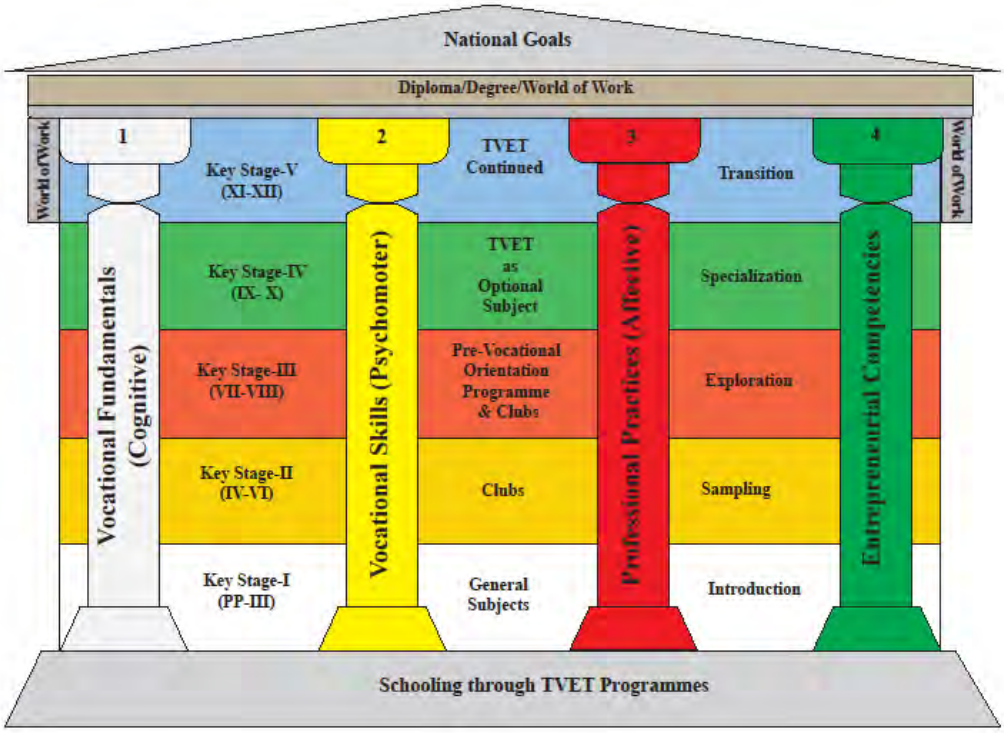
TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING (TVET)

NEW NORMAL CURRICULUM

INSTRUCTIONAL GUIDE

(ELECTRICAL)

CLASS: XI



Royal Education Council

Paro: Bhutan

Published by:
Royal Education Council,
Royal Government of Bhutan
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Website: www.curriculum.bt

Provisional edition 2021
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ACKNOWLEDGEMENT

The REC would like to acknowledge the assistance provided by the Ministry of Education (MoE), Royal Government of Bhutan in the development of Technical and Vocational Education and Training New Normal Curriculum Instructional Guide for classes IX- XII. The REC also extends its sincere gratitude to all the schools and individuals for their invaluable contributions towards the development of this instructional guide.

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FOREWORD

COVID-19 has suddenly caused unforgiving disruptions in the public education all over the world and brought about threats of fragmentation due to disparities in accessibility and connectivity in many systems. In Bhutan too, continuity of education and learning has been severely affected as a result of nationwide school closures and due to restrictions and health protocols. The disruptions have led to challenges in many existing patterns and trends in education resulting in a massive shift away from learning and teaching in traditional settings with physical interactions to the maximum in terms of relevancy and efficiency. This has caused a major problem for children living in poverty worldwide, who often rely on the physical settings of their schools for educational materials, guidance, and, sometimes, the only decent meal of the day.

In the new normal education, human interaction and well-being is a priority. Technology, particularly digital technology that enables communication, collaboration and learning across distance, is a formidable tool – not a panacea but a source of innovation and expanded potentials. As we embrace this exceptional opportunity to transform the world, and as we reimagine the organization of our educational institutions and learning environments, we will need to think about where we want to go.

In the post COVID-19 era, we must prioritize the development of the whole person not just academic knowledge. Inspiration for the change can be drawn from the 1996 Delors report, *Learning the treasure within*, in its specification of four pillars of learning as "learning to know", "to do", "to be", and "to live together". Therefore, curricula must be increasingly perceived as an integrated and based on themes and problems that allows learners to learn to live in peace with our common humanity and our common planet. This has the potential in the development of a strong base of knowledge about one's self and about the world and find purpose and be better able to participate in social and political milieu.

The New Normal Curriculum is, not just a mere response to the pandemic, but also a culmination of the curriculum reform work for the last four years by the Royal Education Council. It is an attempt to transform education from the teaching of "what" to learning of "how" and "why" towards empowering learners with the transversal competencies and the 21st century skills, and preparing them to be lifelong learners. We are optimistic that this move orients our education process towards nurturing nationally rooted and globally competent citizens.

Wish all our learners and teachers a life enriching experiential teaching and learning.

Kinga Dakpa,

Director General

INTRODUCTION

Technical and Vocational Education and Training (TVET) is education and training which provides knowledge and skills for employment. It comprises education, training and skills development related to a wide range of occupational fields, production, services and livelihood. The Royal Education Council and Ministry of Education envisage that the TVET curriculum has a place in the mainstream education system, as it is the case in most of the education systems of the developed world. The formal Technical and Vocational Education and Training (TVET) began in 1965 at Don Bosco Technical School (DBTS), in Kharbandi (presently known as Rinchending) in Phuntsholing. Even after that, major curriculum reform was planned by the then Department of Curriculum Research and Development (DCRD) under the Ministry of Education in an attempt to make education relevant to the Bhutanese society through diversification of Secondary Education Curriculum in the schools, which included the introduction of TVET.

As per 'National Education Framework' developed collaboratively by the Royal Education Council (REC) and the Ministry of Education (MoE), it provides a pathway on integrating technical/vocational education in the mainstream school education curriculum and as elective subjects in higher classes (NEF, 2009; page 64).

With the collaborative efforts of the Ministry of Labour and Human Resources and the erstwhile Department of Curriculum Research and Development under Ministry of Education, Vocational Curriculum has been introduced in the schools with assistance from TTIs since 2011. After the first MoU that was signed between MoE and MoLHR in 2011, the second MoU was signed again in 2014, to improve technical/vocational courses. The technical/vocational courses offered by the TTIs/IZCs are adapted and redesigned and are offered in schools aligning to the 'Bhutan Education Blue Print' 2014-2024, which recommends upscaling and diversification of TVET in schools through the provision of alternative pathways in schools and the tertiary education systems, owing to the limited access to such courses, despite the growing demand for technical skills in the country.

The resolutions of the National School Curriculum Conference 2016, also strongly emphasised the need to upscale and deepen TVET. Accordingly, the TVET framework is developed from classes PP to XII, schools equipped with necessary resources and instructors trained. Tripartite MoU among REC, MoE and MoLHR was also signed in 2018 to implement the programmes collaboratively.

Although the TVET curriculum is Competency-Based with more emphasis on hands-on experience, further improvements have been made taking care of cognitive and affective domains besides psychomotor. Teaching and learning approaches have also been enriched with the recommendation to use ICT and online resources. Since the pandemic (COVID-19) has resulted in the closure of schools, it has taught us lessons to be prepared for such an untoward situation in the future. Thus, the New Normal Curriculum Instructional Guide is prepared not only to encourage blended learning but also to facilitate remote learning. Thus, the guide would help the schools to implement the curriculum effectively without limiting to contact teaching/learning besides using a variety of pedagogies.

Table of Contents

A. Learning Objectives / Broad theme / Strand/Chapter:

MODULE 1: Applying Fundamentals of electricity

Chapter 1: Applying basic electronics theory

Learning objectives	Core concepts (Chapters/Topics)
5.6.1 List the types of the transistor. 5.6.2 Explain the characteristics and application of the transistor as a switch. 5.6.3 *Ensure safe handling of components.* 5.6.4 *Ensure to verify the circuit connection.* 5.6.5 Verify characteristics of the transistor as a switch	**5.6 Verifying characteristics of a transistor as a switch**

B. Competencies:

- ✓ Use a transistor to replace the switch in house wiring or home appliances.

C. Pedagogy/Learning Experiences

- **Contact**:
  - ✓ Make learners read INFORMATION SHEET 5.6
  - ✓ Provide handouts to learners
  - ✓ Demonstrate on OPERATION SHEET 5.6
  - ✓ Provide guided practice on OPERATION SHEET 5.6
  - ✓ Make learners perform OPERATION SHEET 5.6 individually

- **Non-contact:**
  - ✓ Instruct learners to read INFORMATION SHEET 5.6 through google classroom
  - ✓ Provide the web link https://www.youtube.com/watch?v=oE1_CO4bpHI that explains the transistor as a switch
  - ✓ Provide handouts, self-made tutorial video clip and PPT through google classroom.
  - ✓ Let learners submit their response through google classroom or any other relevant social media
  - ✓ Conduct online test

D. Assessment:

- **Contact:**
  - ✓ Make learners to perform and explain OPERATION SHEET 5.6 and use rubric (Available in framework 2020) to assess the learner's conceptual understanding. Provide necessary feedback.
  - ✓ Assess learner's knowledge about transistor by asking questions
  - ✓ Conduct class test to assess their understanding
  - ✓ Let learners carry out activities of the SAMPLE SELF CHECK 5.6

- **Non-contact:**
  - ✓ Let the learners solve SAMPLE SELF CHECK 5.6 and submit answers through google classroom or any other relevant social media.
  - ✓ Provide a web link that contains the sample of MCQ on transistor as a switch https://www.sanfoundry.com/electronic-devices-circuits-questions-answers-transistor-switch/ and let them submit the answers in google classroom

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials
- ✓ Handouts
- ✓ https://www.youtube.com/watch?v=oE1_CO4bpHI (Explanation of transistor as a switch)
- ✓ https://www.sanfoundry.com/electronic-devices-circuits-questions-answers-transistor-switch/ (MCQ on transistor as a switch)

A. Learning Objectives / Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
5.7.1 Explain the application of the transistor as an amplifier. 5.7.2 *Use Cathode Ray Oscilloscope (CRO).* 5.7.3 *Ensure safe handling of CRO.* 5.7.4 *Ensure to verify the circuit connection.* 5.7.5 Verify characteristics of the transistor as an amplifier	**5.7 Verifying characteristics of the transistor as an amplifier**

B. Competencies:

- ✓ Use a transistor to create an outdoor musical system

C. Pedagogy/Learning Experiences

- **Contact**:
  - ✓ Make learners read INFORMATION SHEET 5.6
  - ✓ Provide handouts to learners
  - ✓ Share the web link https://www.youtube.com/watch?v=4U_dwuRu6SA with learners which explains the transistor as an amplifier
  - ✓ Demonstrates on OPERATION SHEET 5.6
  - ✓ Provide guided practice on OPERATION SHEET 5.6
  - ✓ Make learners perform OPERATION SHEET 5.6 individually

- **Non-contact:**
  - ✓ Instruct learners to read INFORMATION SHEET 5.7
  - ✓ Provide the web link https://www.youtube.com/watch?v=4U_dwuRu6SA with learners which explain the transistor as an amplifier

- ✓ Provide handouts, self-made tutorial video clip and PPT through google classroom
- ✓ Provide the web link https://byjus.com/jee/transistor-as-amplifier/ with learners and submit their responses in google classroom.

D. Assessment:

- **Contact:**
  - ✓ Make learners perform and explain OPERATION SHEET 5.7 and use rubric (Available in framework 2020) to assess the learner's conceptual understanding. Provide necessary feedback.
  - ✓ Assess learner's knowledge about transistor as an amplifier by asking questions
  - ✓ Conduct class test to assess their understanding
  - ✓ Let learners carry out activities of the SAMPLE SELF CHECK 5.7

- **Non-contact:**
  - ✓ Let the learners solve SAMPLE SELF CHECK 5.7 and submit answers through google classroom or any other relevant social media.
  - ✓ Give additional relevant questions from CBLM and other resources-text/ Google/ YouTube and let learners submit answers through google classroom or any other relevant social media.

E. Resources (online and offline):

- ✓ Competency-Based learning materials
- ✓ Handouts
- ✓ https://www.youtube.com/watch?v=4U_dwuRu6SA(Explanation on transistor as an amplifier)
- ✓ https://byjus.com/jee/transistor-as-amplifier/ (Questions on amplifier)

A. Learning Objectives / Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
5.8.1 Explain the number system, logic gates, and truth table. 5.8.2 Define Boolean algebra. 5.8.3 State application of NOT, AND, OR, NAND, NOR, XOR, and XNOR gate. 5.8.4 ***Use logic gate trainer kit.*** 5.8.5 *Ensure safe handling of trainer kits.* 5.8.6 Verify truth table for NOT gate	**5.8 Verifying truth table for NOT gate**

B. Competencies:

- ✓ Verify truth table for NOT gate to understand how a NOT gate operates

D. Pedagogy/Learning Experiences

- **Contact**:
  - ✓ Make learners read INFORMATION SHEET 5.8
  - ✓ Provide handouts to learners
  - ✓ Share the web link https://www.electrical4u.com/not-gate/ with learners which explain NOT gate
  - ✓ Demonstrates on OPERATION SHEET 5.8
  - ✓ Provide guided practice on OPERATION SHEET 5.8
  - ✓ Make learners perform OPERATION SHEET 5.8 individually
  - ✓ Let the learners discuss in the group and share their responses among them

- **Non-contact:**
  - ✓ Instruct learners to read INFORMATION SHEET 5.8 through google classroom
  - ✓ Provide the web link https://www.tutorialspoint.com/computer_logical_organization/logic_gates. Or https://www.electrical4u.com/not-gate/
  - ✓ https://www.tutorialspoint.com/computer_logical_organization/boolean_algebra.htm with learners which explains on NOT gate and Booleans algebra
  - ✓ Provide web link https://www.youtube.com/watch?v=Xi18hI1LqAA which explain how to develop NOT gate truth table
  - ✓ Provide handouts, self-made tutorial video clip, and PPT through google classroom.
  - ✓ Let the learners submit their responses through google classroom or any other relevant social media.

D. Assessment:

- **Contact:**
  - ✓ Make learners perform and explain OPERATION SHEET 5.8 and use rubric (Available in framework 2020) to assess them. Provide necessary feedback.
  - ✓ Assess learner's knowledge about the logic gate and Boolean algebra by asking questions
  - ✓ Let learners carry out activities of the SAMPLE SELF CHECK 5.8

- **Non-contact:**
  - ✓ Let the learners solve SAMPLE SELF CHECK 5.8 and submit answers through google classroom or any other relevant social media.

- ✓ Give additional relevant questions from CBLM and other resources-text/ Google/ YouTube and let learners submit answers through google classroom or any other relevant social media.

E. Resources (online and offline):

- ✓ Handouts
- ✓ Competency-Based Learning Materials
- ✓ https://www.tutorialspoint.com/computer_logical_organization/logic_gates. Or https://www.electrical4u.com/not-gate/ (Explanation on NOT gate)

  https://www.tutorialspoint.com/computer_logical_organization/boolean_algebra.htm (Explanation on Boolean algebra)
- ✓ https://www.youtube.com/watch?v=Xi18hI1LqAA (Explanation on NOT gate)

A. Learning Objectives / Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
5.9.6 Draw logic symbol of AND gate. 5.9.7 Interpret the truth table. 5.9.8 *Use logic gate trainer kit* 5.9.9 *Ensure safe handling of trainer kits.* 5.9.10 *Ensure to verify the circuit connection* 5.9.11 Verify truth table for AND gate	**5.9 Verifying truth table for AND gate**

B. Competencies:

- ✓ Verify truth table for AND gate to understand how a AND gate operates

C. Pedagogy/Learning Experiences

- **Contact**:
  - ✓ Make learners read INFORMATION SHEET 5.9
  - ✓ Provide handouts to learners
  - ✓ Provide the web link https://www.electrical4u.com/logical-and-gate/ with the learners which explain AND gate
  - ✓ Demonstrate on OPERATION SHEET 5.9
  - ✓ Provide guided practice on OPERATION SHEET 5.9
  - ✓ Make learners perform OPERATION SHEET 5.9 individually

- **Non-contact:**

✓ Instruct learners to read INFORMATION SHEET 5.9 through google classroom

- ✓ Provide the web link https://www.tutorialspoint.com/computer_logical_organization/logic_gates with learners which explains about AND GATE.
- ✓ Provide web link https://www.youtube.com/watch?v=Xi18hI1LqAA that explains how to develop AND gate truth table
- ✓ Provide handouts, self-made tutorial video clip, and PPT through google classroom.
- ✓ Instruct learners to develop AND gate truth table
- ✓ Let the learners submit their responses through google classroom or any other relevant social media.

D. Assessment:

- **Contact:**
  - ✓ Make learners perform and explain OPERATION SHEET 5.9 and use rubric (Available in framework 2020) to assess the learner's conceptual understanding. Provide necessary feedback.
  - ✓ Assess learner's knowledge about AND gate by asking questions.
  - ✓ Conduct a test to assess their understanding.
  - ✓ Let learners carry out activities of the SAMPLE SELF CHECK 5.9

- **Non-contact:**
  - ✓ Let the learners solve SAMPLE SELF CHECK 5.9 and submit answers through google classroom or any other relevant social media.
  - ✓ Give additional relevant questions from CBLM and other resources-text/ Google/ YouTube and let learners submit answer through google classroom or any other relevant social media

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials
- ✓ Handouts
- ✓ https://www.electrical4u.com/logical-and-gate/ or https://www.tutorialspoint.com/computer_logical_organization/logic_gates. (AND Gate explanation)
- ✓ https://www.youtube.com/watch?v=Xi18hI1LqAA (Video on AND gate truth table)

Learning objectives	Core concepts (Chapters/Topics)
5.10.6 Draw logic symbol of OR gate. 5.10.6 Draw logic symbol of OR gate. 5.10.7 Interpret the truth table. 5.10.8 *Use logic gate trainer kit.* 5.10.9 *Ensure safe handling of trainer kits.*	**5.10 Verifying truth table for OR gate**

5.10.10*Ensure to verify the circuit connection* 5.10.11Verify truth table for OR gate	

A. Learning Objectives / Broad theme / Strand/Chapter:

B. Competencies:

- ✓ Verify truth table for OR gate to understand how OR gate operates

C. Pedagogy/Learning Experiences

- **Contact**:
  - ✓ Make learners read INFORMATION SHEET 5.10
  - ✓ Provide handouts to learners
  - ✓ Provide the web link https://www.electrical4u.com/logical-or-gate/ with learners which explain OR gate
  - ✓ Demonstrate on OPERATION SHEET 5.10
  - ✓ Provide guided practice on OPERATION SHEET 5.10
  - ✓ Make learners perform OPERATION SHEET 5.9individually

- **Non-contact:**
  - ✓ Instruct learners to read INFORMATION SHEET 5.10
  - ✓ Provide the web link https://www.tutorialspoint.com/computer_logical_organization/logic_gates with learners which explains about OR gate.
  - ✓ Provide the web link https://www.youtube.com/watch?v=Xi18hI1LqAA that explains how to develop OR gate truth table.
  - ✓ Provide handouts, self-made tutorial video clip, and PPT through google classroom.
  - ✓ Instruct learners to develop OR gate truth table.
  - ✓ Let the learners submit their responses through google classroom or any other relevant social media.

D. Assessment:

- **Contact:**
  - ✓ Make learners Perform and explain OPERATION SHEET 5.10 and use rubric (Available in framework 2020) to assess the learner's conceptual understanding. Provide necessary feedback.
  - ✓ Assess learner's knowledge about OR gate by asking questions
  - ✓ Let learners carry out activities of SAMPLE SELF CHECK 5.10

- **Non-contact:**
  - ✓ Make learners read INFORMATION SHEET 5.10 and perform OPERATION SHEET 5.10 and ask them to send the short video as evidence through google classroom or any other relevant social media platform. Assess them using the checklist/performance guide.

- ✓ Let the learners solve SAMPLE SELF CHECK 5.10 and submit answers through google classroom or any other relevant social media.
- ✓ Give additional relevant questions from CBLM and other resources-text/ Google/ YouTube and let learners submit answer through google classroom or any other relevant social media

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials
- ✓ https://www.tutorialspoint.com/computer_logical_organization/logic_gates. OR https://www.electrical4u.com/logical-or-gate/ (Explanation on OR Gate)
- ✓ https://www.youtube.com/watch?v=Xi18hI1LqAA (Video on OR gate operation)

A. Learning Objectives / Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
5.11.6 Draw logic symbol of NAND gate. 5.11.7 Interpret the truth table. 5.11.8 *Use logic gate trainer kit* 5.11.9 *Ensure safe handling of trainer kit* 5.11.10*Ensure to verify the circuit connection.* 5.11.11*Verify truth table for NAND gate*	**5.11 Verifying truth table for NAND gate**

B. Competencies:

- ✓ Verify truth table for NAND gate to understand how NAND gate operates

C. Pedagogy/Learning Experiences

- **Contact**:
  - ✓ Make learners read INFORMATION SHEET 5.11
  - ✓ Provide handouts to learners
  - ✓ Share the web link https://www.electrical4u.com/nand-gate/. with learners which explain about OR gate
  - ✓ Demonstrate on OPERATION SHEET 5.11
  - ✓ Provide guided practice on OPERATION SHEET 5.11
  - ✓ Let learners discuss in the group and do a presentation on NAND gate using PPT or handouts

- **Non-contact:**
  - ✓ Instruct learners to read INFORMATION SHEET 5.11 through google classroom.

- ✓ Share the web link https://www.tutorialspoint.com/computer_logical_organization/logic_gates_with learners which explains about NAND gate.
- ✓ Provide web link_https://www.electrical4u.com/nand-gate/ that explains how to develop NAND gate truth table
- ✓ Provide handouts, self-made tutorial video clip, and PPT through google classroom.
- ✓ Instruct learners to develop NAND gate truth table.
- ✓ Let the learners submit their responses through google classroom or any other relevant social media.

D. Assessment:

- **Contact:**
  - ✓ Make learners perform and explain OPERATION SHEET 5.11 and use rubric (Available in framework 2020) to assess the learner's conceptual understanding. Provide necessary feedback.
  - ✓ Assess learner's knowledge about NAND gate by asking questions
  - ✓ Conduct class tests to assess their understanding.
  - ✓ Let learners carry out activities of SAMPLE SELF CHECK 5.11
  - ✓ Let the learners do presentations and assess as per the rubric developed.

- **Non-contact:**
  - ✓ Make learners read INFORMATION SHEET 5.11 and perform OPERATION SHEET 5.11 and ask them to send the video as evidence through google classroom or any other relevant social media platform**.**
  - ✓ Let the learners solve SAMPLE SELF CHECK 5.11 and submit answers through google classroom or any other relevant social media.
  - ✓ Give additional relevant questions from CBLM and other resources-text/ Google/ YouTube and let learners submit answer through google classroom or any other relevant social media

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials
- ✓ https://www.electrical4u.com/nand-gate/ OR https://www.tutorialspoint.com/computer_logical_organization/logic_gates (Information on NAND Gate)

A. Learning Objectives / Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
5.12.6 Draw logic symbol of NOR gate. 5.12.7 Interpret the truth table. 5.12.8 *Use logic gate trainer kit*	**5.12 Verifying truth table for NOR gate**

5.12.9 *Ensure safe handling of trainer kit* 5.12.10*Ensure to verify the circuit connection.* 5.12.11Verify truth table for NOR gate	

B. Competencies:

- ✓ Verify truth table for NOR gate to understand how NOR gate operates

C. Pedagogy/Learning Experiences

- **Contact**:
  - ✓ Make learners read INFORMATION SHEET 5.12
  - ✓ Provide handouts to learners
  - ✓ Provide the web link https://www.electrical4u.com/nor-gate/ with learners which explain about NOR gate
  - ✓ Demonstrate on OPERATION SHEET 5.12
  - ✓ Provide guided practice on OPERATION SHEET 5.12
  - ✓ Let learners discuss in the group and do presentations on the NOR gate symbol and truth table.

- **Non-contact:**
  - ✓ Instruct learners to read INFORMATION SHEET 5.11
  - ✓ Provide web link https://www.electrical4u.com/nor-gate/ that explains how to develop NOR gate truth table.
  - ✓ Make learners watch https://www.youtube.com/watch?v=41RWOZfLriE which explains how to develop NOR gate truth table.
  - ✓ Provide handouts, self-made tutorial video clip, and PPT through google classroom.
  - ✓ Instruct learners to develop NOR gate truth table
  - ✓ Let the learners submit their responses through google classroom or any other relevant social media.

D. Assessment:

- **Contact:**
  - ✓ Make learners perform and explain OPERATION SHEET 5.12 and use rubric (Available in framework 2020) to assess the learner's conceptual understanding. Provide necessary feedback.
  - ✓ Assess learner's knowledge about NOR gate by asking questions
  - ✓ Let learners carry out activities of SAMPLE SELF CHECK 5.12

- **Non-contact:**
  - ✓ Make learners read INFORMATION SHEET 5.12 and perform OPERATION SHEET 5.12 and ask them to send video as evidence through google classroom or any other relevant social media platform**.**

- ✓ Let the learners solve SAMPLE SELF CHECK 5.12 and submit answers through google classroom or any other relevant social media.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials
- ✓ https://www.electrical4u.com/nor-gate/ or https://www.youtube.com/watch?v=41RWOZfLriE (Explanation on NOR gate)

A. Learning Objectives / Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
5.13.6 Draw logic symbol of XOR gate. 5.13.7 Interpret the truth table. 5.13.8 *Use logic gate trainer kit.* 5.13.9 *Ensure safe handling of trainer kits.* 5.13.10*Ensure to verify the circuit connection.* 5.13.11Verify truth table for XOR gate	**5.13 Verifying truth table for XOR gate**

B. Competencies:

- ✓ Verify truth table for XOR gate to understand how XOR gate operates

C. Pedagogy/Learning Experiences

- **Contact**:
  - ✓ Make learners read INFORMATION SHEET 5.13
  - ✓ Provide handouts
  - ✓ Share the web link https://www.electrical4u.com/exclusive-or-gate/ with learners which explain XOR gate
  - ✓ Provide web link https://www.youtube.com/watch?v=dCYXsRRm7gA which explains how to develop XOR gate truth table.
  - ✓ Demonstrate on OPERATION SHEET 5.13
  - ✓ Provide guided practice on OPERATION SHEET 5.13
  - ✓ Let learners discuss in the group and do presentations on the XOR gate symbol and truth table.

- **Non-contact**
  - ✓ Instruct learners to read INFORMATION SHEET 5.11
  - ✓ Provide web linkhttps://www.electrical4u.com/exclusive-or-gate/ explains how to develop XOR gate truth table
  - ✓ Provide web link https://www.youtube.com/watch?v=dCYXsRRm7gA which explains how to develop XOR gate truth table.
  - ✓ Provide handouts, self-made tutorial video clip, and PPT through google classroom.

- ✓ Instruct learners to develop the XOR gate truth table
- ✓ Let the learners submit their responses through google classroom or any other relevant social media.

D. **Assessment:**

- **Contact:**
  - ✓ Make learners perform and explain OPERATION SHEET 5.13 and use rubric (Available in framework 2020) to assess the learner's conceptual understanding. Provide necessary feedback.
  - ✓ Assess learner's knowledge about NOR gate by asking questions
  - ✓ Let learners carry out activities of SAMPLE SELF CHECK 5.13

- **Non-contact:**
  - ✓ Make learners read INFORMATION SHEET 5.13 and perform OPERATION SHEET 5.13 and ask them to send the video as evidence through google classroom or any other relevant social media platform.
  - ✓ Let the learners solve SAMPLE SELF CHECK 5.13 and submit answers through google classroom or any other relevant social media.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials
- ✓ https://www.youtube.com/watch?v=dCYXsRRm7gA (Explanation on truth table)
- ✓ https://www.electrical4u.com/exclusive-or-gate/ (Explanation on XOR gate)

Learning objectives	Core concepts (Chapters/Topics)
5.14.6 Draw logic symbol of XNOR gate. 5.14.7 Interpret the truth table. 5.14.8 *Use logic gate trainer kit.* 5.14.9 *Ensure safe handling of trainer kits.* 5.14.10*Ensure to verify the circuit connection.* 5.14.11Verify truth table for XNOR gate	**5.14 Verifying truth table for XNOR gate**

B. Competencies:

- ✓ Verify truth table for XNOR gate to understand how XNOR gate operates

C. Pedagogy/Learning Experiences

- **Contact**:
  - ✓ Make learners read INFORMATION SHEET 5.14
  - ✓ Provide handouts to learners

- ✓ Provide the web link https://www.electrical4u.com/exclusive-or-gate/#What-is-an-XNOR-Gate with learners which explains XNOR gate
- ✓ Demonstrate on OPERATION SHEET 5.14
- ✓ Provide guided practice on OPERATION SHEET 5.14
- ✓ Let the learners discuss in the group and do presentations on the XNOR gate symbol and truth table.

- **Non-contact:**
  - ✓ Instruct learners to read INFORMATION SHEET 5.14
  - ✓ Provide web link https://www.electrical4u.com/exclusive-or-gate/#What-is-an-XNOR-Gate that explains how to develop XNOR gate truth table
  - ✓ Provide the web link https://www.youtube.com/watch?v=BqtLFTJThaQ that explains how to develop the XNOR gate truth table.
  - ✓ Provide handouts, self-made tutorial video clip, and PPT through google classroom.
  - ✓ Let the learners submit their responses through google classroom or any other relevant social media.

D. **Assessment:**

- **Contact**
  - ✓ Make learners perform and explain OPERATION SHEET 5.14 and use rubric (Available in framework 2020) to assess the learner's conceptual understanding. Provide necessary feedback.
  - ✓ Assess learner's knowledge about XNOR gate by asking questions
  - ✓ Conduct class test to assess their understanding
  - ✓ Let learners carry out activities of SAMPLE SELF CHECK 5.14

- **Non-contact:**
  - ✓ Make learners read INFORMATION SHEET 5.14 and perform OPERATION SHEET 5.14 and ask them to send the video as evidence through google classroom.
  - ✓ Let the learners solve SAMPLE SELF CHECK 5.14 and submit answers through google classroom or any other relevant social media.
  - ✓ Give additional relevant questions from CBLM and other resources-text/ Google/ YouTube and let learners submit answer through google classroom or any other relevant social media

E. **Resources (online and offline):**

- ✓ Competency-Based Learning Materials
- ✓ https://www.youtube.com/watch?v=BqtLFTJThaQ (Explanation on truth table on XNOR gate)
- ✓ https://www.electrical4u.com/exclusive-or-gate/#What-is-an-XNOR-Gate (Explanation on XNOR gate)

Chapter 6: Repairing Home Appliances

A. Learning Objectives / Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
5.1.1 List the types of the water boiler. 5.1.2 Explain the construction and working principle of the water boiler. 5.1.3 Identify and state the function of each component of the water boiler. 5.1.4 Interpret circuit diagram of the water boiler. 5.1.5 Identify the defect of the water boiler. 5.1.6 *Use multimeter.* 5.1.7 *Ensure to store the removed parts safely.* 5.1.8 *Ensure to disconnect the wires properly.* 5.1.9 *Ensure secured connections of electrical wires.* 5.1.10 Repair water boiler	**6.1 Repairing water boiler:**

B. Competencies:

- ✓ Use the component of boilers(thermostat) in other appliances

C. Pedagogy/Learning Experiences

- **Contact**:
  - ✓ Make learners read INFORMATION SHEET 6.1
  - ✓ Provide handouts to learners
  - ✓ Demonstrates on OPERATION SHEET 6.1
  - ✓ Provide guided practice on OPERATION SHEET 6.1
  - ✓ Make learners perform OPERATION SHEET 6.1 individually
  - ✓ Let learners discuss in the group and do presentations on components of water boiler using PPT or handouts.

- **Non-contact:**
  - ✓ Instruct learners to read INFORMATION SHEET 6.1 through google classroom
  - ✓ Provide handouts, self-made tutorial video clip, and PPT through google classroom.
  - ✓ Instruct learners to make PPT on components of the water boiler.
  - ✓ Let the learners submit their responses through google classroom or any other relevant social media.

D. Assessment:

- **Contact:**
  - ✓ Make learners perform and explain OPERATION SHEET 6.1 and use rubric (Available in framework 2020) to assess the learner's conceptual understanding. Provide necessary feedback.
  - ✓ Assess learner's knowledge about water boiler by asking questions
  - ✓ Let learners carry out activities of SAMPLE SELF CHECK 6.1

- **Non-contact:**
  - ✓ Make learners read INFORMATION SHEET 6.1and ask them to send PPT on explaining components of the boiler through google classroom or any other relevant social media platform, used rubrics to assess their understanding.
  - ✓ Let the learners solve SAMPLE SELF CHECK 6.1 and submit answers through google classroom or any other relevant social media.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials
- ✓ Handouts

A. Learning Objectives / Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
6.2.1 List the types of the geyser. 6.2.2 Explain the construction and working principle of geysers. 6.2.3 Identify and state the function of each component of a geyser. 6.2.4 Interpret circuit diagram of a geyser. 6.2.5 Identify the defect of a geyser. *6.2.6 Use multimeter.* *6.2.7 Ensure to store the removed parts safely.* *6.2.8 Ensure to disconnect the wires properly.* *6.2.9 Ensure secured connections of electrical wires.* *6.2.10* Repair geyser	**6.2 Repairing geyser**

B. Competencies:

- ✓ Use the component of the geyser (coil/thermostat) in other appliances

C. Pedagogy/Learning Experiences

- **Contact**:

- ✓ Make learners read INFORMATION SHEET 6.2
- ✓ Provide handouts to learners
- ✓ Demonstrate on OPERATION SHEET 6.2
- ✓ Provide guided practice on OPERATION SHEET 6.2
- ✓ Make learners perform OPERATION SHEET 6.2 individually
- ✓ Let the learners discuss in the group and do presentations on defects/solutions of the geyser and share the information among their peers.

- **Non-contact:**
  - ✓ Instruct learners to read INFORMATION SHEET 6.2
  - ✓ Provide handouts, self-made tutorial video clip, and PPT through google classroom.
  - ✓ Instruct learners to make PPT on defects and its solution of geyser
  - ✓ Let the learners submit their responses through google classroom or any other relevant social media.

D. Assessment:

- **Contact:**
  - ✓ Make learners perform and explain OPERATION SHEET 6.2 and use rubric (Available in framework 2020) to assess the learner's conceptual understanding. Provide necessary feedback.
  - ✓ Assess learner's knowledge about geyser by asking questions
  - ✓ Let learners carry out activities of SAMPLE SELF CHECK 6.2
- **Non-contact:**
  - ✓ Make learners read INFORMATION SHEET 6.2 and ask them to make PPT on defects and their solutions and send through google classroom or any other relevant social media.
  - ✓ Let learners solve SAMPLE SELF CHECK 6.2 and submit answers through google classroom or any other relevant social media.
  - ✓ Give additional relevant questions from CBLM and other resources-text/ Google/ YouTube and let learners submit answers through google classroom or any other relevant social media

E. Resources (online and offline):

- ✓ Handout
- ✓ Competency-Based Learning Materials

A. Learning Objectives / Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
6.3.1 List the types of the washing machine. 6.3.2 Explain the construction and working principle of washing machines. 6.3.3 Identify and state the function of each component of the washing machine. 6.3.4 Interpret circuit diagram of a washing machine. 6.3.5 Identify the defect of a washing machine. *6.3.6 Use multimeter.* *6.3.7 Ensure to store the removed parts safely.* *6.3.8 Ensure to disconnect the wires properly.* *6.3.9 Ensure secured connections of electrical wires.* *6.3.10* Repair washing machine	**6.3 Repairing washing machine**

B. Competencies:

- ✓ Use the components of the washing machine (timer or motor) in other equipment/lighting

C. Pedagogy/Learning Experiences

- **Contact**:
  - ✓ Make learners read INFORMATION SHEET 6.3
  - ✓ Provide handouts to learners
  - ✓ Demonstrates on OPERATION SHEET 6.3
  - ✓ Provide guided practice on OPERATION SHEET 6.3
  - ✓ Make learners perform OPERATION SHEET 6.3 individually
  - ✓ Let the learners discuss in the group and do a presentation on defects of washing machine

- **Non-contact:**
  - ✓ Instruct learners to read INFORMATION SHEET 6.3
  - ✓ Provide handouts, self-made tutorial video clip, and PPT through google classroom.
  - ✓ Instruct learners to make PPT on defects and its solution of the washing machine.
  - ✓ Let the learners submit their responses through google classroom or any other relevant social media.

D. Assessment:

- **Contact:**
  - ✓ Make learners perform and explain OPERATION SHEET 6.3 and use rubric (Available in framework 2020) to assess the learner's conceptual understanding. Provide necessary feedback.
  - ✓ Assess learner's knowledge about washing machine by asking questions
  - ✓ Let learners carry out activities of SAMPLE SELF CHECK 6.3

- **Non-contact:**
  - ✓ Make learners read INFORMATION SHEET 6.3 and ask them to make PPT on defects and its solution of washing machine and through google classroom or any other relevant social media.
  - ✓ Let learners solve SAMPLE SELF CHECK 6.3 and submit answers through google classroom or any other relevant social media.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials
- ✓ Handouts

A. Learning Objectives / Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
6.4.1 List types of the electric iron. 6.4.2 Explain the construction and working principle of an electric iron. 6.4.3 Identify and state the function of each component of the electric iron. 6.4.4 Interpret circuit diagram of an electric iron. 6.4.5 Identify the defect of an electric iron. *6.4.6 Use multimeter.* *6.4.7 Ensure to store the removed parts safely.* *6.4.8 Ensure to disconnect the wires properly.* 6.4.9 *Ensure secured connections of electrical wires.* 6.4.10 Repair electric iron	**6.4 Repairing electric iron**

B. Competencies:

- ✓ Use the components of electric iron (thermostat) in other appliances

C. Pedagogy/Learning Experiences

- **Contact**:
  - ✓ Make learners read INFORMATION SHEET 6.4

- ✓ Provide handouts to learners
- ✓ Provide the web link https://fixitclub.com/small-appliances-repairs/electric-iron-repair/ with learners which explains the procedure to repair electric heater
- ✓ Demonstrates on OPERATION SHEET 6.4
- ✓ Provide guided practice on OPERATION SHEET 6.4
- ✓ Make learners perform OPERATION SHEET 6.4 individually

- **Non-contact:**
  - ✓ Instruct learners to read INFORMATION SHEET 6.4
  - ✓ Provide a web link https://fixitclub.com/small-appliances-repairs/electric-iron-repair/ with learners which explains the procedure to repair electric heater.
  - ✓ Provide handouts, self-made tutorial video clip, and PPT through google classroom.
  - ✓ Let the learners submit their responses through google classroom or any other relevant social media.

D. Assessment:

- **Contact:**
  - ✓ Make learners perform and explain OPERATION SHEET 6.4 and use rubric (Available in framework 2020) to assess the learner's conceptual understanding. Provide necessary feedback.
  - ✓ Assess learner's knowledge about washing electric heater by asking questions
  - ✓ Let learners carry out activities of SAMPLE SELF CHECK 6.4

- **Non-contact:**
  - ✓ Let learners solve SAMPLE SELF CHECK 6.4 and submit answers through google classroom or any other relevant social media.
  - ✓ Give additional relevant questions from CBLM and other resources-text/ Google/ YouTube and let learners submit answer through google classroom or any other relevant social media

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials
- ✓ Handouts
- ✓ https://fixitclub.com/small-appliances-repairs/electric-iron-repair/(Procedure to repair electric iron)

A. Learning Objectives / Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
6.5.1 List the types of curry cookers. 6.5.2 Explain the construction and working principle of curry cookers. 6.5.3 Interpret circuit diagram of curry cooker. *6.5.4* Identify the defect of the curry cooker. *6.5.5 Use multimeter.* *6.5.6 Ensure to store the removed parts safely.* *6.5.7 Ensure to disconnect the wires properly.* 6.5.8 *Ensure secured connections of electrical wires* 6.5.9 Repair curry cooker	**6.5 Repairing curry cooker**

B. Competencies:

- ✓ Use the component of curry cooker(thermostat) in other appliances

C. Pedagogy/Learning Experiences

- **Contact**:
  - ✓ Make learners read INFORMATION SHEET 6.5
  - ✓ Provide handouts to learners
  - ✓ Demonstrate on OPERATION SHEET 6.5
  - ✓ Provide guided practice on OPERATION SHEET 6.5
  - ✓ Make learners perform OPERATION SHEET 6.5 individually

- **Non-contact:**
  - ✓ Instruct learners to read INFORMATION SHEET 6.5
  - ✓ Provide a web link https://www.youtube.com/watch?v=_f2umEYIi5w with learners which explains how to repair curry cooker
  - ✓ Provide handouts, self-made tutorial video clip, and PPT through google classroom.
  - ✓ Instruct learners to make a video explaining components of the curry cooker
  - ✓ Let the learners submit their responses through google classroom or any other relevant social media.

D. Assessment:

- **Contact:**
  - ✓ Make learners perform and explain OPERATION SHEET 6.5 and use rubric (Available in framework 2020) to assess the learner's conceptual understanding. Provide necessary feedback.

- ✓ Assess learner's knowledge about washing electric heater by asking questions
- ✓ Conduct class test to assess learner understanding
- ✓ Let learners carry out activities of SAMPLE SELF CHECK 6.5

- **Non-contact:**
  - ✓ Make learners read INFORMATION SHEET 6.5 and ask them to send video as evidence through google classroom or any other relevant social media.
  - ✓ Let learners solve SAMPLE SELF CHECK 6.5 and submit answers through google classroom or any other relevant social media.
  - ✓ Give additional relevant questions from CBLM and other resources-text/ Google/ YouTube and let learners submit answer through google classroom or any other relevant social media

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials
- ✓ Handout
- ✓ https://www.youtube.com/watch?v=_f2umEYIi5w (Repairing of curry cooker

A. Learning Objectives / Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
6.6.1 List the types of the rice cooker. 6.6.2 Explain the construction and working principle of the rice cooker. 6.6.3 Identify and state the function of each component of the rice cooker. 6.6.4 Interpret circuit diagram of a rice cooker. 6.6.5 Identify the defect of a rice cooker. *6.6.6 Use multimeter.* *6.6.7 Ensure to store the removed parts safely.* *6.6.8 Ensure to disconnect the wires properly.* 6.6.9 *Ensure secured connections of electrical wires.* 6.6.10 Repair rice cooker	**6.6 Repairing rice cooker**

B. Competencies:

- ✓ Use the component of the rice cooker (thermostat) in other appliances

C. Pedagogy/Learning Experiences

Contact:

- ✓ Make learners read INFORMATION SHEET 6.6
- ✓ Provide handouts to learners
- ✓ Demonstrate on OPERATION SHEET 6.6
- ✓ Provide guided practice on OPERATION SHEET 6.6
- ✓ Make learners perform OPERATION SHEET 6.6 individually

- **Non-contact:**
  - ✓ Instruct learners to read INFORMATION SHEET 6.6
  - ✓ Provide a web link https://www.youtube.com/watch?v=n6MSrrPfFo4 with learners which explains how to repair rice cooker
  - ✓ Provide handouts, self-made tutorial video clip, and PPT through google classroom.
  - ✓ Instruct learners to make a video explaining the components of the rice cooker.
  - ✓ Let the learners submit their responses through google classroom or any other relevant social media.

D. Assessment:

- **Contact:**
  - ✓ Make learners perform and explain OPERATION SHEET 6.6 and use rubric (Available in framework 2020) to assess the learner's conceptual understanding. Provide necessary feedback.
  - ✓ Assess learner's knowledge about washing electric heater by asking questions
  - ✓ Let learners carry out activities of SAMPLE SELF CHECK 6.6

- **Non-contact:**
  - ✓ Make learners read INFORMATION SHEET 6.6 and ask them to send video as evidence through google classroom or any other relevant social media.
  - ✓ Let learners solve SAMPLE SELF CHECK 6.6 and submit answers through google classroom or any other relevant social media.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials
- ✓ Handouts
- ✓ https://www.youtube.com/watch?v=n6MSrrPfFo4 **(**Explanation on repairing of rice cooker)

A. Learning Objectives / Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
6.7.1 Explain the construction and working principle of a ceiling fan. 6.7.2 Identify and state the function of each component of a ceiling fan. 6.7.3 Interpret circuit diagram of a ceiling fan. 6.7.4 Identify the defect of a ceiling fan. *6.7.5 Use multimeter.* *6.7.6 Ensure to store the removed parts safely.* *6.7.7 Ensure to disconnect the wires properly.* 6.7.8 *Ensure secured connections of electrical wires.* 6.7.9 *Repair ceiling fan*	**6.7 Repairing ceiling fan**

B. Competencies:

- ✓ Use the component of ceiling fan (capacitor) in other appliances

C. Pedagogy/Learning Experiences

- **Contact**:
  - ✓ Make learners read INFORMATION SHEET 6.7
  - ✓ Provide handouts to learners
  - ✓ Demonstrate on OPERATION SHEET 6.7
  - ✓ Provide guided practice on OPERATION SHEET 6.7
  - ✓ Make learners perform OPERATION SHEET 6.7 individually
  - ✓ Let learners discuss in the group and do the presentation on components of the ceiling fan.

- **Non-contact:**
  - ✓ Instruct learners to read INFORMATION SHEET 6.6
  - ✓ Provide a web link https://www.youtube.com/watch?v=n6MSrrPfFo4 with learners which explains how to repair rice cooker
  - ✓ Provide handouts, self-made tutorial video clip, and PPT through google classroom.
  - ✓ Instruct learners to make handouts on components of the ceiling fan.
  - ✓ Let the learners submit their responses through google classroom or any other relevant social media.

D. Assessment:

- **Contact:**
  - ✓ Make learners perform and explain OPERATION SHEET 6.7 and use rubric (Available in framework 2020) to assess the learner's conceptual understanding. Provide necessary feedback.
  - ✓ Assess learner's knowledge about washing electric heater by asking questions
  - ✓ Conduct class test
  - ✓ Let learners carry out activities of SAMPLE SELF CHECK 6.7

- **Non-contact:**
  - ✓ Make learners read INFORMATION SHEET 6.7 and ask them to send a handout through google classroom or any other social media.
  - ✓ Let learners solve SAMPLE SELF CHECK 6.7 and submit answers through google classroom or any other relevant social media.
  - ✓ Give additional relevant questions from CBLM and other resources-text/ Google/ YouTube and let learners submit answer through google classroom or any other relevant social media

E. Resources (online and offline):

- ✓ Handouts
- ✓ Textbook(CBLM for class XI)

A. Learning Objectives / Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
6.8.1 List the types of the electric heater. 6.8.2 Explain the construction and work principle of an electric heater. 6.8.3 Identify and state the function of each component of an electric heater. 6.8.4 Interpret circuit diagram of an electric heater. *6.8.5 Use multimeter.* *6.8.6 Ensure to store the removed parts safely.* *6.8.7 Ensure to disconnect the wires properly.* 6.8.8 *Ensure secured connections of electrical wires.* 6.8.9 *Repair electric heater*	**6.8 Repair electric heater**

B. Competencies:

- ✓ Use the components of the electric heater (coil) in other appliances

C. Pedagogy/Learning Experiences

- **Contact**:
  - ✓ Make learners read INFORMATION SHEET 6.8
  - ✓ Provide handouts to learners
  - ✓ Demonstrate on OPERATION SHEET 6.8
  - ✓ Provide guided practice on OPERATION SHEET 6.8
    Make learners perform OPERATION SHEET 6.8 individually

- **Non-contact:**
  - ✓ Instruct learners to read INFORMATION SHEET 6.6
  - ✓ Provide handouts, self-made tutorial video clip, and PPT through google classroom.
  - ✓ Let the learners submit their responses through google classroom or any other relevant social media.

D. Assessment:

- **Contact:**
  - ✓ Make learners perform and explain OPERATION SHEET 6.8 and use rubric (Available in framework 2020) to assess the learner's conceptual understanding. Provide necessary feedback.
  - ✓ Assess learners response to SAMPLE SELF CHECK 6.8
  - ✓ Assess learner's knowledge about washing electric heater by asking questions

- **Non-contact:**
  - ✓ Assess learner response of SAMPLE SELF CHECK 6.8 and submit answer through google classroom or any other relevant social media.
  - ✓ Give additional relevant questions from CBLM and other resources-text/ Google/ YouTube and let learners submit answer through google classroom or any other relevant social media

E. Resources (online and offline):

- ✓ Handout
- ✓ Competency-Based Learning

Chapter 7: Installing Solar PV system

A. Learning Objectives / Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
7.1.1 Define Photovoltaic. 7.1.2 List types of PV panels. 7.1.3 Explain the construction of the PV panel.	**7.1 Measuring Photovoltaic (PV) panel output**

7.1.4 State the applications of PV panels. 7.1.5 Calculate the power rating of the PV panel. 7.1.6 State the purpose of measuring Voc and Isc. 7.1.7 Explain the efficiency of panel output. *7.1.8 Use multimeter.* *7.1.9 Ensure safe handling of PV panels.* 7.1.10 *Ensure to select the correct range of multimeter.* 7.1.11 *Measure output PV panel output*	

B. Competencies:

- ✓ Measure output PV panel output to determine if V_{oc} and I_{sc} match with the PV panel rating.

C. Pedagogy/Learning Experiences

- **Contact**:
  - ✓ Make learners read INFORMATION SHEET 7.1
  - ✓ Provide handouts
  - ✓ Provide web link https://www.youtube.com/watch?v=s5qlA1R2WrI with learners which explains how to calculate power rating of PV panel
  - ✓ Demonstrate on OPERATION SHEET 7.1
  - ✓ Provide guided practice on OPERATION SHEET 7.1
  - ✓ Make learners perform OPERATION SHEET 7.1 individually

- **Non-contact:**
  - ✓ Instruct learners to read INFORMATION SHEET 7.1
  - ✓ Provide a web link https://www.greenmatch.co.uk/blog/2015/09/types-of-solar-panels that explains different types of PV panel
  - ✓ Share web links that explain the construction of https://www.youtube.com/watch?v=sXcsKzJylrA PV panel
  - ✓ Provide a web link https://www.youtube.com/watch?v=s5qlA1R2WrI with learners that explains how to calculate the power rating of PV panel
  - ✓ Provide handouts, self-made tutorial video clip, and PPT through google classroom.
  - ✓ Let the learners submit their responses through google classroom or any other relevant social media.

D. Assessment:

- **Contact:**
  - ✓ Make learners perform and explain OPERATION SHEET 7.1and use rubric (Available in framework 2020) to assess the learner's conceptual understanding. Provide necessary feedback.

- ✓ Assess learner's knowledge about washing electric heater by asking questions
- ✓ Let learners carry out activities of SAMPLE SELF CHECK 7.1

- **Non-contact:**
  - ✓ Let learners solve SAMPLE SELF CHECK 7.1 and submit answers through google classroom or any other relevant social media.
  - ✓ Give additional relevant questions from CBLM and other resources-text/ Google/ YouTube and let learners submit answer through google classroom or any other relevant social media

E. Resources (online and offline):

- ✓ Handouts
- ✓ Competency-Based Learning Materials
- ✓ https://www.greenmatch.co.uk/blog/2015/09/types-of-solar-panels (Different types of solar panel)
- ✓ https://www.youtube.com/watch?v=sXcsKzJylrA (Construction of PV panel)
- ✓ https://www.youtube.com/watch?v=s5qlA1R2WrI(Calculation of power rating)

Chapter 7: Installing a solar PV system

A. Learning Objectives / Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
7.2.1 List the methods of creating artificial weather. 7.2.2 State the purpose of measuring PV output under different weather conditions. *7.2.3 Use multimeter.* *7.2.4 Ensure safe handling of PV panels.* 7.2.5 *Ensure to select the correct range of multimeter.* 7.2.6 *Measure the output of PV panel under different weather conditions*	**7.2 Measuring the output of PV panel under the different weather condition**

B. Competencies:

- ✓ Assess the PV panel output under different weather conditions

C. Pedagogy/Learning Experiences

- **Contact**:
  - ✓ Make learners read INFORMATION SHEET 7.2
  - ✓ Provide handouts to learners

- ✓ Demonstrate on OPERATION SHEET 7.2
- ✓ Provide guided practice on OPERATION SHEET 7.2
- ✓ Make learners perform OPERATION SHEET 7.2 individually

- **Non-contact:**
  - ✓ Instruct learners to read INFORMATION SHEET 7.1
  - ✓ Provide a web link https://greencoast.org/solar-panels-and-weather/ to learners which explains how different weather conditions effects PV panel output
  - ✓ Provide handouts, self-made tutorial video clip, and PPT through google classroom.
  - ✓ Let the learners submit their responses through google classroom or any other relevant social media.

D. Assessment:

- **Contact:**
  - ✓ Make learners perform and explain OPERATION SHEET 7.2and use rubric (Available in framework 2020) to assess the learner's conceptual understanding. Provide necessary feedback.
  - ✓ Assess learner's knowledge about PV panel under different weather conditions by asking questions
  - ✓ Let learners carry out activities of SAMPLE SELF CHECK 7.2

- **Non-contact:**
  - ✓ Let learners solve SAMPLE SELF CHECK 7.2 and submit answers through google classroom or any other relevant social media.
  - ✓ Give additional relevant questions from CBLM and other resources-text/ Google/ YouTube and let learners submit answer through google classroom or any other relevant social media

E. Resources (online and offline):

- ✓ Handouts
- ✓ Competency-Based Learning Materials
- ✓ https://greencoast.org/solar-panels-and-weather/ (Output of PV panel under different weather conditions)

A. Learning Objectives / Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
7.3.1 State the purpose of measuring PV output under different inclinations. *7.3.2 Use inclinometer.* *7.3.3 Use multimeter.*	**7.3 Measuring the output of PV panel under the different inclination**

7.3.4 Ensure safe handling of PV panels. 7.3.5 *Ensure to select the correct range of multimeter.* 7.3.6 *Measure the output of PV panel under different inclinations*	

B. Competencies:

✓ Measure the output of PV panel under different inclination **to** find out the best inclination angle to obtain maximum output.

C. Pedagogy/Learning Experiences

- **Contact**:
  - ✓ Make learners read INFORMATION SHEET 7.3
  - ✓ Provide handouts to learners
  - ✓ Demonstrate on OPERATION SHEET 7.3
  - ✓ Provide guided practice on OPERATION SHEET 7.3
  - ✓ Make learners perform OPERATION SHEET 7.3 individually

- **Non-contact:**
  - ✓ Instruct learners to read INFORMATION SHEET 7.3
  - ✓ Provide handouts, self-made tutorial video clip, and PPT through google classroom.
  - ✓ Let the learners submit their responses through google classroom or any other relevant social media.

D. Assessment:

- **Contact:**
  - ✓ Make learners perform and explain OPERATION SHEET 7.3 and use rubric (Available in framework 2020) to assess the learner's conceptual understanding. Provide necessary feedback.
  - ✓ Assess learner's knowledge about PV panel under different weather conditions by asking questions
  - ✓ Let learners carry out activities of SAMPLE SELF CHECK 7.3

- **Non-contact:**
  - ✓ Let learners solve SAMPLE SELF CHECK 7.3 and submit answers through google classroom or any other relevant social media.
  - ✓ Give additional relevant questions from CBLM and other resources-text/ Google/ YouTube and let learners submit answer through google classroom or any other relevant social media

E. Resources (online and offline):

- ✓ Handout
- ✓ Competency-Based Learning Materials for class XI

A. Learning Objectives / Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
7.4.1 State the purpose of measuring PV output under different directions. *7.4.2 Use a magnetic compass.* *7.4.3 Use multimeter.* *7.4.4 Ensure safe handling of PV panels.* *7.4.5 Ensure to select the correct range of multimeter.* *7.4.6 Measure the output of PV panel in different directions*	**7.4 Measuring the output of PV panel in different directions**

B. Competencies:

- ✓ Measure the output of the PV panel in different directions to find out the best direction to obtain maximum output

C. Pedagogy/Learning Experiences

- **Contact**:
  - ✓ Make learners read INFORMATION SHEET 7.4
  - ✓ Provide handouts to learners
  - ✓ Demonstrate on OPERATION SHEET 7.4
  - ✓ Provide guided practice on OPERATION SHEET 7.4
  - ✓ Make learners perform OPERATION SHEET 7.4 individually

- **Non-contact:**
  - ✓ Instruct learners to read INFORMATION SHEET 7.4
  - ✓ Provide handouts, self-made tutorial video clip, and PPT through google classroom.
  - ✓ Let the learners submit their responses through google classroom or any other relevant social media.

D. Assessment:

- **Contact:**
  - ✓ Make learners perform and explain OPERATION SHEET 7.4 and use rubric (Available in framework 2020) to assess the learner's conceptual understanding. Provide necessary feedback.
  - ✓ Assess learner's knowledge about PV panel under different inclinations by asking questions
  - ✓ Let learners carry out activities of SAMPLE SELF CHECK 7.4

- **Non-contact:**
  - ✓ Let learners solve SAMPLE SELF CHECK 7.4 and submit answers through google classroom or any other relevant social media.
  - ✓ Give additional relevant questions from CBLM and other resources-text/ Google/ YouTube and let learners submit answer through google classroom or any other relevant social media

E. Resources (online and offline):

- ✓ Handout
- ✓ Competency-Based Learning Materials

A. Learning Objectives / Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
7.5.1 State the purpose of connecting PV panels in series. *7.5.2 Use multimeter.* *7.5.3 Ensure safe handling of PV panels.* 7.5.4 *Ensure to select the correct range of multimeter.* 7.5.5 Verify the characteristics of PV panel connected in series	**7.5 Verifying the characteristics of PV panel connected in series**

B. Competencies:

- ✓ Verify the characteristics of the PV panel connected in series **t**o increase the output voltage of the PV array

C. Pedagogy/Learning Experiences

- **Contact**:
  - ✓ Make learners read INFORMATION SHEET 7.5
  - ✓ Provide handouts
  - ✓ Demonstrate on OPERATION SHEET 7.5
  - ✓ Provide guided practice on OPERATION SHEET 7.5
  - ✓ Make learners perform OPERATION SHEET 7.5 individually

- **Non-contact:**
  - ✓ Instruct learners to read INFORMATION SHEET 7.5
  - ✓ Provide web link https://www.alternative-energy-tutorials.com/solar-power/pv-panel.html with learners which explains the panel connected in series.
  - ✓ Provide handouts, self-made tutorial video clip, and PPT through google classroom.

- ✓ Let the learners submit their responses through google classroom or any other relevant social media.

D. Assessment:

- **Contact:**
  - ✓ Make learners perform and explain OPERATION SHEET 7.5 and use rubric (Available in framework 2020) to assess the learner's conceptual understanding. Provide necessary feedback.
  - ✓ Assess learner's knowledge about PV panel connected in series by asking questions
  - ✓ Let learners carry out activities of SAMPLE SELF CHECK 7.5

- **Non-contact:**
  - ✓ Let learners solve SAMPLE SELF CHECK 7.5and submit answers through google classroom or any other relevant social media.
  - ✓ Give additional relevant questions from CBLM and other resources-text/ Google/ YouTube and let learners submit answer through google classroom or any other relevant social media

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials
- ✓ https://www.alternative-energy-tutorials.com/solar-power/pv-panel.html (Explanation on Panel connected in series)

A. Learning Objectives / Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
7.6.1 State the purpose of connecting PV panels in parallel. *7.6.2 Use multimeter.* *7.6.3 Ensure safe handling of PV panels.* 7.6.4 *Ensure to select the correct range of multimeter.* 7.6.5 *Verify the characteristics of PV panel connected in parallel*	**7.6 Verifying the characteristics of PV panel connected in parallel**

B. Competencies:

- ✓ Verify the characteristics of PV panels connected in parallel to increase the output current and ampere-hour of the PV array.

C. Pedagogy/Learning Experiences

- **Contact**:
  - ✓ Make learners read INFORMATION SHEET 7.6

- ✓ Provide handouts
- ✓ Demonstrate on OPERATION SHEET 7.6
- ✓ Provide guided practice on OPERATION SHEET 7.6
- ✓ Make learners perform OPERATION SHEET 7.6 individually

- **Non-contact:**
  - ✓ Instruct learners to read INFORMATION SHEET 7.5
  - ✓ Provide web link https://www.alternative-energy-tutorials.com/solar-power/pv-panel.html with learners which explains the panel connected in parallel.
  - ✓ Provide handouts, self-made tutorial video clip, and PPT through google classroom.
  - ✓ Let the learners submit their responses through google classroom or any other relevant social media.

D. Assessment:

- **Contact:**
  - ✓ Make learners perform and explain OPERATION SHEET 7.6 and use rubric (Available in framework 2020) to assess the learner's conceptual understanding. Provide necessary feedback.
  - ✓ Assess learner's knowledge about PV panel connected in parallel by asking questions
  - ✓ Let learners carry out activities of SAMPLE SELF CHECK 7.6

- **Non-contact:**
  - ✓ Let learners solve SAMPLE SELF CHECK 7.6 and submit answers through google classroom or any other relevant social media.
  - ✓ Give additional relevant questions from CBLM and other resources-text/ Google/ YouTube and let learners submit answer through google classroom or any other relevant social media

E. Resources (online and offline):

- ✓ Competency-Based Learning material for class XI
- ✓ Handouts
- ✓ https://www.alternative-energy-tutorials.com/solar-power/pv-panel.html (Panel connection in parallel)

A. Learning Objectives / Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
7.7.1 Define solar battery. 7.7.2 List types of battery. 7.7.3 State the function of the solar battery. 7.7.4 State the characteristics of the battery. 7.7.5 Explain the characteristics of the charging and discharging rate of the battery. 7.7.6 State the difference between the car battery and solar battery 7.7.7 Calculate battery capacity of amperes hours. 7.7.8 Calculate the Ampere hour (Ah) capacity of the battery. *7.7.9 Use hydrometer.* *7.7.10 Use multimeter.* *7.7.11 Ensure safe handling of solar battery.* 7.7.12 *Ensure to select the correct range of multimeter.* 7.7.13 Install solar battery	**7.7 Installing solar battery**

B. Competencies:

- ✓ Install the solar battery in Solar Housing System

C. Pedagogy/Learning Experiences

- **Contact**:
  - ✓ Make learners read INFORMATION SHEET 7.7
  - ✓ Provide handouts to learners
  - ✓ Demonstrate on OPERATION SHEET 7.7
  - ✓ Provide guided practice on OPERATION SHEET 7.7
  - ✓ Make learners perform OPERATION SHEET 7.7 individually

- **Non-contact:**
  - ✓ Instruct learners to read INFORMATION SHEET 7.7
  - ✓ Provide the web link https://www.youtube.com/watch?v=cgEvCLJuBkgwith learners which explains solar battery.
  - ✓ Provide handouts, self-made tutorial video clip, and PPT through google classroom.
  - ✓ Let the learners submit their responses through google classroom or any other relevant social media.

D. Assessment:

- **Contact:**
  - ✓ Make learners perform and explain OPERATION SHEET 7.7 and use rubric (Available in framework 2020) to assess the learner's conceptual understanding. Provide necessary feedback.
  - ✓ Assess learner's knowledge about Solar battery by asking questions
  - ✓ Let learners carry out activities of SAMPLE SELF CHECK 7.7

- **Non-contact:**
  - ✓ Let learners solve SAMPLE SELF CHECK 7.7 and submit answers through google classroom or any other relevant social media.
  - ✓ Give additional relevant questions from CBLM and other resources-text/ Google/ YouTube and let learners submit answer through google classroom or any other relevant social media

E. Resources (online and offline):

- ✓ Competency-based Learning Materials for class XI
- ✓ https://www.youtube.com/watch?v=cgEvCLJuBkg (Installation of solar battery)

A. Learning Objectives / Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
7.8.1 List types of a mounting PV panel. 7.8.2 List panel mounting rules. 7.8.3 Calculate system sizing. 7.8.4 *Ensure safe handling of PV panels.* *7.8.5 Use multimeter.* *7.8.6 Ensure safe handling of PV panels.* 7.8.7 *Ensure to select the correct range of multimeter.* 7.8.8 *Install PV panel*	**7.8 Installing PV panel**

B. Competencies:

- ✓ Install PV panel in Solar Housing System (SHS)

C. Pedagogy/Learning Experiences

- **Contact**:
  - ✓ Make learners read INFORMATION SHEET 7.8
  - ✓ Provide web link https://ww w.youtube.com/watch?v=ailIMRL2VL4 with learners which explains how to install PV panel
  - ✓ Provide handouts

- ✓ Demonstrate on OPERATION SHEET 7.8
- ✓ Provide guided practice on OPERATION SHEET 7.8
- ✓ Make learners perform OPERATION SHEET 7.8 individually

- **Non-contact:**
  - ✓ Instruct learners to read INFORMATION SHEET 7.8
  - ✓ Provide web link https://www.youtube.com/watch?v=ailIMRL2VL4learners which explains how to install PV panel
  - ✓ Provide handouts, self-made tutorial video clip, and PPT through google classroom.
  - ✓ Let the learners submit their responses through google classroom or any other relevant social media.

D. **Assessment:**

- **Contact:**
  - ✓ Make learners perform and explain OPERATION SHEET 7.8 and use rubric (Available in framework 2020) to assess the learner's conceptual understanding. Provide necessary feedback.
  - ✓ Assess learner's knowledge about PV panel by asking questions
  - ✓ Let learners carry out activities of SAMPLE SELF CHECK 7.8

- **Non-contact:**
  - ✓ Let learners solve SAMPLE SELF CHECK 7.8 and submit answers through google classroom or any other relevant social media.
  - ✓ Give additional relevant questions from CBLM and other resources-text/ Google/ YouTube and let learners submit answer through google classroom or any other relevant social media

E. **Resources (online and offline):**

- ✓ Handouts
- ✓ Competency-Based Learning Materials
- ✓ https://www.youtube.com/watch?v=ailIMRL2VL4 (Installation of PV panel)

A. Learning Objectives / Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
7.9.1 List types of controller. 7.9.2 Explain the characteristics of the controller. 7.9.3 List advantages and disadvantages of the controller. 7.9.4 Explain causes of controller failure. 7.9.5 State the types of controllers. 7.9.6 Explain the characteristics of the controller. 7.9.7 State the advantages and disadvantages of the controller. 7.9.8 Explain the causes of controller failure. *7.9.9 Ensure safe handling of the controller.* *7.9.10 Use multimeter.* *7.9.11 Ensure safe handling of the controller.* 7.9.12 *Ensure to select the correct range of multimeter.* 7.9.13 Install controller	**7.9 Installing controller**

B. Competencies:

- ✓ Install controller in Solar Housing System (SHS)

C. Pedagogy/Learning Experiences

- **Contact**:

✓ Make learners read INFORMATION SHEET 7.9

✓ Provide web link https://www.elprocus.com/solar-charge-controller/#:~:text=This%20system%20consists%20of%204,diode%20to%20the%20MOSFET%20switch with learners which explains about the function of solar controller

✓ Provide handouts

✓ Demonstrate on OPERATION SHEET 7.9

✓ Provide guided practice on OPERATION SHEET 7.9

✓ Make learners perform OPERATION SHEET 7.9individually

- **Non-contact:**

✓ Instruct learners to read INFORMATION SHEET 7.9

✓ Provide web link https://www.elprocus.com/solar-charge-controller/#:~:text=This%20system%20consists%20of%204,diode%20to%20the%20MOSFET%20switch with learners which explains functions and types of solar controller.

✓ Provide web link https://www.youtube.com/watch?v=UJVVcpVFvbw with learners which explains how to install the solar controller.

- ✓ Provide handouts, self-made tutorial video clip, and PPT through google classroom.
- ✓ Let the learners submit their responses through google classroom or any other relevant social media.

D. **Assessment:**

- **Contact:**
  - ✓ Make learners perform and explain OPERATION SHEET 7.9and use rubric (Available in framework 2020) to assess the learner's conceptual understanding. Provide necessary feedback.
  - ✓ Assess learner's knowledge about solar controller by asking questions
  - ✓ Let learners carry out activities of SAMPLE SELF CHECK 7.9

- **Non-contact:**
  - ✓ Let learners solve SAMPLE SELF CHECK 7.9 and submit answers through google classroom or any other relevant social media.
  - ✓ Give additional relevant questions from CBLM and other resources-text/ Google/ YouTube and let learners submit answer through google classroom or any other relevant social media

E. Resources (online and offline):

- ✓ Handouts
- ✓ Competency-Based Learning Materials for class XI
- ✓ https://www.elprocus.com/solar-charge-controller/#:~:text=This%20system%20consists%20of%204,diode%20to%20the%20MOSFET%20switch. (Explanation of solar controller)
- ✓ https://www.youtube.com/watch?v=UJVVcpVFvbw (Installation of controller)

A. Learning Objectives / Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
7.10.1 State the purpose of the inverter. 7.10.2 List types of the inverter. *7.10.3* ***Use multimeter****.* *7.10.4 Ensure safe handling of inverter panels.* 7.10.5 *Ensure to select the correct range of multimeter.* 7.10.6 *Install inverter*	**7.10 Installing inverter**

B. Competencies:

- ✓ Install inverter in Solar Housing System (SHS)

C. Pedagogy/Learning Experiences

- **Contact**:

✓ Make learners read INFORMATION SHEET 7.10
✓ Provide handouts to learners
✓ Demonstrate on OPERATION SHEET 7.10
✓ Provide guided practice on OPERATION SHEET 7.10
✓ Make learners perform OPERATION SHEET 7.10 individually

- **Non-contact:**

✓ Instruct learners to read INFORMATION SHEET 7.10
✓ Provide web link https://www.solarpowerworldonline.com/2016/05/different-types-solar-inverters/ or learners which explain different types of solar inverter
✓ Provide web link https://www.youtube.com/watch?v=x-05gKrdg3U with learners which explains how to install the solar inverter.
✓ Provide handouts, self-made tutorial video clip, and PPT through google classroom.
✓ Let the learners submit their responses through google classroom or any other relevant social media.

D. Assessment:

- **Contact:**

✓ Make learners perform and explain OPERATION SHEET 7.10 and use rubric (Available in framework 2020) to assess the learner's conceptual understanding. Provide necessary feedback.
✓ Assess learner's knowledge about solar inverter by asking questions
✓ Let learners carry out activities of SAMPLE SELF CHECK 7.10

- **Non-contact:**

✓ Let learners solve SAMPLE SELF CHECK 7.10 and submit answers through google classroom or any other relevant social media.
✓ Give additional relevant questions from CBLM and other resources-text/ Google/ YouTube and let learners submit answer through google classroom or any other relevant social media

E. Resources (online and offline):

✓ Handouts
✓ Competency-Based Learning Materials for class XI
✓ https://www.youtube.com/watch?v=x-05gKrdg3U(Installation of the inverter)
✓ https://www.solarpowerworldonline.com/2016/05/different-types-solar-inverters/ (Different types of the inverter)

MODULE 2: Domestic and Commercial building wiring

Chapter 1: Preparing for electrical wiring
A. Learning Objectives / Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
8.1.1 List type of tools used for electrical work. 8.1.2 Identify materials used for electrical work. 8.1.3 Identify equipment used for electrical work. 8.1.4 State specifications for tools, equipment and materials 8.1.5 *Ensure safe handling of tools, materials and equipment.* 8.1.6 *Ensure safe storage of tools, materials and equipment* 8.1.7 *Select tools, materials and equipment*	**1.1 Selecting tools, materials, and equipment**

B. Competencies:

- ✓ Use the correct tool, materials and equipment for a specific task.

C. Pedagogy/Learning Experiences

- **Contact**:
  - ✓ Make learners read INFORMATION SHEET 1.1
  - ✓ Provide handouts to learners
  - ✓ Demonstrate on OPERATION SHEET 1.1
  - ✓ Provide guided practice on OPERATION SHEET 1.1
  - ✓ Make learners perform OPERATION SHEET 1.1 individually

- **Non-contact:**
  - ✓ Instruct learners to read INFORMATION SHEET 1.1
  - ✓ Provide handouts, self-made tutorial video clip, and PPT through google classroom.
  - ✓ Let the learners submit their responses through google classroom or any other relevant social media.

D. **Assessment:**

- **Contact:**
  - ✓ Make learners perform and explain OPERATION SHEET 1.1 and use rubric (Available in framework 2020) to assess the learner's conceptual understanding. Provide necessary feedback.
  - ✓ Assess learner's knowledge about solar inverter by asking questions
  - ✓ Let learners carry out activities of SAMPLE SELF CHECK 1.1

- **Non-contact:**
  - ✓ Let learners solve SAMPLE SELF CHECK 1.1 and submit answers through google classroom or any other relevant social media.
  - ✓ Give additional relevant questions from CBLM and other resources-text/ Google/ YouTube and let learners submit answer through google classroom or any other relevant social media

E. Resources (online and offline):

- ✓ Handouts
- ✓ Competency-Based Learning Materials

A. Learning Objectives / Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
8.2.1 Define estimation. 8.2.2 Explain the purpose of estimation and costing. 8.2.3 Calculate the cost estimate for electrical work. 8.2.4 Study the price list for electrical as per the Bhutan Schedule of Rate (BSR). 8.2.5 Prepare the bill of quantity (BOQ). 8.2.6 *Ensure safe handling of materials.* 8.2.7 *Ensure to refer BSR.* 8.2.8 *Estimate materials*	**1.2 Estimating materials**

B. Competencies:

- ✓ Estimate materials to allocate budget and mobilize resources.

C. Pedagogy/Learning Experiences

- **Contact**:
  - ✓ Make learners read INFORMATION SHEET 1.2
  - ✓ Provide handouts to learners
  - ✓ Demonstrate on OPERATION SHEET 1.2
  - ✓ Provide guided practice on OPERATION SHEET 1.2
  - ✓ Make learners perform OPERATION SHEET 1.2 individually

- **Non-contact**
  - ✓ Instruct learners to read INFORMATION SHEET 1.2
  - ✓ Provide handouts, self-made tutorial video clip, and PPT through google classroom.
  - ✓ Let the learners submit their responses through google classroom or any other relevant social media.

D. Assessment:

- **Contact:**
  - ✓ Make learners perform and explain OPERATION SHEET 1.2and use rubric (Available in framework 2020) to assess the learner's conceptual understanding. Provide necessary feedback.
  - ✓ Assess learner's knowledge about solar inverter by asking questions
  - ✓ Let learners carry out activities of SAMPLE SELF CHECK 1.2

- **Non-contact:**
  - ✓ Let learners solve SAMPLE SELF CHECK 1.2 and submit answers through google classroom or any other relevant social media.
  - ✓ Give additional relevant questions from CBLM and other resources-text/ Google/ YouTube and let learners submit answer through google classroom or any other relevant social media

E. Resources (online and offline):

- ✓ Handouts
- ✓ Competency-Based Learning Materials for class XI

Resources

1. Technical and Vocational Education and Training (TVET) New Normal Curriculum framework (Class: PP-XII)
2. Competency-Based Learning Materials (Electrical)