>➤ Introduction</li> <li>➤ Importance of conceal wiring</li> <li>➤ Advantage of conceal wiring</li> <li>➤ Preparation of cement mixture</li> <li>➤ Use of construction tools</li> <li>➤ Use of safety tools</li> <li>➤ Procedure</li> <li>➤ Safety precaution</li> </ul>

**Tools/equipment:** PVC pipes, binding wires, wages, drawing specifications etc

**Safety:** Follow safe and careful movement around the construction site.



## Task Analysis

**TASK NO: 45 Draw wire/cable through PVC pipe using fish wire.**

Time : 10 hrs

Theory : 1 hr

Practical: 9 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions</li> <li>2. Obtain required tools, equipment &amp; materials.</li> <li>3. Select cubicles</li> <li>4. Mark the wiring routes</li> <li>5. Groove the routes in smooth and required depth.</li> <li>6. Lay PVC conduit pipe along the grooves</li> <li>7. Insert a fish wire/tape through PVC pipes.</li> <li>8. Hook wires and pull them upto the various junction box, DB, light points, switch and outlet boxes.</li> <li>9. Cut wire providing as required.</li> <li>10. Make report</li> </ol>	<p><b><u>Condition (Given):</u></b> Cubicle wall, construction buildings, drawings and specification</p> <p><b><u>Task (What):</u></b> Draw wire/cable through PVC pipe using fish wire.</p> <p><b><u>Standards (How well):</u></b> Wire or cable through PVC pipe using fish wire drawn as per requirements.</p>	<ul style="list-style-type: none"> <li>➤ Introduction</li> <li>➤ Fish wire/tape</li> <li>➤ Purpose of application</li> <li>➤ Application technique</li> <li>➤ Advantage</li> <li>➤ Procedure</li> <li>➤ Safety precautions</li> </ul>

**Tools/equipment:** Set of wiring tool kits, pulling/fish wire, different color of insulation tape for identification marking.

**Safety:** Follow safe and careful movement around the construction site.

## Task Analysis

**TASK NO: 46 Install/ connect accessories/fittings/protective devices/ distribution board.**

Time : 14 hrs

Theory : 2 hrs

Practical: 12 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instruction.</li> <li>2. Obtain required tools, equipments and materials.</li> <li>3. Study and analyze the loads.</li> <li>4. Calculate the total load.</li> <li>5. Group the loads into the light and power loads.</li> <li>6. Calculate the load of each floor of the premises.</li> <li>7. Draw the layout diagram of the proposed distribution board plan.</li> <li>8. Prepare the list of materials required.</li> <li>9. Estimate the cost for the installation.</li> <li>10. Mark the location of distribution board to be installed.</li> <li>11. Identify the number of distribution board required.</li> <li>12. Install distribution board as per layout diagram.</li> <li>13. Connect the supply to the distribution board.</li> <li>14. Keep records.</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop / site equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Install/ connect accessories/fittings/protective devices/ distribution board.</p> <p><b><u>Standards (How well):</u></b> Accessories, fittings, protective devices, distribution board installed, and connected.</p>	<ul style="list-style-type: none"> <li>➤ Introduction</li> <li>➤ Distribution system</li> <li>➤ Identification of number of sub circuits to be classified</li> <li>➤ Light point load</li> <li>➤ Power point load</li> <li>➤ Use the bus bar</li> <li>➤ Use the fuses/ MCBs</li> <li>➤ Main switch and its capacity</li> <li>➤ Determination of fuses/mcbs and their Amperage capacity</li> <li>➤ Earthing and its conductors</li> <li>➤ Energy meter and their amperage capacity</li> <li>➤ Testing instrument and their uses</li> <li>➤ Procedure</li> <li>➤ Safety precautions</li> </ul>

**Tools/equipment:** Set of wiring tool kits, fixing hardwares and wiring cables and materials, spade, shovel, pick, earth electrodes, pipe, salt, charcoal, sand clay earth electrode plate as per specifications.

**Safety:**

- Use hand tools, sharpened tools and instruments safely.
- Apply of safe practice technique.
- Use first aid, if needed.
- Work safely with live line.

## Task Analysis

**TASK NO: 47 Install SMART HOUSE wiring system.(project work).**

Time : 30 hrs

Theory : 2 hrs

Practical: 28 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions</li> <li>2. Obtain required tools, equipments and materials</li> <li>3. Study the given plan and drawings of the building</li> <li>4. Calculate the total required load</li> <li>5. Determine the required number of circuits to be used</li> <li>6. Visit the building to be electrified</li> <li>7. Mark positions of the electrical point on the wall, ceiling and other places</li> <li>8. Determine for required accessories for electrical wiring</li> <li>9. Decide the specifications of main switch, conduit pipe, earthwire, distribution board, conductor size and protective (fuses)</li> <li>10. Draw a wiring diagram</li> <li>11. Estimate the materials required and its costs</li> <li>12. Install the wiring in the building</li> <li>13. Test the wiring for approval by NEA</li> <li>14. Make a report</li> </ol>	<p><b><u>Condition (Given):</u></b> Site, electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Install SMART HOUSE wiring system according to manufacturer's specifications.</p> <p><b><u>Standards (How well):</u></b> A SMART HOUSE wiring system installed according with the manufacturer's specifications. The entire wiring system checked. Pre commissioning test carried out.</p>	<ul style="list-style-type: none"> <li>➤ Project carrying out guidelines</li> <li>➤ Load assessment</li> <li>➤ Size of wires and use of formula</li> <li>➤ Testing                             <ul style="list-style-type: none"> <li>▪ Insulation resistance Test</li> <li>▪ Continuity Test</li> <li>▪ Polarity Test</li> <li>▪ Earth Resistance Test</li> </ul> </li> <li>➤ Estimating and Costing of Materials</li> <li>➤ Arrangement of Switch Board and Distribution Board</li> <li>➤ Procedure</li> <li>➤ Safety precaution</li> </ul>

**Tools/equipment:** : Set of wiring tool kits, technical wiring layout diagram, fixing hardwires and wiring cables and materials, recessing equipments, power drilling machine, drill bits of appropriate sizes.

**Safety:**

- Use hand tools, sharpened tools and instruments safely.
- Apply of safe practice technique.
- Use first aid, if needed.
- Work safely with live line.

## Task Analysis

**TASK NO: 48 Carry out the rural electrification of a small village (project work).**

Time : 14 hrs  
Theory : 2 hr  
Practical: 12 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions</li> <li>2. Obtain required tools, equipment &amp; materials.</li> <li>3. Study the given plan and single line drawings</li> <li>4. Calculate the total electrical load for the village to be electrified</li> <li>5. Calculate the KVA rating of the Transformer</li> <li>6. Prepare a list of equipments and accessories required for the sub-station</li> <li>7. Prepare a cost estimation for the establishing sub-station</li> <li>8. Call quotation/tenders in newspapers for procuring the required equipments and electrification materials</li> <li>9. Get approval from the authorized institution</li> <li>10. Carry out line erection work as per the single line diagram</li> <li>11. Perform the pre-commission test</li> <li>12. Carryout pre commissioning test.</li> <li>13. Charge the installation systems.</li> <li>14. Locate and rectify faults, if any</li> <li>15. Make a report</li> </ol>	<p><b><u>Condition (Given):</u></b> Accessories, fittings protective devices distribution board and installation and testing tools and instruments</p> <p><b><u>Task (What):</u></b> Carry out the rural electrification of a small village.</p> <p><b><u>Standards (How well):</u></b> Rural electrification of a small village carried out as per drawing and specification</p> <p>The entire wiring system checked.</p> <p>Pre commissioning test carried out.</p>	<ul style="list-style-type: none"> <li>➤ Wiring Estimation</li> <li>➤ Explain in details: <ul style="list-style-type: none"> <li>▪ Determination of number of points (Light, Fan, Socket outlet)</li> <li>▪ Determination of total Load</li> <li>▪ Determination of number of sub-circuits</li> <li>▪ Determination of rating of Main switch, and Distribution Board</li> <li>▪ Determination of size of conductors</li> </ul> </li> <li>➤ Procedure</li> <li>➤ Safety precaution</li> </ul>

**Tools/equipment:** : Set of wiring tool kits, technical wiring layout diagram, fixing hardwires and wiring cables and materials, recessing equipments, power drilling machine, drill bits of appropriate sizes.

**Safety:**

- Use hand tools, sharpened tools and instruments safely.
- Apply of safe practice technique.
- Use first aid, if needed.
- Work safely with live line.

## Task Analysis

**TASK NO: 49 Install solar electrical systems (project work).**

Time : 24 hrs

Theory : 4 hrs

Practical: 20 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions / order</li> <li>2. Obtain required tools and equipments.</li> <li>3. Visit site</li> <li>4. Consult with client</li> <li>5. Finalize the contract</li> <li>6. Prepare wiring layout and design</li> <li>7. Locate points, outlets, positions of accessories</li> <li>8. Fix boxes, accessories and fittings blocks.</li> <li>9. Install wooden/plastic listics as per drawing.</li> <li>10. Lay wires on listics</li> <li>11. Connect wires to junction box, lighting fixtures and switches</li> <li>12. Connect charge controller.</li> <li>13. Connect inverter.</li> <li>14. Connect battery.</li> <li>15. Install PV (photovoltaic) models to south faces and at appropriate angle.</li> <li>16. Connect entire system with the solar module.</li> <li>17. Perform pre-commission test</li> <li>18. Check and energize the system</li> <li>19. Operate system</li> <li>20. Handover to the owner</li> <li>21. Make report.</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop / site equipped with electrical tools, instruments and required materials</p> <p><b><u>Task (What):</u></b> Install solar electrical systems.</p> <p><b><u>Standards (How well):</u></b> Solar electrical systems installed as per requirements and specification.</p>	<ul style="list-style-type: none"> <li>➤ Introduction of: <ul style="list-style-type: none"> <li>▪ Basic Electricity</li> <li>▪ Voltage, current, and resistance</li> <li>▪ Ohm's law and its application</li> <li>▪ Source of electricity Generation</li> <li>▪ Use of millimeter</li> <li>▪ Measurement of DC voltage</li> </ul> </li> <li>➤ Solar modules and its construction</li> <li>➤ Lamps</li> <li>➤ Charge controllers</li> <li>➤ Battery and its type</li> <li>➤ Physical inspection of battery</li> <li>➤ Measurement technique of battery voltage</li> <li>➤ Measurement technique of specific gravity of battery acid</li> <li>➤ Use of Hydrometer</li> <li>➤ Negative impact of disposal of Battery to the environment and human life</li> <li>➤ Wire size and its type</li> <li>➤ DC/DC converters</li> <li>➤ DC/AC inverters</li> <li>➤ Procedure</li> <li>➤ Safety precaution</li> </ul>

**Tools/equipment:** Set of wiring tool kits, fixing hardwares and wiring cables and materials, fixing boxes, fuses and protective devices, test lamp/phase tester.

### Safety:

- Use hand tools, sharpened tools and instruments safely.
- Apply of safe practice technique.
- Use first aid, if needed.
- Work safely with live line.

## **Additional Tasks for Practice:**

**Instruction for Trainer:**

*These tasks are not offered here for compulsory practice. If the trainees are interested and management of the concerned institute agrees, the mentioned tasks could be carried out by arranging additional time.*

50. Install low-voltage communication and telephone wires/cables
51. Control/install electricity generation in three phase
52. Apply the electronic circuitry
53. Fabricate the dc voltage regulator up to 12 volts (project work)
54. Fabricate an Emergency light using transformer and diode (project work)

## Task Analysis

**TASK NO: 46 Install low-voltage communication and telephone wires/cables.**

Time : 32 hrs  
Theory : 2 hrs  
Practical: 30 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions.</li> <li>2. Prepare the tools, equipments as requirement.</li> <li>3. Visit site</li> <li>4. Study the Traffic load at the particular zone.</li> <li>5. Find out the free point at the point/cabinet box</li> <li>6. Consult with client</li> <li>7. Make the rough layout of the connection of cable.</li> <li>8. Prepare wiring layout and design</li> <li>9. Collect necessary tools, equipment &amp; materials</li> <li>10. Locate points, positions of accessories</li> <li>11. Fix boxes, accessories and fittings</li> <li>12. Connect accessories and fittings</li> <li>13. Test entire installation system</li> <li>14. Perform test</li> <li>15. Check the connection of wires</li> <li>16. Check data flow from the cable at tower and at connection point.</li> <li>17. Operate system</li> <li>18. Handover to the owner</li> <li>19. Make report.</li> </ol>	<p><b><u>Condition (Given):</u></b> Site equipped with communication tower/ tools, instruments and required materials.</p> <p><b><u>Task (What):</u></b> Install low-voltage communication and telephone wires/cables</p> <p><b><u>Standards (How well):</u></b> Low-voltage communication and telephone wires/cables were installed.</p>	<ul style="list-style-type: none"> <li>➤ Introduction</li> <li>➤ Telephone system</li> <li>➤ Voltage levels in telecommunication system</li> <li>➤ Tower</li> <li>➤ Telecommunication traffic Load</li> <li>➤ Telephone line connection, sockets type</li> <li>➤ Selection and use of tools and materials</li> <li>➤ Estimating and costing</li> <li>➤ Procedure</li> <li>➤ Safety precaution</li> </ul>

**Tools/equipment:**

**Safety:**

## Task Analysis

**TASK NO: 47 Control/install electricity generation in three phase.**

Time : 32 hrs

Theory : 2 hrs

Practical: 30 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions.</li> <li>2. Obtain the required tools, equipments.</li> <li>3. Trace wiring layout</li> <li>4. Trace angular motion of single Phase</li> <li>5. Trace angular motion of two Phase</li> <li>6. Trace angular motion of three Phase</li> <li>7. Generate electricity in single Phase</li> <li>8. Generate three phase current, voltage</li> <li>9. Demonstrate the output obtained</li> <li>10. Make report.</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop / site equipped with electrical tools, instruments and required materials.</p> <p><b><u>Task (What):</u></b> Control/install electricity generation in three phase</p> <p><b><u>Standards (How well):</u></b> Electricity generation in three phase controlled.</p>	<ul style="list-style-type: none"> <li>➤ Introduction</li> <li>➤ Electricity</li> <li>➤ Magnetism</li> <li>➤ Principle of Induced voltage in a rotating conductor in magnetic field</li> <li>➤ Generation of Electricity</li> <li>➤ Electric current, voltage</li> <li>➤ Single Phase Electricity</li> <li>➤ Three Phase Electricity</li> <li>➤ Procedure</li> <li>➤ Safety precaution</li> </ul>

**Tools/equipment:**

**Safety:**



## Task Analysis

**TASK NO: 48 Apply the electronic circuitry**

Time : 32 hrs

Theory : 2 hrs

Practical: 30 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instructions.</li> <li>2. Obtain required tools, equipments.</li> <li>3. Study the circuitry in detail</li> <li>4. Analyze the Appliances connection.</li> <li>5. Analyze/connect the components use.               <ul style="list-style-type: none"> <li>▪ Connect resistor</li> <li>▪ Connect capacitor</li> <li>▪ Connect inductor</li> <li>▪ Connect diode</li> <li>▪ Connect transistor</li> <li>▪ Connect ICs</li> <li>▪ Connection Transformer</li> <li>▪ Connect switches</li> </ul> </li> <li>6. Make report.</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop / site equipped with electrical tools, instruments and required materials.</p> <p><b><u>Task (What):</u></b> Apply the electronic circuitry.</p> <p><b><u>Standards (How well):</u></b> The electronic circuitry applied.</p>	<ul style="list-style-type: none"> <li>➤ Introduction</li> <li>➤ Basic Electronics</li> <li>➤ Energy levels used in Electronics</li> <li>➤ Components of electronics               <ul style="list-style-type: none"> <li>▪ Resistor</li> <li>▪ Capacitor</li> <li>▪ Inductor</li> <li>▪ Diodes</li> <li>▪ Transistor</li> <li>▪ Integrated Circuits(ICs)</li> <li>▪ Transformer                   <ul style="list-style-type: none"> <li>○ Step-up</li> <li>○ Step-down</li> </ul> </li> </ul> </li> <li>➤ Switch and its type</li> <li>➤ Display System</li> <li>➤ Electronic Appliances</li> <li>➤ Protection measures of Electronic Appliances</li> <li>➤ Identification and Use of Electronics tools and equipments</li> <li>➤ Procedure</li> <li>➤ Safety precaution</li> </ul>

**Tools/equipment:**

**Safety:**

## Task Analysis

**TASK NO: 49 Fabricate the dc voltage regulator up to 12 volts (project work)**

Time : 32 hrs  
Theory : 2 hrs  
Practical: 30 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instruction</li> <li>2. Obtain tools, equipment as per requirement.</li> <li>3. Obtain the circuit diagram.</li> <li>4. Study the circuit diagram carefully</li> <li>5. Calculate the voltages, current.</li> <li>6. Prepare breadboard design and check the values.</li> <li>7. Prepare the PCB layout and connect the circuit to the PCB.</li> <li>8. Make the connections insulated from each other.</li> <li>9. Cleanup extra wires.</li> <li>10. Check the circuit at various points</li> <li>11. Test entire circuit.</li> <li>12. Operate system.</li> <li>13. Make report.</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop / site equipped with electrical tools, instruments and required materials.</p> <p><b><u>Task (What):</u></b>  Fabricate the dc voltage regulator up to 12 volts.</p> <p><b><u>Standards (How well):</u></b>  The dc voltage regulator up to 12 volts fabricated</p>	<ul style="list-style-type: none"> <li>➤ Introduction to voltage</li> <li>➤ AC voltage</li> <li>➤ DC voltage</li> <li>➤ Difference between AC and DC voltage</li> <li>➤ Regulated voltage</li> <li>➤ Use of Regulated voltage</li> <li>➤ Various electronic components               <ul style="list-style-type: none"> <li>▪ Passive components</li> <li>▪ Active components</li> </ul> </li> <li>➤ Transformer</li> <li>➤ Procedure</li> <li>➤ Safety precaution</li> </ul>

**Tools/equipment:**

**Safety:**

## Task Analysis

**TASK NO: 50 Fabricate an Emergency light using transformer and diode (project work)**

Time : 32 hrs  
Theory : 2 hrs  
Practical: 30 hrs

Performance steps	Terminal Performance Objective	Related Technical Knowledge
<ol style="list-style-type: none"> <li>1. Obtain instruction.</li> <li>2. Obtain the required tools, equipments.</li> <li>3. Make the circuit diagram.</li> <li>4. Study the circuit diagram made carefully.</li> <li>5. Calculate the output voltages, resistance, and current.</li> <li>6. Measure the components required in the project using millimeters.</li> <li>7. Connect the circuit in the breadboard and check the output values.</li> <li>8. Now connect the components in the PCB board.</li> <li>9. Make the connections insulated from each other.</li> <li>10. Cleanup extra wires.</li> <li>11. Check the circuit at various points.</li> <li>12. Connect lamp.</li> <li>13. Give power supply to the circuit.</li> <li>14. Make packaging for the complete circuit.</li> <li>15. Clean the place</li> <li>16. Make a report.</li> </ol>	<p><b><u>Condition (Given):</u></b> Workshop / site equipped with electrical tools, instruments and required materials.</p> <p><b><u>Task (What):</u></b> Fabricate an Emergency light using transformer and diode.</p> <p><b><u>Standards (How well):</u></b> An emergency light using transformer and diode was fabricated.</p>	<ul style="list-style-type: none"> <li>➤ Introduction</li> <li>➤ Emergency light</li> <li>➤ Semiconductor</li> <li>➤ Various electronics components <ul style="list-style-type: none"> <li>▪ Passive components</li> <li>▪ Active components</li> </ul> </li> <li>➤ Transformer</li> <li>➤ AC and DC source</li> <li>➤ Measuring equipments like ammeter, voltmeter</li> <li>➤ Procedure</li> <li>➤ Safety precaution</li> </ul>

**Tools/equipment:**

**Safety:**

<b>Part: B Common Module</b>					
<b>Description:</b> This module consists of skills and knowledge related to applied math, occupational health and safety, HIV/AIDS, first aid, communication, and small business management applicable in the related job performances.					
<b>Objectives:</b> <ul style="list-style-type: none"> <li>• Carry out simple mathematical calculations related to the occupation</li> <li>• Be familiar with hazards related to this occupation</li> <li>• Apply preventive measures for occupational health and safety</li> <li>• Apply first aid measures</li> <li>• Apply preventive measures for HIV/AIDS</li> <li>• Communicate with others</li> <li>• Apply skills of small business management</li> </ul>					
Sub modules: <ol style="list-style-type: none"> <li>1. Applied math</li> <li>2. Occupational health and safety</li> <li>3. First aid</li> <li>4. HIV/AIDS</li> <li>5. Communication</li> <li>6. Small business management</li> </ol>					
<b>Sub module:1:Applied Mathematics</b>					
<b>Description:</b> It consists of skills and knowledge related to mathematical calculations applicable in the related occupational performances.					
<b>Objective:</b> <ul style="list-style-type: none"> <li>• To carry out simple mathematical calculations that must be done for the effective performance in the occupational job.</li> </ul>					
<b>Tasks:</b> To fulfill the objective the trainees are expected to get proficiency on the following tasks/skills/steps together with their related technical knowledge:					
Th.(4 hrs) + Pr.( 16hrs) = Tot.( 20 hrs)				Time( hrs )	
SN	Tasks or skills/ steps	Related technical knowledge	Th.	Pr.	Tot.
1.	Carry out simple addition applicable in job situation	<u>Addition:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Simple calculations</li> <li>➤ Application in the occupation</li> </ul>	0.2	0.8	1
2.	Carry out simple subtraction applicable in job situation	<u>Subtraction:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Simple calculations</li> <li>➤ Application in the occupation</li> </ul>	0.2	0.8	1
3.	Carry out simple multiplication applicable in job situation	<u>Multiplication</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Simple calculations</li> <li>➤ Application in the occupation</li> </ul>	0.2	0.8	1
4.	Carry out simple division applicable in job situation	<u>Division:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> </ul>	0.2	0.8	1

		<ul style="list-style-type: none"> <li>➤ Simple calculations</li> <li>➤ Application in the occupation</li> </ul>			
5.	Carry out measurements	<u>Measurement:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Application in the occupation</li> </ul>	0.2	0.8	1
6.	Convert units of measurement	<u>Units of measurement:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Units of measurement</li> <li>➤ Unit conversion</li> <li>➤ application</li> </ul>	0.2	0.8	1
7.	Convert units of measuring temperature	<u>Units of measuring temperature:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Units of temperature measurement</li> <li>➤ Unit conversion</li> <li>➤ application</li> </ul>	0.2	0.8	1
8.	Calculate area	<u>Area:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Formula</li> <li>➤ Calculation</li> <li>➤ Application</li> </ul>	0.2	0.8	1
9.	Calculate volume	<u>Volume:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Formula</li> <li>➤ Calculation</li> <li>➤ Application</li> </ul>	0.2	0.8	1
10.	Calculate weight	<u>Weight:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Formula</li> <li>➤ Calculation</li> <li>➤ Application</li> </ul>	0.2	0.8	1
11.	Calculate percentage	<u>Percentage:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Formula</li> <li>➤ Calculation</li> <li>➤ Application</li> </ul>	0.2	0.8	1
12.	Calculate ratio and proportions	<u>Ratio and proportions:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Formula</li> <li>➤ Calculation</li> <li>➤ Application</li> </ul>	0.2	0.8	1
13.	Apply Pythagoras formula	<u>Pythagoras formula:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Formula</li> <li>➤ Calculation</li> <li>➤ Application</li> </ul>	0.2	0.8	1
14.	Apply unitary method	<u>Unitary method:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Calculation</li> </ul>	0.2	0.8	1

		➤ Application			
15.	Calculate simple interest	<u>Simple interest:</u> ➤ Concept ➤ Formula ➤ Calculation ➤ Application	0.2	0.8	1
16.	Calculate unit cost	<u>Unit cost:</u> ➤ Concept ➤ Formula ➤ Calculation ➤ Application	0.2	0.8	1
17.	Calculate per unit income	<u>Per unit income:</u> ➤ Concept ➤ Formula ➤ Calculation ➤ Application	0.2	0.8	1
18.	Calculate profit and loss	<u>Profit and loss:</u> ➤ Concept ➤ Formula ➤ Calculation ➤ Application	0.2	0.8	1
19.	Perform billing	<u>Billing:</u> ➤ Concept ➤ Calculation ➤ Bill format ➤ Procedure ➤ Application	0.2	0.8	1
20.	Prepare simple balance sheet	<u>Balance sheet:</u> ➤ Concept ➤ Format ➤ Procedure ➤ Application	0.2	0.8	1
	<b>Total:</b>		<b>4</b>	<b>16</b>	<b>20</b>
<b>Sub module: 2: Occupational Health and Safety</b>					
	<b>Description:</b> It consists of skills and knowledge related to occupational health and safety applicable in the related occupational performances				
	<b>Objectives:</b> <ul style="list-style-type: none"> <li>• To be familiar with hazards related to this occupation</li> <li>• To apply preventive measures for occupational health and safety</li> </ul>				
	<b>Tasks:</b> To fulfill the objective the trainees are expected to get proficiency on the following tasks/skills/steps together with their related technical knowledge:				
	Th.(2 hrs) + Pr.( 8hrs) = Tot.( 10 hrs)			Time( hrs )	
SN	Tasks or skills/ steps	Related technical knowledge	Th.	Pr.	Tot.
Be familiar with hazards related to this occupation					
1.	Be familiar with accident hazards	<u>Accident hazards:</u> ➤ Concept ➤ Causes ➤ Procedures for managing this hazard	0.2	0.8	1
2.	Be familiar with physical	<u>Physical hazards:</u>	0.2	0.8	1

	hazards	<ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Causes</li> <li>➤ Procedures for managing this hazard</li> </ul>			
3.	Be familiar with chemical hazards	<u>Chemical hazards:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Causes</li> <li>➤ Procedures for managing this hazard</li> </ul>	0.2	0.8	1
4.	Be familiar with biological hazards	<u>Biological hazards:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Causes</li> <li>➤ Procedures for managing this hazard</li> </ul>	0.2	0.8	1
5.	Be familiar with ergonomic/psychological / organizational factors:	<u>Ergonomic /psychological / organizational factors:</u> <ul style="list-style-type: none"> <li>➤ Concept of : <ul style="list-style-type: none"> <li>▪ Ergonomic factors</li> <li>▪ Psychological factors</li> <li>▪ organizational factors</li> </ul> </li> <li>➤ Procedures for managing hazards caused by these factors</li> </ul>	0.2	0.8	1
Sub total:			<b>1</b>	<b>4</b>	<b>4</b>
<b>Apply preventive measures for occupational health and safety</b>					
1.	Wear safety wares	<u>Safety wares:</u> <ul style="list-style-type: none"> <li>➤ Identification</li> <li>➤ Needs</li> <li>➤ Wearing procedures</li> </ul>	0.2	0.5	0.7
2.	Inspect workplace before working	<u>Workplace inspection:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Principle and procedures</li> <li>➤ Records keeping</li> </ul>	0.2	0.5	0.7
3.	Inspect tools/materials/equipment before use	<u>Inspection of tools/materials/equipment:</u> <ul style="list-style-type: none"> <li>➤ Concept and identification</li> <li>➤ Principle and procedures</li> <li>➤ Records keeping</li> </ul>	0.1	0.5	0.6
4.	Be prevented from accident hazards	<u>Prevention of accident hazards:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Being prevented from accident hazards</li> <li>➤ Records keeping</li> </ul>	0.1	0.5	0.6
5.	Be prevented from physical hazards	<u>Prevention of physical hazards:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Being prevented from physical hazards</li> <li>➤ Records keeping</li> </ul>	0.1	0.5	0.6
6.	Be prevented from chemical hazards	<u>Prevention of chemical hazards:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> </ul>	0.1	0.5	0.6

		<ul style="list-style-type: none"> <li>➤ Being prevented from chemical hazards</li> <li>➤ Records keeping</li> </ul>				
7.	Be prevented from biological hazards	<u>Prevention of biological hazards:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Being prevented from biological hazards</li> <li>➤ Records keeping</li> </ul>	0.1	0.5	0.6	
8.	Be prevented from ergonomic/psychological / organizational factors that create problems/hazards.	<u>Prevention of ergonomic/psychological / organizational factors that create problems/hazards:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Being prevented from ergonomic/psychological / organizational factors that create problems/hazards</li> <li>➤ Records keeping</li> </ul>	0.1	0.5	0.6	
	Sub total:		1	4	5	
	<b>Total:</b>		2	8	10	
<b>Sub module: 3: First Aid</b>						
	<b>Description:</b> It consists of skills and knowledge related to first aid measures applicable in the related occupational performances.					
	<b>Objective:</b> • To apply first aid measures					
	<b>Tasks:</b> To fulfill the objective the trainees are expected to get proficiency on the following tasks/skills/steps together with their related technical knowledge:					
	Th.(1 hrs) + Pr.( 4hrs) = Tot.( 5 hrs)			Time( hrs )		
SN	Tasks or skills/ steps	Related technical knowledge	Th.	Pr.	Tot.	
1.	Carryout simple dressings	<u>Carryout simple dressings:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Needs</li> <li>➤ Procedures</li> <li>➤ Precautions</li> <li>➤ Recording</li> </ul>	0.10	0.40	0.5	
2.	Apply simple bandages	<u>Apply simple bandages:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Needs</li> <li>➤ Procedures</li> <li>➤ Precautions</li> <li>➤ Recording</li> </ul>	0.10	0.40	0.5	
3.	Apply first aid for simple wounds	<u>Apply first aid for simple wounds:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Needs</li> <li>➤ Procedures</li> <li>➤ Precautions</li> <li>➤ Recording</li> </ul>	0.10	0.40	0.5	
4.	Apply first aid for heat /chemical burns	<u>Apply first aid for heat /chemical burns:</u>	0.10	0.40	0.5	



		<ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Needs</li> <li>➤ Procedures</li> <li>➤ Precautions</li> <li>➤ Recording</li> </ul>			
5.	Apply first aid for injuries/cuts	<u>Apply first aid for injuries/cuts:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Needs</li> <li>➤ Procedures</li> <li>➤ Precautions</li> <li>➤ Recording</li> </ul>	0.10	0.40	0.5
6.	Apply first aid for fracture	<u>Apply first aid for fracture:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Needs</li> <li>➤ Procedures</li> <li>➤ Precautions</li> <li>➤ Recording</li> </ul>	0.10	0.40	0.5
7.	Apply first aid for simple bleeding	<u>Apply first aid for simple bleeding:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Needs</li> <li>➤ Procedures</li> <li>➤ Precautions</li> <li>➤ Recording</li> </ul>	0.10	0.40	0.5
8.	Apply first aid for insect bites	<u>Apply first aid for insect bites:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Needs</li> <li>➤ Procedures</li> <li>➤ Precautions</li> <li>➤ Recording</li> </ul>	0.05	0.20	0.25
9.	Apply first aid for animal bites	<u>Apply first aid for animal bites:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Needs</li> <li>➤ Procedures</li> <li>➤ Precautions</li> <li>➤ Recording</li> </ul>	0.05	0.20	0.25
10.	Apply first aid for frost bite	<u>Apply first aid for frost bite :</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Needs</li> <li>➤ Procedures</li> <li>➤ Precautions</li> <li>➤ Recording</li> </ul>	0.05	0.20	0.25
11.	Apply first aid for simple poisoning	<u>Apply first aid for simple poisoning:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Needs</li> <li>➤ Procedures</li> <li>➤ Precautions</li> <li>➤ Recording</li> </ul>	0.05	0.20	0.25
12.	Apply first aid for electrical shock	<u>Apply first aid for electrical shock:</u>	0.05	0.20	0.25

		<ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Needs</li> <li>➤ Procedures</li> <li>➤ Precautions</li> <li>➤ Recording</li> </ul>			
13.	Apply first aid for choking/ drowning	<u>Apply first aid for choking/ drowning:</u> <ul style="list-style-type: none"> <li>➤ Concept</li> <li>➤ Needs</li> <li>➤ Procedures</li> <li>➤ Precautions</li> <li>➤ Recording</li> </ul>	0.05	0.20	0.25
	<b>Total:</b>		<b>1</b>	<b>4</b>	<b>5</b>
<b>Sub module:4: HIV/AIDS</b>					
	<b>Description:</b> It consists of skills and knowledge related to safety measures to be followed for the prevention of HIV/AIDS including its management.				
	<b>Objectives:</b> <ul style="list-style-type: none"> <li>• To state the concept of HIV/AIDS</li> <li>• To apply safety measures for prevention of HIV/AIDS</li> </ul>				
	<b>Tasks:</b> To fulfill the objective the trainees are expected to get proficiency on the following tasks/skills/steps together with their related technical knowledge:				
	Th.(1 hrs) + Pr.( 4hrs) = Tot.( 5 hrs)		Time( hrs )		
SN	Tasks or skills/ steps	Related technical knowledge	Th.	Pr.	Tot.
1.	<b>State the concept of HIV/AIDS</b> <ol style="list-style-type: none"> <li>1. Define HIV</li> <li>2. Enlist modes of transmission of HIV</li> <li>3. Enlist signs and symptoms of HIV infected person</li> <li>4. Enlist stages of HIV</li> <li>5. Define AIDS</li> <li>6. Enlist signs and symptoms of AIDS</li> <li>7. Enlist current status of global HIV/AIDS</li> <li>8. Enlist difference between HIV/AIDS</li> </ol>	<b><u>State the concept of HIV/AIDS:</u></b> <b><u>HIV:</u></b> <ul style="list-style-type: none"> <li>➤ Definition of HIV:</li> <li>➤ Modes of transmission of HIV</li> <li>➤ Signs and symptoms of HIV infected person</li> <li>➤ Stages of HIV</li> </ul> <b><u>AIDS:</u></b> <ul style="list-style-type: none"> <li>➤ Definition of AIDS</li> <li>➤ Signs and symptoms of AIDS</li> <li>➤ Current status of global HIV/AIDS</li> <li>➤ Difference between HIV and AIDS</li> </ul>	0.5	2	2.5
2.	Apply safety measures for prevention of <b>HIV/AIDS:</b> <ol style="list-style-type: none"> <li>1. Keep touch with single partner for sexual intercourse</li> <li>2. Ensure safe intercourse</li> <li>3. Use condom carefully and consistently during each act of sexual intercourse incase of other than single sex</li> </ol>	<u>Apply safety measures for prevention of HIV/AIDS:</u> <ul style="list-style-type: none"> <li>➤ Keeping touch with single partner for sexual intercourse</li> <li>➤ Ensuring safe intercourse</li> <li>➤ Using condom carefully and consistently during each act of sexual intercourse incase of other</li> </ul>	0.5	2	2.5

	<p>partner</p> <p>4. Keep away from sharing syringes, needles and other skin piercing instrument with HIV infected people</p> <p>5. Keep away from sharing toothbrushes, blade razors or other instruments that could become contaminated from blood</p> <p>6. Keep away from handling clothes or cloths that are visibly contaminated with blood</p> <p>7. Follow positive health behavior</p> <p>8. Get blood be tested to ensure HIV negative/positive</p>	<p>than single sex partner</p> <p>➤ Keeping away from sharing syringes, needles and other skin piercing instrument with HIV infected people</p> <p>➤ Keeping away from sharing toothbrushes, blade razors or other instruments that could become contaminated from blood</p> <p>➤ Keeping away from handling clothes or cloths that are visibly contaminated with blood</p> <p>➤ Positive health behavior</p> <p>➤ Getting blood be tested to ensure HIV negative/positive</p>			
	<b>Total:</b>		1	4	5
<b>Sub module: 5 : Communication</b>					
	<b>Description:</b> It consists of the skills and knowledge related to communication in the related occupation. Each task consists of its steps, related technical knowledge and hour distribution.				
	<b>Objectives:</b> After its completion the trainees will be able:				
	<ul style="list-style-type: none"> <li>• To handle telephone calls</li> <li>• To handle fax</li> <li>• To handle mail</li> <li>• To write letters</li> <li>• To write memos / tips / notes / notice</li> <li>• To perform internal communication</li> <li>• To perform external communication</li> <li>• To perform oral communication</li> <li>• To perform written communication</li> </ul>	<ul style="list-style-type: none"> <li>• To communicate with donors To communicate with financial institutes</li> <li>• To link with media</li> <li>• To disseminate information</li> <li>• Write job application</li> <li>• Prepare Resume.</li> <li>• Communicate with senior.</li> <li>• Communicate with juniors.</li> <li>• Deal with customers</li> <li>• Request / purchase tool, supplies, materials and equipment.</li> <li>• Fill up leave requisition form.</li> </ul>			
	<b>Tasks:</b> To fulfill the objective the trainees are expected to get proficiency on the following tasks/skills/steps together with their related technical knowledge:				
	Th.(2 hrs) + Pr.( 8hrs) = Tot.( 10 hrs)			Time( hrs )	
SN	Tasks or skills/ steps	Related technical knowledge	Th.	Pr.	Tot.
1.	Handle telephone calls	<u>Handling telephone calls:</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Operating principles and procedures</li> </ul>	0.1	0.4	0.5

		<ul style="list-style-type: none"> <li>➤ Care and maintenance</li> <li>➤ Safety precautions to be taken</li> <li>➤ Keeping activity records</li> </ul>			
2.	Handle fax	<u>Handling fax:</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Operating principles and procedures</li> <li>➤ Care and maintenance</li> <li>➤ Safety precautions to be taken</li> <li>➤ Keeping activity records</li> </ul>	0.1	0.4	0.5
3.	Handle mail	<u>Handling mail:</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Operating principles and procedures</li> <li>➤ Care and maintenance</li> <li>➤ Safety precautions to be taken</li> <li>➤ Keeping activity records</li> </ul>	0.1	0.4	0.5
4.	Write letters	<u>Writing letters:</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Types of letter</li> <li>➤ Component parts of each type of letter</li> <li>➤ Format of each type of letter</li> <li>➤ Writing letters</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping activity records</li> </ul>	0.1	0.4	0.5
5.	Write memos / tips / notes / notice	<u>Writing memos / tips / notes / notice :</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Component parts of memos / tips / notes / notice</li> <li>➤ Format of memos / tips / notes / notice</li> <li>➤ Writing memos / tips / notes / notice</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping activity records</li> </ul>	0.1	0.4	0.5
6.	Prepare simple report	<u>Preparing simple report:</u>	0.1	0.4	0.5

		<ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Component parts of a report</li> <li>➤ Format of a report</li> <li>➤ Writing a report</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping activity records</li> </ul>			
7.	Prepare simple proposal	<u>Preparing simple proposal:</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Component parts of a proposal</li> <li>➤ Format of a proposal</li> <li>➤ Writing a proposal</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping activity records</li> </ul>	0.1	0.4	0.5
8.	Perform internal/ external communication	<u>Performing internal/ external communication:</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Principles, procedures, and application</li> <li>➤ Performing internal/ external communication</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping activity records</li> </ul>	0.1	0.4	0.5
9.	Perform horizontal/vertical communication	<u>Performing horizontal/vertical communication:</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Principles, procedures, and application</li> <li>➤ Performing horizontal/vertical communication</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping activity records</li> </ul>	0.1	0.4	0.5
10.	Perform oral/ written communication	<u>Performing oral/ written communication:</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Principles, procedures, and application</li> <li>➤ Performing oral/ written communication</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping activity records</li> </ul>	0.1	0.4	0.5

11.	Communicate with financial institutes	<u>Communicating with financial institutes:</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Principles, procedures, and application</li> <li>➤ Communicating with financial institutes</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping activity records</li> </ul>	0.1	0.4	0.5
12.	Link with media	<u>Linking with media:</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Principles, procedures, and application</li> <li>➤ Linking with media</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping activity records</li> </ul>	0.1	0.4	0.5
13.	Disseminate information	<u>Disseminating information:</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Principles, procedures, and application</li> <li>➤ Disseminating information</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping activity records</li> </ul>	0.1	0.4	0.5
14.	Write job application	<u>Writing job application:</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Component parts of job application</li> <li>➤ Format of job application</li> <li>➤ Writing job applications</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping activity records</li> </ul>	0.1	0.4	0.5
15.	Prepare resume	<u>Preparing resume:</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Component parts of a resume</li> <li>➤ Format of a resume</li> <li>➤ Writing resume</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping activity records</li> </ul>	0.1	0.4	0.5
16.	Communicate with senior.	<u>Communicating with senior:</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and</li> </ul>	0.1	0.4	0.5

		<ul style="list-style-type: none"> <li>importance</li> <li>➤ Principles, procedures, and application</li> <li>➤ Communicating with senior</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping activity records</li> </ul>			
17.	Communicate with juniors.	<u>Communicating with juniors:</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Principles, procedures, and application</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping activity records</li> </ul>	0.1	0.4	0.5
18.	Deal with customers/stake holders	<u>Dealing with customers/stake holders:</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Principles, procedures, and application</li> <li>➤ Communicating with juniors</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping activity records</li> </ul>	0.1	0.4	0.5
19.	Request / purchase tool, supplies, materials and equipment.	<u>Requesting / purchasing tool, supplies, materials and equipment:</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Principles, procedures, and application</li> <li>➤ Requesting / purchasing tool, supplies, materials and equipment</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping activity records</li> </ul>	0.1	0.4	0.5
20.	Fill up leave requisition form	<u>Filling up leave requisition form:</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Principles, procedures, and application</li> <li>➤ Filling up leave requisition form</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping activity records</li> </ul>	0.1	0.4	0.5
		<b>Total:</b>	<b>2</b>	<b>8</b>	<b>10</b>
<b>Sub module: 6 : Small Enterprise Development</b>					
<b>Description:</b>					

	It consists of the skills and knowledge related to small enterprise development in the related occupation. Each task consists of its steps, related technical knowledge and hour distribution.				
	<b>Objectives:</b> After its completion the trainees will be able:				
	<ul style="list-style-type: none"> <li>• To be familiar with entrepreneurship development</li> <li>• To prepare a business plan</li> </ul>				
	<b>Tasks:</b> To fulfill the objective the trainees are expected to get proficiency on the following tasks/skills/steps together with their related technical knowledge:				
	Th.(4 hrs) + Pr.( 16 hrs) = Tot.( 20 hrs)			Time( hrs )	
SN	Tasks or skills/ steps	Related technical knowledge	Th.	Pr.	Tot.
	<b><u>Entrepreneurship development:</u></b>	<b><u>Entrepreneurship development:</u></b>			
1.	Be familiar with business / entrepreneurship	<b><u>Business / entrepreneurship:</u></b> <ul style="list-style-type: none"> <li>➤ Concept, definitions, need, and importance</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping activity records</li> </ul>	0.1	0.4	0.5
2.	Develop qualities of a successful entrepreneur	<b><u>Qualities of a successful entrepreneur:</u></b> <ul style="list-style-type: none"> <li>➤ Concept and needs</li> <li>➤ Qualities of a successful entrepreneur</li> <li>➤ Keeping activity records</li> </ul>	0.1	0.4	0.5
3.	Follow professional ethics	<b><u>Professional ethics:</u></b> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Professional ethics</li> <li>➤ Interpretation</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping activity records</li> </ul>	0.1	0.4	0.5
4.	Analyze prevailing rules / regulations/ laws /acts related to the profession	<b><u>Prevailing rules / regulations/ laws /acts related to the profession:</u></b> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Prevailing rules / regulations/ laws /acts related to the profession</li> <li>➤ Interpretation</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping activity records</li> </ul>	0.1	0.4	0.5
5.	Develop skills of good governance	<b><u>Good governance:</u></b> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Principles and procedures of good governance</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping activity re</li> </ul>	0.1	0.4	0.5



6.	Be familiar with entrepreneurship development/factors affecting the growth of entrepreneurship	<u>Entrepreneurship development/factors affecting the growth of entrepreneurship:</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Entrepreneurship development</li> <li>➤ Factors affecting the growth of entrepreneurship</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping records</li> </ul>	0.1	0.4	0.5
7.	Develop an entrepreneurship competency development [ECD] program	<u>Entrepreneurship competency development [ECD] program:</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Entrepreneurship competency development [ECD]</li> <li>➤ ECD program development</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping records</li> </ul>	0.1	0.4	0.5
8.	Be familiar with identification / selection/appraising/gaining instructional a support of a project <ul style="list-style-type: none"> <li>• Be familiar with identification of a project</li> <li>• Be familiar with selection of a project</li> <li>• Be familiar with appraising of a project</li> <li>• Be familiar with gaining instructional a support of a project</li> </ul>	<u>Identification / selection/appraising/gaining instructional a support of a project:</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Identification of a project</li> <li>➤ Selection of a project</li> <li>➤ Appraising of a project</li> <li>➤ Gaining instructional a support of a project</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping records</li> </ul>	0.1	0.4	0.5
9.	Be familiar with the preparation of a comprehensive business plan for starting / acquiring /running a business	<u>Be familiar with the preparation of a comprehensive business plan for starting / acquiring /running a business:</u> <ul style="list-style-type: none"> <li>➤ Preparation of a comprehensive business plan for starting a business</li> <li>➤ Preparation of a comprehensive business plan for acquiring a business</li> <li>➤ Preparation of a comprehensive business plan for running a business</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping records</li> </ul>	0.1	0.4	0.5

10.	Be familiar with marketing of products	<u>Be familiar with marketing of products:</u> <ul style="list-style-type: none"> <li>➤ concept of product, price, place, promotion</li> <li>➤ marketing of products</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping records</li> </ul>	0.1	0.4	0.5
		Sub total:	<b>1</b>	<b>4</b>	<b>5</b>
	<b><u>Business plan:</u></b>	<b><u>Business plan:</u></b>			
11.	Collect related information / data	<u>Collecting related information / data:</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance of data and information</li> <li>➤ Difference between data and information</li> <li>➤ Principles and procedures for collecting related information / data</li> <li>➤ Collecting related information / data</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping records</li> </ul>	0.4	1.6	2
12.	Prepare production plan	<u>Preparing production plan:</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Component parts</li> <li>➤ Format</li> <li>➤ Principles and procedures</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping records</li> </ul>	0.4	1.6	2
13.	Prepare cost plan	<u>Preparing cost plan:</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Component parts</li> <li>➤ Format</li> <li>➤ Principles and procedures</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping records</li> </ul>	0.4	1.6	2
14.	Prepare financial plan	<u>Preparing financial plan:</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Component parts</li> <li>➤ Format</li> <li>➤ Principles and procedures</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping records</li> </ul>	0.4	1.6	2
15.	Prepare marketing plan	<u>Preparing marketing plan:</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Component parts</li> <li>➤ Format</li> </ul>	0.4	1.6	2

		<ul style="list-style-type: none"> <li>➤ Principles and procedures</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping records</li> </ul>			
16.	Prepare a business plan	<u>Preparing a business plan:</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Component parts</li> <li>➤ Format</li> <li>➤ Principles and procedures</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping records</li> </ul>	0.6	2.4	3
17.	Appraise business plan	<u>Appraising business plan:</u> <ul style="list-style-type: none"> <li>➤ Concept, need, and importance</li> <li>➤ Principles and procedures</li> <li>➤ Precautions to be taken</li> <li>➤ Keeping records</li> </ul>	0.4	1.6	2
		<b>Sub total:</b>	<b>3</b>	<b>12</b>	<b>15</b>
		<b>Total:</b>	<b>4</b>	<b>16</b>	<b>20</b>
		<b>Common module total:</b>	<b>14</b>	<b>56</b>	<b>70</b>

### Reference Books

1. *Code of Practice for Electrical Wiring Installation*, CTEVT.
2. S.K.Malice, *Electric Trade Theory and Practical* .
3. *Electric Trade Technology*, CTEVT.
4. *Skill Standard Level (Building Electrician) 1 & 2* CTEVT.
5. थापा, भोज विक्रम, *भवन तथा औद्योगिक विद्युत जडान*, २०६२ प्रा. शि. तथा व्या. ता. परिषद्,
6. श्रेष्ठ जीवनहरि तथा साथीहरु, *प्रारम्भिक विद्युत*, पाठ्यक्रम विकास केन्द्र त्रि. वि.वि. इ.स .१९८१