


















Session: LT and HT Line Maintenance











Learning Objectives	Evaluation Criterion
<ul style="list-style-type: none"> • Explain the steps involved in maintenance of LT and HT power distribution lines • Identify the accessories installed on LT and HT lines, along with electrical switch gears and their components • Explain the PPE, safety tools and tackles required for working on preventive maintenance of overhead lines 	<p>Interactive Questioning</p>

















	Duration	60 Minutes
	Resources	PowerPoint Presentation, Whiteboard, Markers, Screen and Projector
	Facilitator's Notes	<p>In this session, take the participants through an interactive presentation with video snippets on the steps involved in maintenance of LT and HT power distribution lines. You will also help them identify the accessories installed on these lines, along with electrical switch gears and their components. Further, explain the PPE, safety tools and tackles required for working on preventive maintenance of overhead lines.</p>













End of Notes

















		1.	<p>Tell:</p> <p>Welcome to the video presentation on maintenance of low tension or LT and high tension or HT power distribution lines, accessories installed on these lines, electrical switch gears and their components.</p> <p>You will also know in detail about Personal Protective Equipment or PPE, safety tools and tackles required for taking up preventive maintenance on overhead lines.</p>
			<p>Facilitator's Notes:</p> <ul style="list-style-type: none"> • Display the slide • Read out the objectives and ask participants to note them down • Inform them that they will be asked questions during the session <p>End of Notes</p>
		2.	<p>Tell:</p> <p>By the end of this session, you will be able to:</p> <ul style="list-style-type: none"> • Explain the steps involved in maintenance of LT and HT power distribution lines • Identify the accessories installed on LT and HT lines, along with electrical switch gears and their components • Explain the PPE, safety tools and tackles required for working on preventive




			maintenance of overhead lines
		3.	<p>Tell:</p> <ul style="list-style-type: none"> Preventive maintenance is carried out for safe and proper functioning of distribution lines, machines and equipment throughout their usable life Such maintenance helps reduce breakdowns and unplanned shutdowns It also helps improve the reliability and quality of supply, and reduces maintenance costs <p>Preventive maintenance is taken up as per a periodic schedule. Maintenance is taken up only after getting the planned shutdown approvals and Permit to Work or PTW with regard to a particular LT feeder.</p> <p>Let us first see how low tension line maintenance is done.</p>
		4.	<p>Tell:</p> <p>Before starting work, the team makes certain preparations, like checking tools and wearing personal protective equipment.</p> <p>Facilitator's Note:</p> <p>Click to play the video.</p>
		5.	<p>Tell:</p> <p>The discharge rod is used for discharging the line or live equipment before working on the equipment. The front of the discharge rod is known as capsule. The equipment is discharged with the help of the hook on the rod and the clamp.</p> <p>Facilitator's Note:</p> <p>Continue to play the video.</p>
		6.	<p>Tell:</p> <p>Gloves are designed for use on LT lines.</p> <p>Linemen also wear the safety harness before climbing poles.</p> <p>Ask:</p> <p>Have you ever seen danger boards?</p> <p>Responses:</p> <ul style="list-style-type: none"> No Yes <p>Ask:</p> <p>Where have you seen them?</p> <p>Possible Responses:</p> <ul style="list-style-type: none"> Electricity poles At places where there is high voltage <p>Ask:</p> <p>Why is a danger board used?</p> <p>Possible Responses:</p> <ul style="list-style-type: none"> To make sure no one touches the electrical board To prevent people from harm <p>Tell:</p> <p>That's right. Danger boards are used on poles and electrical equipment as a warning</p>

			<p>and to avoid accidents.</p> <p>Facilitator’s Note: Click to play the video.</p>
		7.	<p>Tell: A safety chain is used for grounding the line after discharging it. Lock-out tags are placed on the equipment before starting work. The tags are removed once the work is completed.</p> <p>Facilitator’s Note: Continue to play the video.</p>
		8.	<p>Tell: Pipe wrench is used to open or close the conduit, GI pipes and valves. The common size of the wrench is 10 inches. Nose pliers help in cutting and holding wires, and for bending, re-positioning or snipping them. Adjustable wrench is used to open and close nuts and bolts.</p> <p>Facilitator’s Note: Continue to play the video.</p>
		9.	<p>Tell: Hammer is used for hammering items wherever required. It is important that the wooden handle of the hammer is firmly fixed to the hammer head. It should not be loose, as linemen may otherwise get injured in case the head comes off.</p> <p>Ask: Why do you think an insulation tape is used?</p> <p>Possible Responses: It is used to insulate electrical wires and other materials that conduct electricity.</p> <p>Facilitator’s Note: Appreciate the correct responses.</p> <p>Tell: Insulation tape is available in different colours – red, yellow, blue and black. HT Tape is an excellent protective over-wrap for terminating high-voltage cables. It is good for insulating and splicing high tension electrical connections.</p> <p>Facilitator’s Note: Continue to play the video.</p>
		10.	<p>Tell: CRC spray is used to clean the carbonised portions of the equipment. Hydraulic crimping tool is utilised for crimping the 630 and 300 sq mm sockets. There are also other dies for 150, 95, 50 and 25 sq mm sockets and ferrules.</p> <p>Facilitator’s Note: Continue to play the video.</p>
		11.	<p>Tell: Hacksaw is a fine-toothed saw, originally meant for cutting metal. Tree saw is used for cutting or trimming trees.</p>

			<p>Facilitator’s Note: Continue to play the video.</p>
		12.	<p>Tell: You have seen the lock out and tag out tags. They are placed as a lock or tag in front of the switchgear after switching off the equipment.</p> <p>Facilitator’s Note: Click to play the video.</p> <p>Tell: You can notice here the name, department, date and complaint or PTW number written on the tag.</p>
		13.	<p>Tell: Let us now see how a tree saw is used for trimming the branches of a tree.</p> <p>Facilitator’s Note: Click to play the video.</p>
		14.	<p>Tell: Let us next look at the safety measures to be taken for LT line maintenance. Here, the lineman is about to climb the pole for discharging the line.</p> <p>Facilitator’s Note: Click to play the video.</p>
		15.	<p>Tell: Before climbing the pole, he wears the safety belt, rope and helmet.</p> <p>Facilitator’s Note: Continue to play the video.</p>
		16.	<p>Tell: Here, the lineman is connecting the discharge rod earth lead with a clamp. He then discharges the line by connecting it to the earth.</p> <p>Facilitator’s Note: Continue to play the video.</p>
		17.	<p>Tell: Once the line is discharged, the discharge rod is hung on the wire as shown.</p> <p>Facilitator’s Note: Continue to play the video.</p>
		18.	<p>Tell: After the line is discharged, the lineman will short all the three phase lines for additional safety. This is done with the help of grounding or short chain.</p> <p>Facilitator’s Note: Continue to play the video.</p>
		19.	<p>Tell:</p>

			<p>Once the line is short, the lineman starts working on it.</p> <p>Facilitator's Note: Continue to play the video.</p>
		20.	<p>Tell: The helper provides the 'D' clamp and duster with the help of the rope. The duster is used for cleaning bushings and accessories fitted on the overhead line.</p> <p>Facilitator's Note: Continue to play the video.</p>
		21.	<p>Tell: The lineman fixes the D clamp and extension loop or ghodi properly. Then, he will connect the service line with the D-clamp. If there is any carbon or fault in the lines, this will affect the D-clamp, while keeping the main conductors of the line safe.</p> <p>Facilitator's Note: Continue to play the video.</p>
		22.	<p>Tell: Dust on the equipment is removed with the help of a blower as part of preventive maintenance. Here, the lineman is using the blower to clean the dust on LT Air Circuit Breaker (LT ACB).</p> <p>Facilitator's Note: Click to play the video.</p>
		23.	<p>Tell: Displayed here are the relays for proper settings.</p> <p>Facilitator's Note: Continue to play the video.</p>
		24.	<p>Tell: The chambers are cleaned with CRC spray to clear any carbon layer. Male and female contacts are cleaned by emery paper.</p> <p>Facilitator's Note: Continue to play the video.</p>
		25.	<p>Tell: Let us now know about the maintenance of HT 11 KV overhead high tension lines.</p> <p>We will go through the steps involved in maintenance of HT lines, accessories, electrical switch gears and their components.</p> <p>We will also know the details of Personal Protective Equipment (PPE), safety and other tools and tackles required for preventive maintenance of HT overhead lines.</p> <p>Preventive maintenance is taken up as per the periodical schedules fixed. Maintenance is carried out only after getting the planned shutdown approval and Permit to Work (PTW) on a particular HT feeder, so that the power supply from the system remains disconnected.</p> <p>Let us see the procedure for HT overhead line maintenance. The complete HT feeder should be switched 'OFF' after receiving the planned shutdown approval and PTW.</p>

			HT overhead line is discharged to the earth and short circuited from both ends. This ensures that no supply back feeds into the working area.
		26.	<p>Tell:</p> <p>Here, you can see that the Double Pole or DP structure is surrounded by the branches of a tree.</p> <p>Facilitator's Note:</p> <p>Click to play the video.</p>
		27.	<p>Tell:</p> <p>You can see the tree cutter and hack saw being used for trimming the trees.</p> <p>Facilitator's Note:</p> <p>Continue to play the video.</p>
		28.	<p>Tell:</p> <p>Here, you can notice that the lineman is repairing the LT cable joints.</p> <p>Facilitator's Note:</p> <p>Continue to play the video.</p>
		29.	<p>Tell:</p> <p>The lineman has fist tightened the sockets before covering the cable with the LT tape.</p> <p>Facilitator's Note:</p> <p>Continue to play the video.</p>
		30.	<p>Tell:</p> <p>The old and worn-out DD fuse units are being replaced as part of preventive maintenance.</p> <p>Facilitator's Note:</p> <p>Continue to play the video.</p>
		31.	<p>Tell:</p> <p>You have seen how the DD fuse is replaced. Now, we will see how the jumpers of a DD fuse unit are changed.</p> <p>The old worn-out DD fuse unit is being replaced with that of a new unit.</p> <p>Facilitator's Note:</p> <p>Click to play the video.</p>
		32.	<p>Tell:</p> <p>The burnt DD fuse jumpers are being replaced with new jumpers.</p> <p>Facilitator's Note:</p> <p>Continue to play the video.</p>
		33.	<p>Tell:</p> <p>The lineman is fixing jumpers in the new DD fuse assembly at the pole. He then cleans the porcelain insulators.</p> <p>Facilitator's Note:</p>

			Continue to play the video.
			<p>Tell:</p> <p>With this, you have seen how LT and HT lines are maintained.</p>
Key Learning Outcomes			
		34-35.	<p>Tell:</p> <p>Let us now quickly recollect the key points of this session.</p> <ul style="list-style-type: none"> • Preventive maintenance is carried out periodically to ensure that machines and equipment are safe and in a good working condition • A discharge rod is used for discharging the line or live equipment before working on that equipment • The important safety tools used include gloves, safety harness, danger boards, safety chain, lock out and tag out tags and other tools • Hydraulic crimping tool is used to crimp the 630 and 300 square millimetre sockets • A blower is used to clean the dust accumulated in switchgears • HT Handle is used to switch the equipment On or Off • D clamps are used on line conductors to avoid carbon and hot spots in the main line conductor • Spacers are used to provide gaps on overhead lines • A tree saw is used for trimming trees