DEPARTMENT OF EDUCATION
REGION X - NORTHERN MINDANAO
DIVISION OF CAGAYAN DE ORO CITY
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Learning Activity Sheets

Electrical Installation and Maintenance

SHARED OPTIONS
Senior High Alternative Responsive Education Delivery

Preface

It has been elaborated in research and literature that the highest performing education systems are those that combine quality with equity. Quality education in the Department of Education (DepEd) is ensured by the learning standards in content and performance laid in the curriculum guide. Equity in education means that personal or social circumstances such as gender, ethnic origin or family background, are not obstacles to achieving educational potential and that inclusively, all individuals reach at least a basic minimum level of skills.

In these education systems, the vast majority of learners have the opportunity to attain high-level skills, regardless of their own personal and socio-economic circumstances. This corresponds to the aim of DepEd Cagayan de Oro City that no learner is left in the progression of learning. Through DepEd's flexible learning options (FLO), learners who have sought to continue their learning can still pursue in the Open High School Program (OHSP) or in the Alternative Learning System (ALS).

One of the most efficient educational strategies carried out by DepEd Cagayan de Oro City at the present is the investment in FLO all the way up to senior high school. Hence, Senior High School Alternative Responsive Education Delivery (SHARED) Options.

Two secondary schools, Bulua National High School and Lapasan National High School, and two government facilities, Bureau of Jail Management and Penology-Cagayan de Oro City Jail and Department of Health-Treatment and Rehabilitation Center-Cagayan de Oro City, are implementing the SHARED Options.

To keep up with the student-centeredness of the K to 12 Basic Education Curriculum, SHARED Options facilitators are adopting the tenets of Dynamic Learning Program (DLP) that encourages responsible and accountable learning.

This compilation of DLP learning activity sheets is an instrument to achieve quality and equity in educating our learners in the second wind. This is a green light for SHARED Options and the DLP learning activity sheets will continually improve over the years.

Ray Butch D. Mahinay, PhD
Jean S. Macasero, PhD

Acknowledgment

The operation of the Senior High School Alternative Responsive Education Delivery (SHARED) Options took off with confidence that learners with limited opportunities to senior high school education can still pursue and complete it. With a pool of competent, dedicated, and optimistic Dynamic Learning Program (DLP) writers, validators, and consultants in Senior High School Technical Vocational Livelihood Learning activity Sheets , the SHARED Options is in full swing.

Gratitude is due to the following:

- Schools Division Superintendent, Cherry Mae L. Limbaco, PhD, CESO V, Assistant Schools Division Superintendent Alicia E. Anghay, PhD, for buoying up this initiative to the fullest;
- CID Chief Lorebina C. Carrasco, and SGOD Chief Rosalio R. Vitorillo, for the consistent support to all activities in the SHARED Options;
- School principals and senior high school teachers from Bulua NHS, Lapasan NHS, Puerto NHS and Lumbia NHS, for the legwork that SHARED Options is always in vigor;
- Stakeholders who partnered in the launching and operation of SHARED Options, specifically to the Bureau of Jail Management and Penology-Cagayan de Oro City Jail and the Department of Health-Treatment and Rehabilitation Center-Cagayan de Oro City;
- Writer: Camille Q. Delapus and validators of the DLP learning activity sheets, to which this compilation is heavily attributable to, for their expertise and time spent in the workshops;

- Alternative Learning System implementers namely Willy P. Calo Ailiene P. Libres, Rubeneth V. Salazar and Metocila O. Agbay, Puerto National High School, Leneth G. Udarbe, Lapasan National High School and Pinky B. Dela Calzada, for the technical assistance given to the sessions;
- Reproduction LRMDS: Gemma P. Pajayon and Lanie M. Signo, and:
- To all who in one way or another have contributed to the undertakings of SHARED Options.

Mabuhay ang mga mag-aaral! Ito ay para sa kanila, para sa bayan!

Ray Butch D. Mahinay, PhD
Jean S. Macasero, PhD

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Name:	Date:	Score:
Subject: Electrical Installation And Maintenance NCII Migrated		
Lesson Title: **OCCUPATIONAL HEALTH AND SAFETY PROCEDURES**		
Lesson Competency: Practice Occupational Health and Safety Procedures (TLE_IAEI/80S-0h-1, TLE_IAEI/80S-0i-2, TLE_IAEI/80S-0j-3)		
References: https://www.ccohs.ca/oshanswers/hsprograms/hazard_risk.html https://en.wikipedia.org/wiki/Occupational_safety_and_health	LAS No.: 01	

CONCEPT NOTES:

Occupational Safety and Health (**OSH**), also commonly referred to as **Occupational Health and Safety** (**OHS**), **Occupational Health**, or **Workplace Health and Safety**(**WHS**), is a multidisciplinary field concerned with the safety, health, and welfare of people at work.

The main concept of **OHS** is to make sure every person who work inside the laboratory area will be safe from harm and prevent from unexpected incidents. You will be able to identify a certain hazards and risk that may occur but let us know first the difference between HAZARDS and RISKS. **Hazards** are situation that can cause harm like electricity, chemicals, high places, stress, etc. **Risk** is the occurrence of harm and the severity of that harm.

What types of hazards are there?

A common way to classify hazards is by category:

- **biological** - bacteria, viruses, insects, plants, birds, animals, and humans, etc.,
- **chemical** - depends on the physical, chemical and toxic properties of the chemical
- **ergonomic** - repetitive movements, improper set up of workstation, etc.,
- **physical** - radiation, magnetic fields, pressure extremes (high pressure or vacuum), noise, etc.,
- **psychosocial** - stress, violence, etc.,
- **safety** - slipping/tripping hazards, inappropriate machine guarding, equipment malfunctions or breakdowns.

How are you going to assess the risk?

✓ Hazard Identification
✓ Risk Analysis and Risk Evaluation
✓ Risk Control

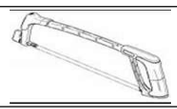
EXERCISE:

A. Watch a video presentation from this link youtube.com/watch?v=dS4PWTJ51d8 on different hazards and risk and answer the following questions: (5pts each)
   1. Based from the video, what type of hazard was presented?
   2. What were the risks involved?
   3. If you are to evaluate the hazards and risks you had viewed, what possible recommendations will you give? Why?

Name:	Date:	Score:
Subject: Electrical Installation And Maintenance NCII Migrated		
Lesson Title: **BASIC HAND TOOLS**		
Lesson Competency: Use Hand Tools (A) (TLE_IAEI7/8UT-0a-1)		
References: K to 12 Electrical Learning Module by Hector M. Vallarta & Roman A. Cabusora Jr.		LAS No.: 02

CONCEPT NOTES:

Performing electrical task must be organized in order for you to work effectively. While doing your task you may use specific tools for you to perform properly. This learning activity sheet will state the basic hand tools and its function used in electrical wiring installation. These are the following:

Picture	Tools and its Function
	**Screw Drivers** – These tools are made of steel hardened and tempered at the tip used to loosen or tighten screws with slotted heads. They come in various sizes and shapes.
	**Hammers** – These are tools used in driving or pounding and pulling out nails. They are made of hard steel, wood, plastic or rubber.
	**Pliers** – These are made from metal with insulators in the handle and are used for cutting, twisting, bending, holding, and gripping wires and cables.
	**Wire Stripper** – A tool used for removing insulation of medium sized wires ranging from gauge #10 to gauge #16.
	**Electrician's Knife** – This is used by linemen to remove insulation of wire and cables in low and high voltage transmission lines.
	**Hacksaw** - This tool is used to cut metal conduit and armoured cable.

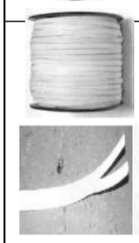
EXERCISE: Matching Type. Match the items in column A with those in column B.

A	B
_____1. It is used cut metal conduit and armoured cable.	A. Screw Drivers
_____2. It is used to loosen or tighten screws.	B. Hammers
_____3. It is used in driving or pounding and pulling out nails.	C. Pliers
_____4. It is used for cutting, twisting, bending, holding, and gripping wires and cables.	D. Wire Stripper
	E. Electrician's Knife
_____5. It is used for removing insulation of medium sized wires.	F. Hacksaw
_____6. Used by linemen to remove insulation of wire and cables in low and high voltage transmission lines.	

Name:	Date:	Score:
Subject: Electrical Installation And Maintenance NCII Migrated		
Lesson Title: **USE OF ELECTRICAL MATERIALS**		
Lesson Competency: Use Hand Tools (B) (TLE_IAEI7/8UT-0a-2)		
References: References: K to 12 Electrical Learning Module by Hector M. Vallarta & Roman A. Cabusora Jr.	LAS No.: 03	

CONCEPT NOTES:

Performing electrical task must be organized in order for you to work effectively. While doing your task you may use specific electrical materials for you to perform properly. This Learning activity sheet will state the basic hand tools and its function used in electrical wiring installation. These are the following:

Picture	Material and its Function	Picture	Material and its Function
	**Junction Box** - an octagonal shaped electrical material where the connections or joints of wires are being done. This could be made of metal or plastic (PVC) Polyvinylchloride.		**Conduits/Pipes-** electrical materials used as the passage of wires for protection and insulation. These could be rigid metallic, flexible metallic conduit (FMC), rigid non-metallic (PVC), and flexible non-metallic or corrugated plastic conduit (CPC)
	**Flat Cord**- Is a duplex stranded wire used for temporary wiring installation and commonly used in extension cord assembly		
	**Utility Box** - a rectangular shaped metallic or plastic (PVC) material in which flush type convenience outlet and switch are attached.		**Electrical Wire/Conductor**- electrical material that could be: **Stranded wire** and **Solid wire** These are used in wiring installation inside and outside the buildings.
	**Connectors**- used to attach metallic or non-metallic conduit to the junction or utility boxes.		**Clamps**- electrical materials used to hold and anchor electrical conduits in its proper position.

EXERCISE: Identification. Identify the tools/equipment used in electrical wiring installations.

_____1.It is used as the passage of wires for protection and insulation.
_____2.It is used in wiring installation inside and outside buildings.
_____3.It is used for temporary wiring and commonly used in extension cord.
_____4.It is used to hold and anchor electrical conduits in its position.
_____5.A material in which flush type convenience outlet/switch is attached.
_____6. It is used to attach metallic or non-metallic conduit to junction/utility box.

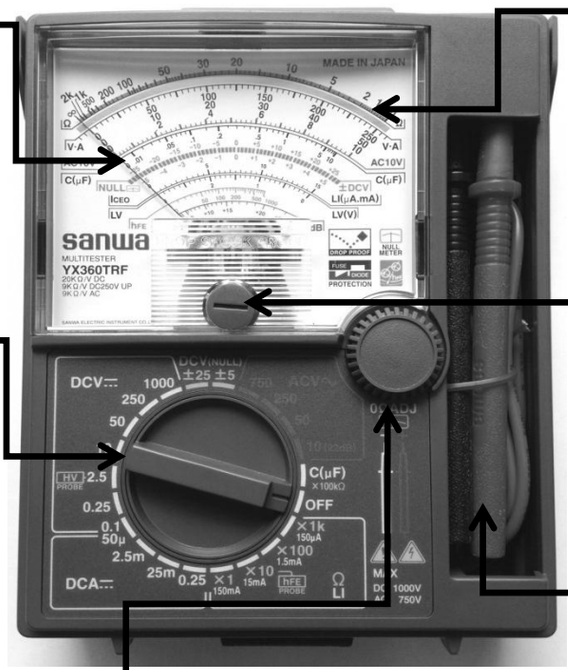
Name:	Date:	Score:
Subject: Electrical Installation And Maintenance NCII Migrated		
Lesson Title: **USE OF MULTI-TESTER**		
Lesson Competency: Perform Mensuration and Calculation (TLE_IAEI7/8MC-0c-1, TLE_IAEI7/8MC-0d-2)		
References: K to 12 Electrical Learning Module by Hector M. Vallarta & Roman A. Cabusora Jr.		LAS No.: 04

CONCEPT NOTES:

A **multimeter** or a **multitester**, also known as a **VOM** (volt-ohm-milliammeter), is an electronic measuring instrument that combines several measurement functions in one unit. It measures voltage, current, and resistance. An **analog multimeter** uses a microammeter with a moving pointer to display readings. **Digital multimeters** have a numeric display, and may also show a graphical bar representing the measured value.

POINTER - The needle-shaped rod that moves over the scale of a meter.

RANGE SELECTOR KNOB (Selector switch) makes it possible to select different functions and range of the meter.



Source same on content references.

SCALE is a series of marking used for reading the value of a quantity.

ADJUSTMENT SCREW makes it possible to adjust the pointer to the zero position of the scale.

TEST PROBE positive (red), negative (black) is used to connect the circuit to the electrical components being tested.

ZERO-OHM ADJUSTING KNOB is used to zero-in the pointer before measuring resistance.

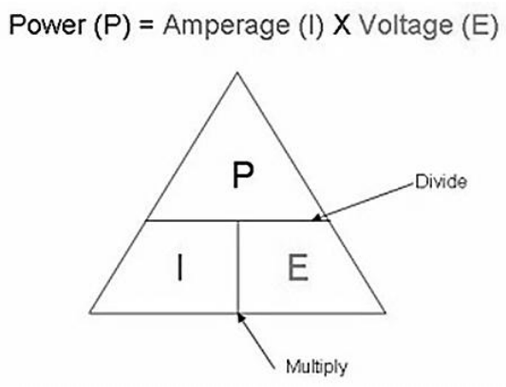
EXERCISE: TRUE OR FALSE. Write TRUE if the statement is true, and if your answer is FALSE, write the false on the space provided before each number.

_____1. Scale is a needle-shaped rod that moves over the meter.
_____2.Selector knob adjusts the pointer to the zero position of the scale.
_____3.Zero Ω adjusting knob selects different functions and range of meter.
_____4.Test probe is used for reading the value of a quantity.
_____5.Pointer is used to connect the circuit to the electrical components being tested.

Name:	Date:	Score:
Subject: Electrical Installation and Maintenance NCII Migrated		
Lesson Title: **WATT'S LAW / OHM'S LAW**		
Lesson Competency: Perform Mensuration and Calculation (TLE_IAEI7/8MC-0c-1, TLE_IAEI7/8MC-0d-2)		
References: http://www.streetrod101.com/watts-law.html		LAS No.: 05

CONCEPT NOTES:

WATT'S LAW



Wattage is another important term used to help the street rodder analyze electrical circuits and systems. Wattage is calculated by using Watt's Law. Wattage is a measure of the **power (P)** used in the circuit and is also a measure of the total electrical work being done per unit of time. When **voltage (E)** is multiplied by **amperage (I)**, the result is wattage or power (P). Wattage, which is a measure of electrical power, may also be referred to as **kilowatts (kW)**. The drawing on the left illustrates the relationship between **voltage**, **amperage**, and **wattage**. If the amperage and wattage are known, cover the voltage to see the formula. If the voltage and wattage are known, amperage can also be calculated by dividing the **voltage (E)** into the **wattage** or **power (P)**.

Example:

Given #1:

P= 400W
E= 200V
I= ?

I= P/E

$$I = \frac{400W}{200V}$$

I= 1.81A

Given #2:

P= ?
E= 12V
I= 1A

P= IxE
P= 12V x 1A
P= 12W

EXERCISE:

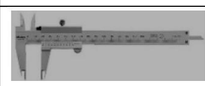
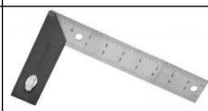
Calculate the missing value:

1. P = ? , I = 2A , E = 12V
2. P = 200W , I = 2A , E = ?
3. P = 100W , I = ? , E = 120V
4. P = 1000W , I = 10A , E = ?
5. P = 150W , I = ? , E = 120V
6. P = ? , I = 3A , E = 15V
7. P = 300W , I = ? , E = 100V
8. What unit is to measure power? _____
9. What unit is to measure voltage? _____
10. What unit is to measure amperage? _____

Name:	Date:	Score:
Subject: Electrical Installation and Maintenance NCII Migrated		
Lesson Title: **SELECT MEASURING INSTRUMENT 1**		
Lesson Competency: Perform Mensuration and Calculation (TLE_IAEI7/8MC-0c-1, TLE_IAEI7/8MC-0d-2)		
References: K to 12 Electrical Learning Module by Hector M. Vallarta & Roman A. Cabusora Jr.		LAS No.: 06

CONCEPT NOTES:

For you to be able to get the exact measurement in installing electrical wiring, you must use proper **electrical measuring tools**. This activity sheet will discuss the use of each measuring tool in doing an electrical task. These are the following:

Measuring Tool/ Instrument	Description	Measuring Tool/ Instrument	Description
	**Test Light** is a pocket size tool used to test the line wire or circuit if there is current in it.		**Calliper** is an instrument for measuring external or internal dimensions
	**Micrometre** is used to measure the diameter of wires/conductors in circular mils. It can measure small and big sizes of wires and cables.		**Ruler/foot rule** is a measuring tool used to measure length, width and thickness of short flat object and in sketching straight lines.
	**Pull-Push Rule** is a measuring tool used to measure the length of an object in centimetre and inches		**Wire Gauge** is used in determining the size of wires. The gauge ranges from 0 to 60 awg.
	**Spirit Level** is an instrument designed to indicate whether a surface is horizontal or vertical		**Try square** is a woodworking tool used for marking and measuring a piece of wood.

EXERCISES:

A. **Direction: Arrange the jumbled letters to form words related to the concept.**

1. GEWIGREAU 2. RPPULLUSHULE 3. ELRCPILA 4. ERSYTQARU

B. **Directions**: Choose two formed-words from Activity A and describe its uses in one or two sentences.

1. _____
2. _____

Name:	Date:	Score:
Subject: Electrical Installation and Maintenance NCII Migrated		
Lesson Title: **SELECT MEASURING INSTRUMENT 2**		
Lesson Competency: Perform Mensuration and Calculation (TLE_IAEI7/8MC-0c-1, TLE_IAEI7/8MC-0d-2)		
References: K to 12 Electrical Learning Module		LAS No.: 06

CONCEPT NOTES:

SYSTEM OF MEASUREMENT

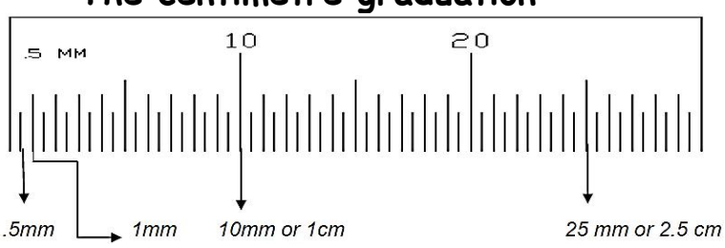
A system of measurement is a set of units which can be used to specify anything can be measured. These are common units of measurement used in making layout and installation of electrical materials:

Linear measures

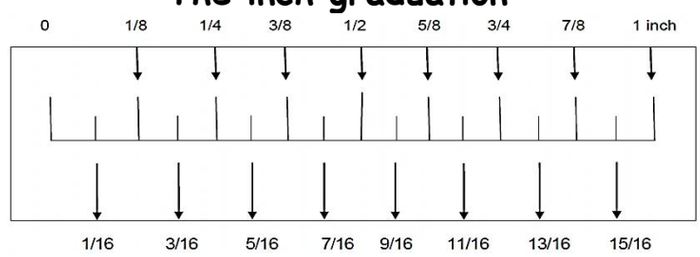
1. **English system** provides the creative way on how people can measure by themselves. For example, people measure shorter distance on the ground with their feet. They measure long distances by their palms which is equal to a yard.
   •Inch •Yard •Miles
2. **Metric system** is a decimalized system of measurement. It exists in several variations with different choices of base units. Metric units are widely used around the world for personal, commercial and scientific purpose.
   •Millimeter •Centimeter •Decimeter •Meter

English units and each equivalent		Metric units and each equivalent		English to metric equivalent	
12 inches	1 foot	10 mm	1 cm	1 inch	2.54 cm
1 foot	3 yard	10 cm	1 dm	1 foot	30.48 cm
1 yard	36 inches	10 dm	1 m	1 yard	91.44 cm

The centimetre graduation



The inch graduation



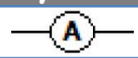
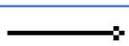
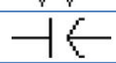
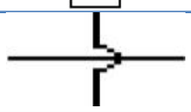
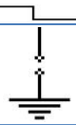
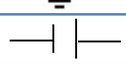
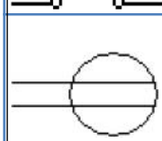
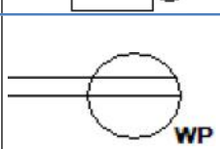
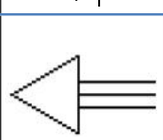
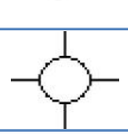
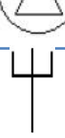
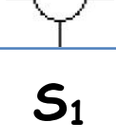
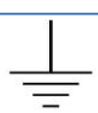
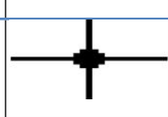
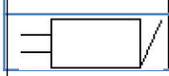
EXERCISE: Convert into given units of measurement.

1. 150 inches = _____ cm
2. 2000 mm = _____ cm
3. 3 feet = _____ m
4. 30 cm = _____ inches
5. 2 cm = _____ mm
6. 300 cm = _____ inches
7. 2 yards = _____ inches
8. 3 meters = _____ dm
9. 2 meters = _____ feet
10. 30 mm = _____ cm

Name:	Date:	Score:
Subject:Electrical Installation and Maintenance NCII Migrated		
Lesson Title: **INTERPRET TECHNICAL DRAWING**		
Lesson Competency:Prepare and Interpret Technical Drawing (TLE_IAEI7/8ID-0e-1)		
References:K to 12 Electrical Learning Module		LAS No.: 07

CONCEPT NOTES:

Electrical Symbols are schematic symbols used to represent different electrical devices in a diagram or plan of an electrical circuit. We need to use electrical symbol to sketch electrical diagrams and electrical plans in different electrical task. Every electrical fixture have corresponding electrical symbol which guides the electricians for an easier wiring installation. These are the following common electrical symbols used in sketching wiring plan and diagram.

Symbol	Description	Symbol	Description	Symbol	Description
	Conductor/Wire		Ammeter		Battery
	Terminal		Voltmeter		Resistor
	Switch		Galvanometer		Capacitor
	Fuse		Wattmeter		Diode
	Speaker		Push Button		Male plug
	Kilowatt-hour Meter		Wires Not Connected		Lightning Arrester
	Circuit Breaker		Bell		Cell
	Duplex Convenience Outlet		Weather-proof Outlet		Service Entrance (3 wires)
	Lighting Panel Board		Special Purpose Outlet		Incandescent Lamp
	Power Panel Board		Antenna		Single Pole Switch
	Fluorescent Lamp		Ground		Connected Wires
	Buzzer		Floor Outlet		Range Outlet

MOVING EXERCISE

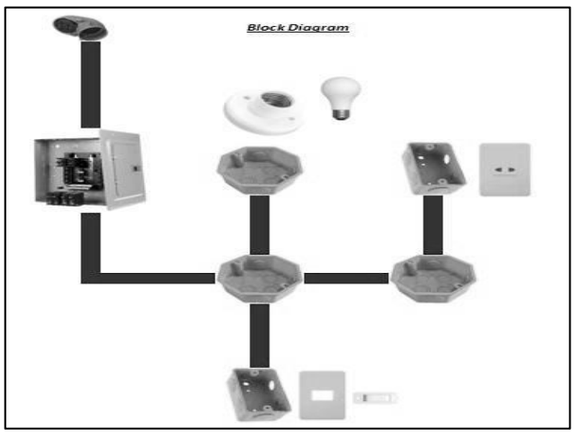
Directions: The students will identify the electrical symbols in each question set by the teacher in a specific number. After giving the answer, you can move to another question. Each question will be read and answered within 30 seconds. (20 Questions).

Name:	Date:	Score:
Subject: Electrical Installation And Maintenance NCII Migrated		
Lesson Title: **AUXILIARY – CONNECT ELECTRICAL WIRING**		
Lesson Competency: Terminate and Connect Electrical Wiring and Electronics Circuit.		
References: TESDA TR – Electrical Installation and Maintenance NCII https://www.dfliq.net/electrical-materials-products/ https://www.dhs.gov/sites/default/files/publications		LAS No.: 08

CONCEPT NOTES:

Materials List

- 1 pc.-Entrance Cap "1/2
- 1 pc.-EMT Pipe "1/2 x 8ft.
- 1 pc.-Circuit Breaker Panel Board (Single Hole)
- 1 pc.-Circuit Breaker 15amp./20amp.
- 12 pcs.-Connector EMT Pipe "1/2
- 3 pcs.-Junction Box (EMT/PVC)
- 2 pcs.-Utility Box (EMT/PVC)
- 1 pc.-Bulb 5watts
- 1 pc.-Bulb socket/holder
- 1 pc.-Switch (single); 1 pc.-Plate 1-Gang
- 1 pc.-Outlet 1-Gang; 1 roll –Wire 14/7
- 1 roll -Electrical Tape
- 1 pc.-Plyboard "3/4 (4ft.x4ft.)



EXERCISES: Perform the following procedures:

1. Procure Materials
2. Design and Build Electrical Wiring (Follow the diagram shown above)
3. Mount the Circuit Breaker Panel, Entrance Cap, EMT Pipe, Junction Box, Utility Box on the Plyboard.
4. Connect the necessary wirings.
5. Re-check the connection of materials for mistakes.
6. Test the Electrical Wiring connection

Criteria for Evaluation

Rubric/Criteria	%	Score
Layout Design	20%	
Proper Wiring Splicing	20%	
Neatness of Work	20%	
Proper use of tools and equipment	15%	
Adherence to OHS in the building wiring process	15%	
Overall Connection functionality	10%	

Name:	Date:	Score:
Subject: Electrical Installation and Maintenance NCII Migrated		
Lesson Title: **TYPES OF CONDUITS**		
Lesson Competency: Perform roughing-in activities, wiring and cabling works for single-phase distribution, power, lighting and auxiliary systems **(TLE_IAEI9-12RC-IIa-j-1)**		
References: https://www.thebalancesmb.com/seven-types-of-electrical-conduits-844832		LAS No.: 9

CONCEPT NOTES:

The term ***electrical conduit*** refers to durable tubing or other types of enclosure used to protect and provide a route for individual electrical wiring conductors. **Conduit** is typically required where wiring is exposed or where it might be subject to damage. A conduit can be made of metal or plastic and may be rigid or flexible. All conduit is installed with compatible fittings (couplings, elbows, connectors) and electrical boxes, usually made of the same or similar material.

TYPES OF CONDUITS	EXAMPLES OF CONDUITS WITH PICTURE
METALLIC FLEXABLE CONDUIT	FMT- FLEXABLE METALLIC TUBING 
METALLIC NON-FLEXABLE CONDUIT	IMC- INTERMEDIATE METALLIC CONDUIT RSC-RIGID STEEL CONDUIT EMT-ELECTRICAL METALLIC TUBING 
NON-METALLIC FLEXABLE CONDUIT	CPC- CORRUGATED PLASTIC CONDUIT 
NON-METALLIC NON-FLEXABLE CONDUIT	PVC- POLYVINYL CHLORIDE 

EXERCISES: Write ✓ if the statement is correct and ✗ if the statement is incorrect.

_____1. FMT is one of the hardest steel conduit.
_____2. CPC is usually used in building wiring.
_____3. EMT is also known as thin wall conduit.
_____4. A thread can be used in IMC and RSC types of conduits.

Name:	Date:	Score:
Subject: Electrical Installation Maintenance NCII Migrated		
Lesson Title: **BENDING ELECTRICAL NON-METALLIC CONDUIT**		
Lesson Competency: Perform roughing-in activities, wiring and cabling works for single-phase distribution, power, lighting and auxiliary systems (TLE_IAEI9-12RC-IIa-j-1)		
References: https:// www.wikihow.com/Bend-Conduit		LAS No.: 10

CONCEPT NOTES:

You can bend conduit to fit many angles and work it around corners, under or over ceilings, and past other permanent structures. The hardest part of bending conduit is getting the proper measurements and applying just the right amount of pressure to make a good bend.

NAME AND PICTURE	FUNCTION
MEASURING TAPE 	Its design allows for a measure of great length to be easily carried in pocket or toolkit and permits one to measure around curves or corners.
CUTTING TOOLS 	A tool that is used to remove material from the work piece by means of shear deformation.
PIPE REAMER 	A pipe reamer can help you clean up your work and make the holes smooth and free of burrs or metal shavings.
HEATING EQUIPMENT 	device used to emit a stream of hot air, usually at temperatures between 100 °C and 550 °C (200-1000 °F), with some hotter models running around 760 °C (1400 °F),
SPIRIT LEVEL 	Instrument designed to indicate whether a surface is horizontal (level) or vertical (plumb).
PVC CONDUIT 	Provides non-metallic protection for your cables and conductors that provides good insulation without power loss or conductor heating.

EXERCISE: Write ✓ if the statement is correct and ✗ if the statement is incorrect.

_____1. Pipe bender may help electrician works.
_____2. Pipe reamer may remove sharp edges of conduit.
_____3. Spirit level is design to measure the angles of conduit
_____4. Measuring tape may use to measure the level of conduit

Name:	Date:	Score:
Subject: Electrical Installation and Maintenance NCII Migrated		
Lesson Title: **BENDING ELECTRICAL METALLIC CONDUIT**		
Lesson Competency: Perform roughing-in activities, wiring and cabling works for single-phase distribution, power, lighting and auxiliary systems (TLE_IAEI9-12RC-IIa-j-1)		
References: https:// www.wikihow.com/Bend-Conduit		LAS No.: 11

CONCEPT NOTES:

You can bend conduit to fit many angles and work it around corners, under or over ceilings, and past other permanent structures. The hardest part of bending conduit is getting the proper measurements and applying just the right amount of pressure to make a good bend.

NAME AND PICTURE	FUNCTION
MEASURING TAPE 	Its design allows for a measure of great length to be easily carried in pocket or toolkit and permits one to measure around curves or corners.
CUTTING TOOLS  	A tool that is used to remove material from the work piece by means of shear deformation.
PIPE REAMER 	A pipe reamer can help you clean up your work and make the holes smooth and free of burrs or metal shavings.
PIPE BENDER 	Designed to save you money by allowing you to bend your own 30-degree, 45-degree, 60-degree and 90-degree elbow joints. Conduit benders take the guesswork out of bending conduit at the correct angle by providing raised degree markers at these angles.
SPIRIT LEVEL 	Instrument designed to indicate whether a surface is horizontal (level) or vertical (plumb).
EMT CONDUIT 	Sometimes called thin-wall, is commonly used instead of galvanized rigid conduit (GRC), as it is less costly and lighter than GRC. EMT itself is not threaded.

EXERCISE: Write ✓ if the statement is correct and ✕ if the statement is incorrect.

_____1. Pipe bender may help electrician works.
_____2. Pipe reamer may remove sharp edges of conduit.
_____3. Spirit level is design to measure the angles of conduit.
_____4. Measuring tape may use to measure the level of conduit.

Name:	Date:	Score:
Subject: Electrical Installation And Maintenance NCII Migrated		
Lesson Title: **HOW TO THREAD METALLIC CONDUIT PIPE**		
Lesson Competency: Perform Roughing – In Activities , wiring and cabling works for single – phase distribution, power, lighting and auxiliary system **(TLE_IAEI9-12RC-IIa-j-1)**		
References: https://http://www.ehow.com/how_6108591_thread-conduit-pipe.html https://http://www.rigid.com/Tools/pipe-Threading-and-Fabrication/index.htm https://http://www.wisegeek.com/what-is-pipe-thread.htm		LAS No.: 12

CONCEPT NOTES:

Conduit pipe provides superior protection for the electrical wiring of your home. Long runs of electrical conduit often require threaded connections per local building codes.

Name and Picture	Uses and Function
 Manual Ratchet Pipe Threader	A device used to cut grooves or threads into the end of metal pipe
Die 	It is open at its center with a series of cutting edges or cutting insert along its inner surface.
 Machine Pipe Threader	The function of this machine of this type allows the threading process to produce uniform pipe threads that are uniform in nature.
 Pipe Reamer	It is used to remove burrs from the inside of pipes or holes drilled in metal. A pipe reamer can help you clean up your work and make the holes smooth and free of burrs.
Oiler Can 	A metal container with a log thin spout which used to squirt lubricating oil into pipe.
Pipe Cutter 	It is used by rotating it around the pipe and repeatedly tightening it until it cuts all of the way through.
Pipe Wrench 	A One fixed and one moveable which is used to grip and turn pipes and other tubular objects.

EXERCISE: MULTIPLE CHOICE. Encircle the letter of the correct answer.

1.What tool is used to make a thread on pipe?

A.Pipe cutter B. Pipe threader C.Pipe vise D.Pipe reamer

2. Which of the following manual ratchets is use to ensure threads are sharp.

A. Blade B. Die C. Cutter D. Reamer

3.Which of the following tools is used to remove of pipes or holes drilled in metal.

A.Pipe cutter B.Pipe reamer C.Pipe vise D.Pipe wrench

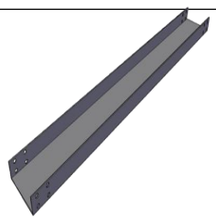
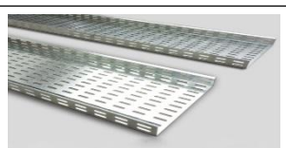
4. **Which of the following tools is used to rotate the pipe repeatedly tightening it until it cuts.**

A.Pipe cutter B.Pipe reamer C.Pipe vise D.Pipe wrench

Name:	Date:	Score:
Subject: Electrical Installation and Maintenance NCII Migrated		
Lesson Title: **INSTALL WIRE WAYS AND CABLE TRAY**		
Lesson Competency: Perform Roughing-in Activities, Wiring and Cabling works for Single-Phase Distribution, Power, Lighting and Auxiliary Systems. (TLE_IAEI9-12RC-IIIa-j-2)		
References: TESDA TR – Electrical Installation and Maintenance NCII		LAS No.: 13

CONCEPT NOTES:

Wire ways are troughs with hinged or removable covers for housing and protecting electric wires and cable, conductors are laid into the **wire way** after the **wire way** has been installed as a complete system. A **Cable Tray** system enhances safety of electrical wiring system., Cable tray installation provides dependability in any circumstances, Cable Tray system saves space, materials, labor, time and cost, Maintenance and extension of cable tray installation are easier than any other wiring system.

Component	Picture	Function
Ladder Type Cable Tray		**A Ladder Cable Tray** systems consists of two longitudinal side members connected by individual transverse members, and is designed for use as a power **cable** or control **cable** support system.
Solid Bottom Cable Tray		A **Solid Bottom** Cable Tray contained within longitudinal side members. **Solid bottom** trough is used to carry smaller instrumentation, data communications, computer, telephone, control and fiber optic **cable** from one location to another.
Trough Cable Tray		**A Trough Tray** is a **cable tray** consisting of ventilated or solid bottom contained within longitudinal side members.
Wire Ways		**A Wire ways** are troughs with hinged or removable covers for housing and protecting electric wires and cable.

EXERCISE: Fill in the blanks.

_____1. A tray consisting of ventilated or solid bottom contained within longitudinal side members.

_____2. A Tray systems consists of two longitudinal side members connected by individual transverse members.

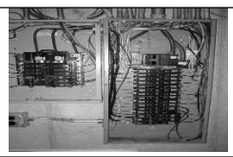
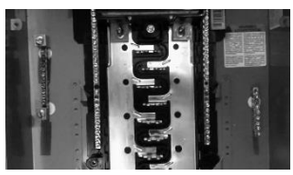
_____3. A hinged or removable covers for housing and protecting electric wires and cable.

_____4. A Tray contained within longitudinal side members and solid bottom trough tray is used to carry smaller instrumentation.

Name:	Date:	Score:
Subject: Electrical Installation and Maintenance NCII Migrated		
Lesson Title: **INSTALL AUXILIARY TERMINAL CABINET AND DISTRIBUTION PANEL**		
Lesson Competency: Perform roughing-in activities, wiring and cabling works for single-phase distribution, power, lighting and auxiliary systems. (TLE_IAEI9-12RC-Iva-e-3)		
References: https://alciska.com/panel-board-supplier-different-types-of-panel-boards-for-your-needs/		LAS No.: 14

CONCEPT NOTES:

Distribution board (also known as panel board, breaker panel, or electric panel) is a component of an electricity supply system that divides an electrical power feed into subsidiary circuits, while providing a protective fuse or circuit breaker for each circuit in a common enclosure.

Materials	Picture	Description
Panel Board		an electrical panel containing switches and fuses or circuit breakers controlling branch circuits
Circuit Breaker		Automatically operated electrical switch designed to protect an electrical circuit from damage caused by excess current from an overload or short circuit.
Terminal Log		Terminal may also refer to an electrical connector at this endpoint.
fuse		Sacrificial device; once a fuse has operated it is an open circuit, and it must be replaced.
Brass bar and Ground terminal		A copper conductor is connected from the metal rod of the wiring system to a set of terminals for ground connections in the service panel.
Mica tube		Which are widely used in the field of high voltage and strong insulation applications.

EXERCISE: True or False. Write ✓ is the statement is true and ✕ if the statement is false.

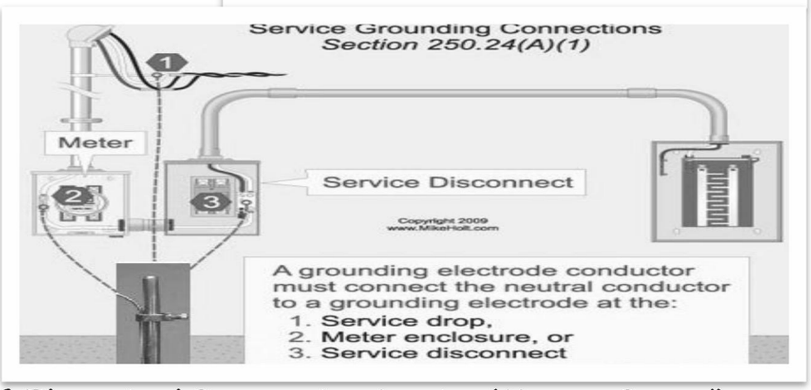
_____1. Panel board is the control of the current flow
_____2. Circuit breaker is a sacrificial device that can be open circuit.
_____3. Terminal log are used to connect in a circuit breaker terminals
_____4. Mica tube usually used in protecting wire from sharp edge.

Name:	Date:	Score:
Subject: Electrical Installation And Maintenance NCII Migrated		
Lesson Title: **INSTALL ELECTRICAL PROTECTIVE DEVICE (METER-BASED)**		
Lesson Competency: Install Electrical Protective Devices for Distribution, Power, Lightning, Auxiliary, Lighting Protection and Grounding Systems. (TLE_IAEI9-12EP-IIa-j-2)		
References: TESDA TR – Electrical Installation and Maintenance NCII / https://www.dfliq.net/electrical-materials-products/ https://www.dhs.gov/sites/default/files/publications		LAS No.: 15

CONCEPT NOTES:

Materials List

- 1 pc.-Entrance Cap "1/2;
- 1 pc.-Meter Base
- 2 pc.-EMT Pipe "1/2 x 8ft.
- 1 pc.-Circuit Breaker Panel Board (Single Hole)
- 1 pc.-Circuit Breaker 15amp./20amp.
- 1 roll -Wire 14/7
- 1 roll -Electrical Tape
- 1 pc.-Plyboard "3/4 (4ft.x4ft.)
- 1 pc.-Ground Rod



EXERCISES: Perform the following

1. Make ready the Materials
2. Design and Build the installation of Electrical Protective Device(Meter-Based) (Follow the diagram shown above)
3. Mount the Meter Base, Circuit Breaker Panel, Entrance Cap, EMT Pipe on the Plyboard.
4. Connect the necessary wirings.
5. Re-check the connection of materials for mistakes.
6. Test the Electrical Wiring connection

Criteria for Evaluation

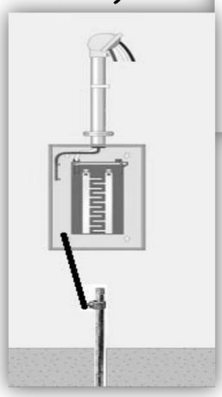
Rubric/Criteria	%	Score
Layout Design	20%	
Proper Wiring Splicing	20%	
Neatness of Work	20%	
Proper use of tools and equipment	15%	
Adherence to OHS in the building wiring process	15%	
Overall Connection functionality	10%	

Name:	Date:	Score:
Subject: Electrical Installation And Maintenance NCII Migrated		
Lesson Title: **INSTALL ELECTRICAL PROTECTIVE DEVICE PANEL BOARD**		
Lesson Competency: Install Electrical Protective Devices for Distribution, Power, Lightning, Auxiliary, Lighting Protection and Grounding Systems. (TLE_IAEI9-12EP-IIa-j-2)		
References: TESDA TR – Electrical Installation and Maintenance NCII / https://www.dfliq.net/electrical-materials-products/ https://www.dhs.gov/sites/default/files/publications		LAS No.: 16

CONCEPT NOTES:

Materials List

- 1 pc.-Entrance Cap "1/2
- 1 pc.-EMT Pipe "1/2 x 8ft.
- 1 pc.-Circuit Breaker Panel Board (Single Hole)
- 1 pc.-Circuit Breaker 15amp./20amp.
- 1 roll -Wire 14/7
- 1 pc.-Plyboard "3/4 (4ft.x4ft.)
- 1 roll -Electrical Tape



EXERCISES: Perform the following procedures:

1. Make ready the Materials
2. Design and Build the installation of Electrical Protective Device Panel Board (Follow the diagram shown above)
3. Mount the Circuit Breaker Panel Board, Entrance Cap, EMT Pipe on the Plyboard.
4. Connect the necessary wirings.
5. Re-check the connection of materials for mistakes.
6. Test the Electrical Wiring connection

Criteria for Evaluation

Rubric/Criteria	%	Score
Layout Design	20%	
Proper Wiring Splicing	20%	
Neatness of Work	20%	
Proper use of tools and equipment	15%	
Adherence to OHS in the building wiring process	15%	
Overall Connection functionality	10%	

Name:	Date:	Score:
Subject: Electrical Installation and Maintenance NCII Migrated		
Lesson Title: **TYPES OF LIGHTING FIXTURE**		
Lesson Competency: Install Electrical Protective Devices for Distribution, Power, Lightning, Auxiliary, Lighting Protection and Grounding Systems. (TLE_IAEI9-12EP-IIa-j-2)		
References: https://www.delmarfans.com/educate/basics/lighting-types/		LAS No.: 17

CONCEPT NOTES:

Proper lighting can have a significant impact on how you feel in a space, and each space may call for a variety of different lighting requirements. A good lighting setup combines different kinds of lighting to create a welcoming space where you can easily work or relax.

Types of lighting fixture	Picture	Description
Ambient Lighting (General Lighting)		In photography and cinematography, ambient light is considered the "natural light" within a room. Ex: Recessed or Track Lights, Chandeliers , Pendants, Wall Sconces and Wall Lights
Task Lighting		You want task lighting around when you're working. In fact, some people call it office lighting. Ex: Desk, Swing Arm, Floor Lamps, Under Cabinet, Vanity Lights, Pendant and Track Lights.
Accent Lighting		It evokes feelings of meaning and importance to the images it displays. Ex: Wall Lights, Spot Lighting and Landscape Lighting.

EXERCISE: Read the following statements and write True or False.

_____1. Wall Sconces are one of the example of ambient lighting.
_____2. Task lighting are applicable in working activity.

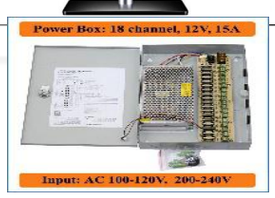
Name:	Date:	Score:
Subject: Electrical Installation and Maintenance NCII Migrated		
Lesson Title: **TYPES OF LIGHTING FIXTURE**		
Lesson Competency: Install Electrical Protective Devices for Distribution, Power, Lightning, Auxiliary, Lighting Protection and Grounding Systems. (TLE_IAEI9-12EP-IIa-j-2)		
References: https://www.delmarfans.com/educate/basics/lighting-types/		LAS No.: 17

_____3. Ambient lighting is also known natural light.
_____4. Accent lighting impress the main display.

Name:	Date:	Score:
Subject: Electrical Installation And Maintenance NCII Migrated		
Lesson Title: **AUXILIARY – CCTV INSTALLATION**		
Lesson Competency: Install Electrical Protective Devices for Distribution, Power, Lightning, Auxiliary, Lighting Protection and Grounding Systems. (TLE_IAEI9-12EP-IIa-j-2)		
References: TESDA TR – Electrical Installation and Maintenance NCII / https://www.google.com.ph/search?q=CCTV+parts / https://www.dfliq.net/electrical-materials-products/		LAS No.: 18A

CONCEPT NOTES:

A **Digital Video Recorder (DVR)** in **CCTV function** is a closed circuit camera, which has a **DVR** is not completely analog. The **CCTV** transmits the video signal in an analog format and the connected **DVR** transmits the received signals to the digital format prior to recording and sending over the respective network.

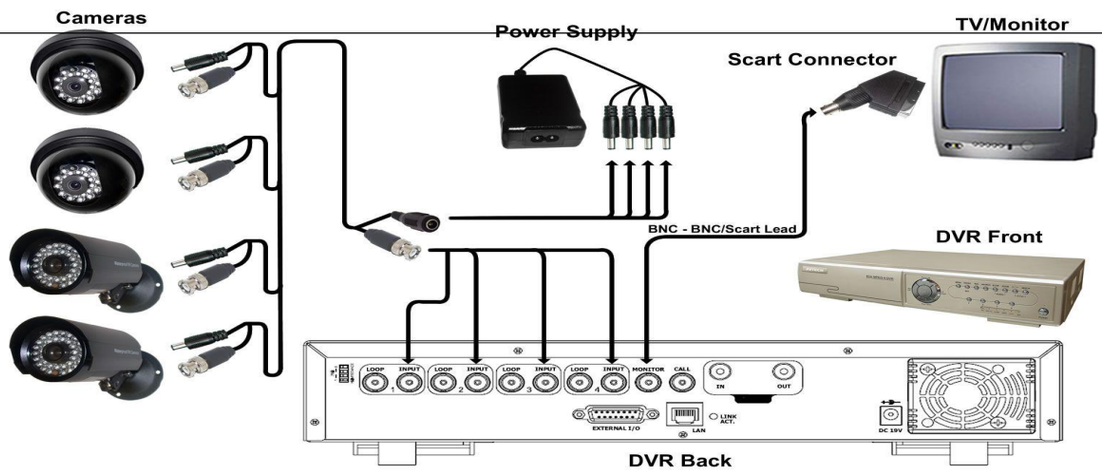
Component	Picture	Function
DVR – Digital Video Recorder		DVR transmits the received signals to the digital format prior to recording and sending over the respective network.
CCTV – Closed Circuit Television		Closed Circuit TV a self-contained surveillance system comprising cameras, recorders and displays for monitoring activities in a store or company or school.
LCD Monitor		Liquid Crystal Display (LCD) Monitor technology connects to a DVR. Used LCD screens almost exclusively, and the LCD monitor is the standard display screen for video from CCTV.
CCTV Power Supply Unit		A CCTV power supply box, also known as a power distribution box, allows surveillance system installers to easily manage the power to multiple CCTV cameras at a central point (usually at the location of the DVR).
VGA Cable		A flat panel screen that uses the liquid crystal display (LCD) technology and connects to a DVR.

EXERCISES: Identification. Identify what is being described in each item.

_____1. A flat panel screen that uses the LCD tech. and connects to DVR.
_____2. Transmits the received signals to the digital format.
_____3. To monitor and connects to a DVR.
_____4. A power distribution box, allows surveillance system installers to easily manage the power to multiple CCTV cameras at a central point.
_____ 5. A self-contained surveillance system comprising cameras and recorders.

Name:	Date:	Score:
Subject: Electrical Installation And Maintenance NCII Migrated		
Lesson Title: **CCTV INSTALLATION 1**		
Learning Competency: Install Electrical Protective Devices for Distribution, Power, Lightning, Auxiliary, Lighting Protection and Grounding Systems. (TLE_IAEI9-12EP-IIa-j-2)		
References: TESDA TR – Electrical Installation and Maintenance NCII / https://www.google.com.ph/search?q=CCTV+parts / https://www.dfliq.net/electrical-materials-products/ https://www.dhs.gov/sites/default/files/publications/CCTV-Tech-HBK		LAS No.: 18B

CONCEPT NOTES:



System Planning:

1. How can I estimate how many cameras I will need?
2. Where will I store the DVR and power supplies for the cameras?
3. How far will the cameras be located from the DVR and power supply?
4. Do you want to access your cameras remotely?

EXERCISE: Perform the following Installation Procedure: (Refer to Manufacturer's Installation Manual)

1. Choose Camera Locations
2. Run Your Cables
3. Power your Cameras
4. Power your DVR
5. Connect the Monitor to the DVR
6. Program your DVR

Criteria for Evaluation

Rubric/Criteria	%	Score
Physical Camera and DVR Installation	20%	
Neatness of Wiring/Harness	20%	
Proper use of tools and equipment	20%	
Adherence to OHS in the Installation process	15%	
Serviceability	15%	
Overall Device functionality	10%	

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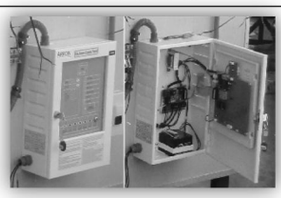
GRADE 11 & 12 DLP LEARNING ACTIVITY SHEET

Name:	Date:	Score:
Subject: Electrical Installation And Maintenance NCII Migrated		
Lesson Title: **AUXILIARY - FIRE ALARM SYSTEM 1**		
Lesson Competency: Install Electrical Protective Devices for Distribution, Power, Lightning, Auxiliary, Lighting Protection and Grounding Systems. (TLE_IAEI9-12EP-IIa-j-2)		
References: TESDA TR – Electrical Installation and Maintenance NCII / https://en.wikipedia.org/wiki/Fire_alarm_system https://www.dhs.gov/sites/default/files/publications		LAS No.: 19A

CONCEPT NOTES:

A **Fire alarm system** has a number of devices working together to detect and warn people through visual and audio appliances when smoke, fire, carbon monoxide or other emergencies are present. These alarms may be activated automatically from smoke detectors, and heat detectors or may also be activated via manual fire alarm activation devices such as manual call points or pull stations.

Component	Picture	Function
Fire Alarm System		A **Fire alarm system** has a number of devices working together to detect and warn people through visual and audio appliances when smoke, fire, carbon monoxide or other emergencies are present.
Alarm Bell		An **Alarm** Bell is a device that makes a noise, for example with a bell, to warn people when there is a fire.
Smoke Detector		A **smoke detector** is a sensor that detects smoke as a primary indication of fire. It provides a signal to a fire alarm system in a large building, or produces an audible and visual signal locally in a room or a home.
Strobe Alarm/Light		**Strobe Lights** are designed to notify hearing impaired individuals of impending danger, they have no detection means and must be used in conjunction with operating Smoke, Heat, or Carbon Monoxide Alarms. ...

EXERCISE: Read the statements below and write True or False.

_____1. Smoke detector are designed to notify hearing impaired individuals of impending danger.

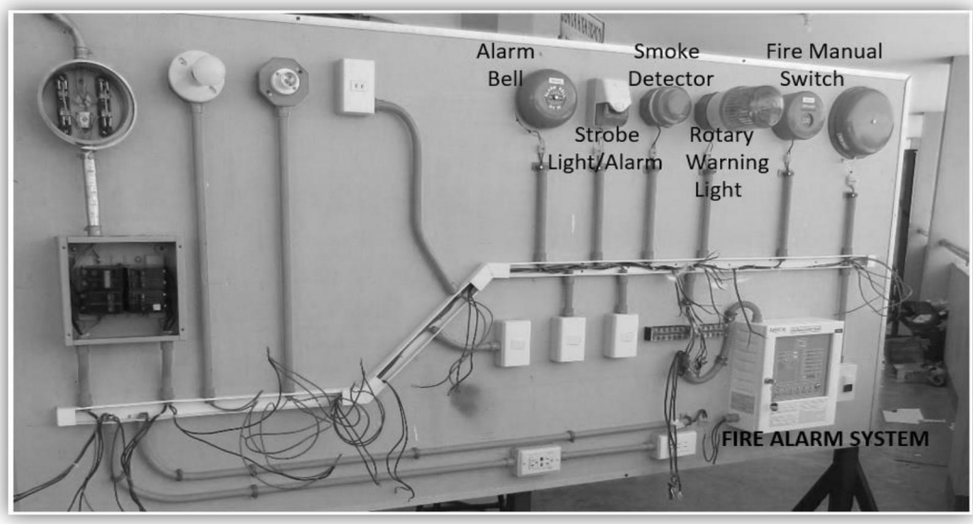
_____2. An Alarm Bell is a device that makes a noise.

_____3. Strobe Lights are device working together to detect and warn people through visual and audio appliances.

_____4. Fire alarm system has a number of devices working together to detect and warm people through visual and audio .

Name:	Date:	Score:
Subject: Electrical Installation and Maintenance NCII Migrated		
Lesson Title: **FIRE ALARM SYSTEM 2**		
Learning Competency: Install Electrical Protective Devices for Distribution, Power, Lightning, Auxiliary, Lighting Protection and Grounding Systems. (TLE_IAEI9-12EP-IIa-j-2)		
References: TESDA TR – Electrical Installation and Maintenance NCII		LAS No.: 19B

CONCEPT NOTES:



System Planning:

1. How can I estimate the Fire Alarm System load in Zone1 to SDN1 & SND2?
2. Where will I start the FAS power supplies 24volts & connections of load input to output?
3. How far will be the distance located from the FAS and load Zone1 and SND1,SND2?
4. Do you want to access your FAS properly?

EXERCISE: Perform the following Installation Procedure: (Refer to Manufacturer's Installation Guide & Schematic Diagram for FAS)

1. Choose FAS Location
2. Connect your cables and wiring supplies of the load zone1 & sdn1, sdn2
3. Power on your FAS and Run
4. Test the input (Zone1) and output (SDN1, SDN2)

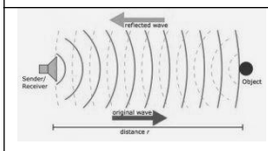
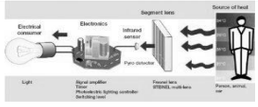
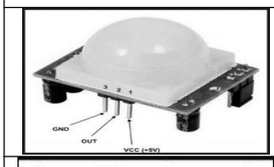
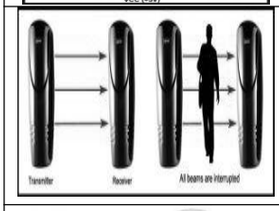
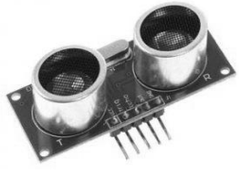
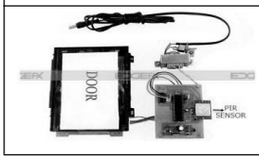
Criteria for Evaluation

Rubric/Criteria	%	Score
Physical FAS and Installation of Input Zone1 & Output SDN1, SDN2	20%	
Neatness of Wiring/Harness	20%	
Proper use of tools and equipment	20%	
Adherence to OHS in the Installation process	15%	
Serviceability	15%	
Overall Device functionality	10%	

Name:	Date:	Score:
Subject: Electrical Installation and Maintenance NCII Migrated		
Lesson Title: **INSTALL AUXILIARY – MOTION CENSORED DEVICE**		
Lesson Competency: Install Electrical Protective Devices for Distribution, Power, Lightning, Auxiliary, Lighting Protection and Grounding Systems. (TLE_IAEI9-12EP-IIa-j-2)		
References: https://www.edgefx.in/types-of-motion-sensors-working-and-applications/		LAS No.: 20

CONCEPT NOTES:

Motion sensors are commonly used in security systems. They work based on a wide variety of principles and are used in a wide variety of applications. Typical usage could be in the exterior doorways or windows of a building for monitoring the area around the building.

Picture	Types of Motion Sensor
	**Active Detector Sensors** emit the radio waves/ microwaves across a room or other place, which strike on nearby objects and reflect it back to the sensor detector.
	**Passive Motion Sensors** are opposite to active sensors, they do not send out anything, but it simply detects the infrared energy.
	**Passive Infrared Detectors** are looking the changes of infrared energy level that caused by movement of objects (human, pets… etc.).
	**Active infrared Detectors** use a dual beam transmission as structure, one side of a transmitter for emitting Infrared Ray, and the other side with a receiver for receiving the IR, it is suitable for the outdoor point to point interruption detection.
	**Ultrasonic detector** sends out high-frequency sound waves that are reflected back to the sensor. If any interruption occurs in the sound waves, the active ultrasonic sensor may sound the alarm.
	**Automatic Door Opening System Using PIR sensor** detects the presence of humans to perform door operations, i.e., opening and closing the door.

EXERCISE: Read the following statements. Write True or False

_____1. Active Detector Sensors are opposite to Passive Motion Sensors.

_____2. Active infrared Detectors use a single beam transmission as structure.

_____3. Ultrasonic sensor may sound the alarm when it detects interruption.

_____4. Automatic Door Opening System Using PIR sensor perform opening and closing the door.

Name:	Date:	Score:
Subject: Electrical Installation and Maintenance NCII Migrated		
Lesson Title: **WIRING DEVICES – LIGHTING - OUTLET**		
Lesson Competency: Install Wiring devices of floor and wall mounted outlets, lighting fixture/switches, and auxiliary outlets (TLE_IAEI9-12EL-IIIa-IVj-1)		
Reference: https://www.google.com/search?q=wiring+devices+lighting+outlets&source	LAS No.: 21	

Concept Notes: A Lighting Outlet is a point where fixed Lighting fixtures are Connected to a wiring system.

Types of Lighting Outlet	Uses
 **Receptacle**	A lighting outlet is a point where fixed lighting fixtures are connected to a wiring system.
 **Lamp Socket**	Lamp socket is a device which mechanically supports and provides electrical connections for a compatible electric lamp.
 **Pin Light**	PIN LIGHT is our new compact ULTRA NARROW LED SPOT designed to create dramatic lighting effects on façades and architectural surfaces.
 **Lamp Holder**	A lamp holder is the device for holding a light bulb or lamp. Most light fittings or luminaires have a lamp holder.
 **G U Socket**	These sockets are made to adapt lamps with GU10 and GU5.3 base, they are made of heat resistant ceramic with ready tap wires for convenience.

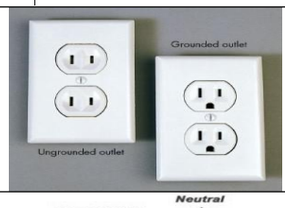
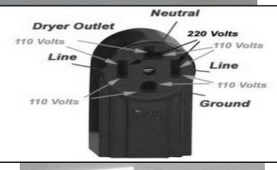
EXERCISE: Identification. Identify the wiring devices of Lighting – Outlet use in electrical wiring installations.

_____1. It is a device which mechanically supports and provides electrical connections for a compatible electric lamp.
_____2. It is the device for holding a light bulb or lamps.
_____3. It is a point where fixed lighting fixtures are connected to a wiring system.
_____4. They are made of heat resistant ceramic with ready tap wires for convenience.
_____5. It is a Ultra narrow Led spot.

Name:	Date:	Score:
Subject: Electrical Installation and Maintenance NCII Migrated		
Lesson Title: **WIRING DEVICE- CONVENIENCE OUTLET**		
Lesson Competency: Install wiring devices of floor and wall mounted outlets, lighting fixtures/switches, and auxiliary outlets. (TLE_IAEI9-12EL-IIIa-IVj-1)		
References:https://www.electronicproducts.com/Lighting/Research/6_kinds_of_electrical_outlets_you_can_install_in_your_home.aspx	LAS No.: 22	

CONCEPT NOTES:

A contact device installed at an outlet (the point on an electrical wiring system at which current is taken) for the connection of a portable lamp or appliance by means of a plug.

Types of Convenience Outlet	Picture	Description
GFCI outlets		A ground fault circuit interrupter, or GFCI for short, is meant to quickly shut off an outlet's power when it detects a short circuit or ground fault.
AFCI outlets		Short for "arc fault circuit interrupter," it protects from arcs, which happen when electricity jumps from one wire to another, which can result in a fire.
Standard Outlets		Standard outlets are the ones you see scattered about your home and office. You can plug in just about any small appliance to them
Range Outlets		A range outlet provides electricity specifically to your cooking range and is attached to its own circuit breaker.
USB Outlets		These USB outlets allow homeowners to plug in items that are charged using a USB connector,
Smart outlets		They're like regular outlets, but can be controlled from your smartphone

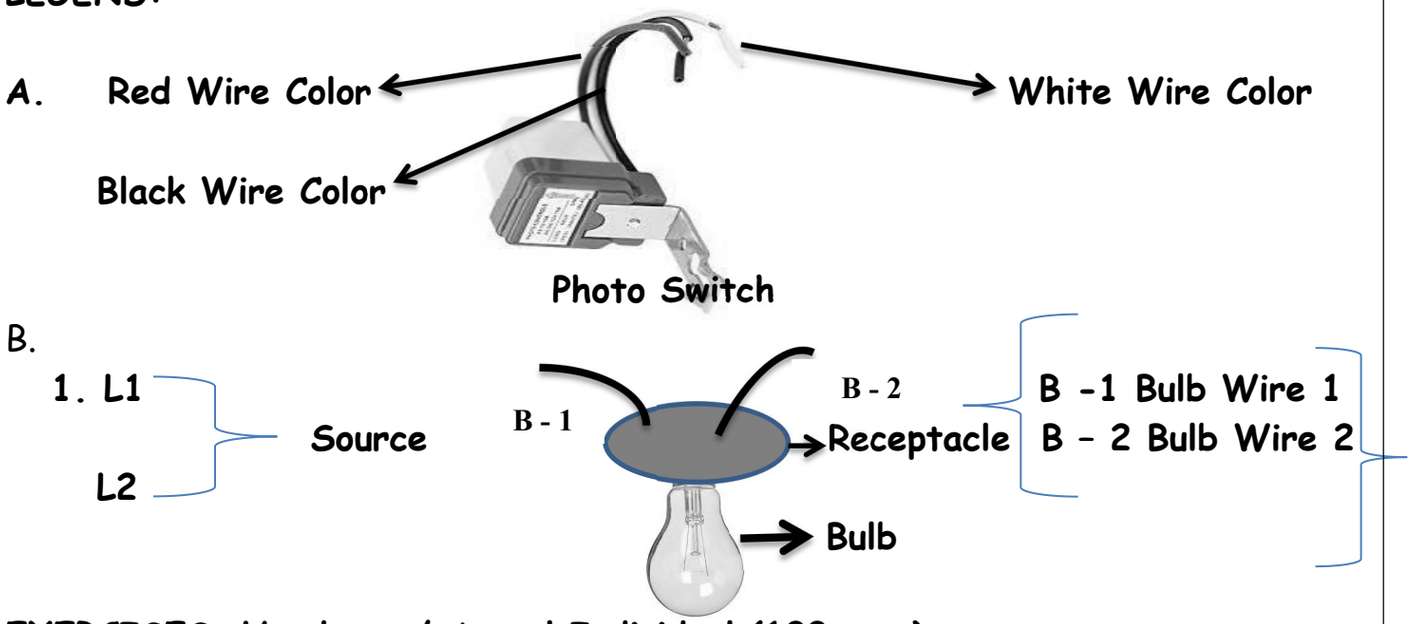
EXERCISE: Read the statements below and write TRUE or FALSE.

_____1. GFCI can trip off the circuit breaker when it detects short circuit.
_____2. AFCI outlet protect from fire
_____3. USB outlet allows to internet connection.
_____4. Smart outlet did not run without internet connection.

Name:	Date:	Score:
Subject: Electrical Installation And Maintenance NCII Migrated		
Lesson Title: **PHOTO CONTROL SWITCH**		
Lesson Competency: Install Wiring devices of floor and wall mounted outlets, lighting fixture/switches, and auxiliary outlets (TLE_IAEI9-12EL-IIIa-IVj-1) Enabling Skills: How to connect a Photo Control Switch		
Reference: https://www.google.com/search?q=photo+switch+images		LAS No.: 24

Concept Notes: Photo Switch is a sensor that detects the presence of light or a change in its intensity.

LEGEND:



EXERCISES: Hands on / Actual Individual (100 pts.)

Step to follow for connection

1. Connect line 1 to photo switch witch is **Black** color of wire.
2. Connect line 2 to the Bulb Wire 1(B1) and wire **White** of the photo switch.
3. Connect **Red** Wire of the photo switches to the Bulb Wire 2. (B2)
4. Cover the Photo Switch of polyethylene plastic cover, wait until 60 seconds to energized the photo switch.

PERFORMANCE RUBRIC

Legend: 4 – Excellent 3 – Good 2 – Fair 1 – Poor

SCALE	DESCRITION	POINTS
4	Excellent	93 – 100
3	Good	86 – 92
2	Fair	79 – 85
1	Poor	78 and below

EXCELLENT – The ability to follow the procedures direction with precision within 3 minutes as instructed. **GOOD** – Student was able to energize partially a wire connection beyond 3 minutes as directed. **Fair** – Student was not able to energize the wire connection as directed. **Poor** – Student

Name:	Date:	Score:
Subject: Electrical Installation And Maintenance NCII Migrated		
Lesson Title: **SINGLE POLE SWITCH CONNECTION**		
Lesson Competency: Install Wiring devices of floor and wall mounted outlets, lighting fixture/switches, and auxiliary outlets Enabling skills: How to Install Lighting outlet		
Reference:https://www.google.com/search?q=single+pole+switch+panasonic+brands		LAS No.: 25

Concept Notes: A Lighting Outlet is a point where fixed Lighting fixtures are Connected to a wiring system.

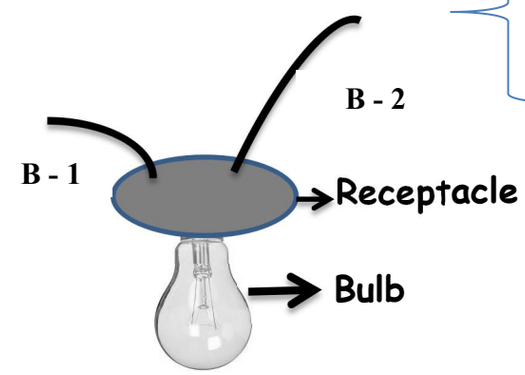
Install Lighting – Outlet

LEGEND

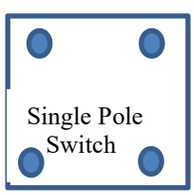
B – 1 Bulb Wire 1
B – 2 Bulb Wire 2

Legend:

1. L1
L2
Source



(Front of the Switch)



(Back of the Switch)

EXERCISES: Hands on / Actual Individual (100 pts.)

Step to follow for connection

1. Connect line 1 into B1 (bulb wire1)
2. Connect line 2 into Single Pole Switch to the lower hole
3. Connect B2 (bulb wire2) into Single Pole switch Upper hole.
4. Energize the Connection using the Single Pole Switch On and Off.

PERFORMANCE RUBRICS

Legend: 4 – Excellent 3 – Good 2 – Fair 1 – Poor

SCALE	DESCRITION	POINTS
4	Excellent	93 – 100
3	Good	86 – 92
2	Fair	79 – 85
1	Poor	78 and below

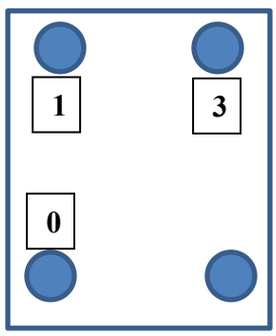
EXCELLENT – The ability to follow the procedures direction with precision within 3 minutes as instructed. **GOOD** – Student was able to energize partially a wire connection beyond 3 minutes as directed. **Fair** – Student was not able to energize the wire connection as directed. **Poor** – Student didn't attempt to energize a circuit / wire connection

Name:	Date:	Score:
Subject: Electrical Installation and Maintenance NCII Migrated		
Lesson Title: **THREE – WAY SWITCH CONNECTION**		
Lesson Competency: Install Wiring devices of floor and wall mounted outlets, lighting fixture/switches, and auxiliary outlets (TLE_IAEI9-12EL-IIIa-IVj-1)		
References: https://www.google.com/search?q=bulb+images&source https:// home.howstuffworks.com		LAS No.: 26

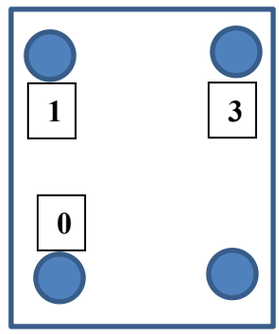
Concept Note: Three - way switch are used to control lights with two switches controlled by two separate switches can turn in On or Off.

LEGEND:

A.

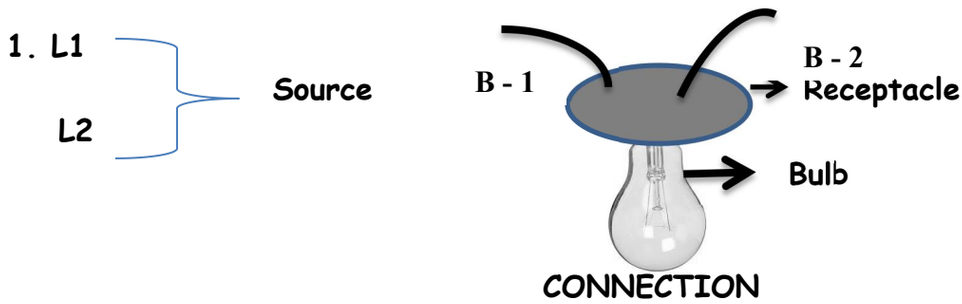


3 – Way Switch
(back of the switch)



3 – Way Switch
(back of the switch)

B.



CONNECTION

EXERCISE: Perform the following procedure:

Step to follow for connection:

1. Connect Line 1 of the circuit to Bulb wire 1 (B -1)
2. Connect Line 2 of the circuit to 3way switch denoted as terminal zero (0) located at the left side end of the circuit.
3. 3-way switch terminal 1, connect it to 3 – way switch terminal 1.
4. 3 way switch terminal 3, connect it to 3 – way switch terminal 3.
5. Connect Bulb wire 2 (B-2) to 3way switch terminal zero (0).

EXERCISES: Hands on / Actual Individual (100 pts)

PERFORMANCE RUBRIC **Legend: 4 – Excellent 3 – Good 2 – Fair 1 – Poor**

SCALE	DESCRITION	POINTS
4	Excellent	93 – 100
3	Good	86 – 92
2	Fair	79 – 85
1	Poor	78 and below

EXCELLENT – The ability to follow the procedures direction with precision within 3 minutes as instructed. **GOOD** – Student was able to energize partially a wire connection beyond 3 minutes as directed. **Fair** – Student was not able to energize the wire connection as directed. **Poor** – Student didn't attempt to energize a circuit / wire connection.

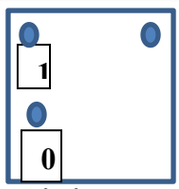
Name:	Date:	Score:
Subject: Electrical Installation And Maintenance NCII Migrated		
Lesson Title: **FOUR – WAY SWITCH CONNECTION**		
Lesson Competency: Install Wiring devices of floor and wall mounted outlets, lighting fixture/switches, and auxiliary outlets (TLE_IAEI9-12EL-IIIa-IVj-1) Enabling skills: How to Install a Four – Way Switch Connection		
References: https://www.google.com/search?q=bulb+images&source		LAS No.: 27

Concept Notes:

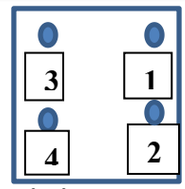
Conventional 4- way Light Switch Diagram is a circuit that uses three or more switches wherein the 4-way switch is installed between the two 3 – way switches or located both ends. They do not have on/off position like single switches.

LEGEND:

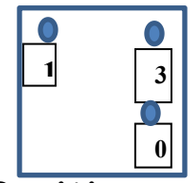
A.



3 – Way Switch
(back of the switch)



4 – Way Switch
(back of the switch)



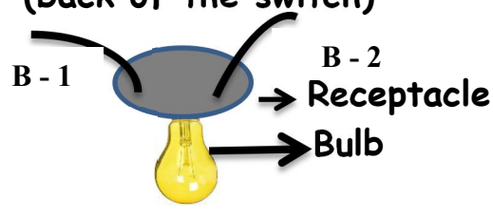
3 – Way Switch
(back of the switch)

B.

1. L1

L2

Source



EXERCISE: Do the following procedures:

The following are steps to follow for Connection.

1. Line 1 of the circuit connect it to Bulb wire 1 (B -1)
2. Bulb wire 2 (B - 2) connect it to 3way switch denoted as terminal zero (0) located at the right side end of the circuit.
3. L2 of the circuit connect it to 3way switch (0)
4. 3way switch # 1 connect it to 4way switch # 3
   3way switch # 3 connect it to 4way switch # 1
   4way switch # 4 connect it to 3way switch # 1
   4way switch # 2 connect it to 3way switch # 3

CRITERIA FOR EVALUATION

Legend: 4 – Excellent 3 – Good 2 – Fair 1 – Poor

SCALE	DESCRITION	POINTS
4	Excellent	93 – 100
3	Good	86 – 92
2	Fair	79 – 85
1	Poor	78 and below

EXCELLENT – The ability to follow the procedures direction with precision within 3 minutes as instructed. **GOOD** – Student was able to energize partially a wire connection beyond 3 minutes as directed. **Fair** – Student was not able to energize the wire connection as directed. **Poor** – Student didn't attempt to energize a circuit / wire connection.