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# ELECTRICAL MACHINE WINDING TECHNICIAN



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CBT Curriculum

National Vocational Certificate Level 1

Version 1 - September, 2018



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## Introduction

The Technical and Vocational Education and Training (TVET) sector in Pakistan is passing through a transition period of shifting from a traditional supply and time based training model to a Competency Based Training. In order to build capacity of the technical and vocational Training Institutes in Pakistan, through provision of demand driven Competency Based Trainings, the NAVTTC and TVET Sector Support Program (TSSP) have joined hands together to develop qualifications for Electrical Sector. These qualifications will not only build the capacity of existing workers of the sector but would also support the youth to acquire skills best fit for this sector. The benefits and impact of development of these qualifications will be both on demand and supply side.

Based upon demand of the industry, these competency-based qualifications for “**Electrical Machine Winding Technician**” are developed under the National Vocational Qualification Framework (NVQF)(Level 1 to 4). The qualifications cover the competencies based on required knowledge, skills and professional attitude which are essential for getting a job or seeking self-employment.

These qualifications are also in line with the vision of Pakistan’s National Skills Strategy (NSS), National TVET Policy and National Vocational Qualification Framework (NVQF). This provides policy directions, support and an enabling environment to the public and private sectors to impart training for skills development to enhance social and economic profile. The National Vocational & Technical Training Commission (NAVTTC) has approved the Qualification Development Committee (QDC). The QDC consist of experts from the relevant industry belonging to different geographical locations across the country and academicians who were consulted during the development process to ensure their input and ownership of all the stakeholders. The National Competency Standards have been used as a reference document for the development of this curricula to be followed by the training institutions across the country.

### 1.1 Competencies to be gained after completion of the course

The detail of competency standards included in these qualifications is given below:

#### **National Vocational Certificate level 1, in (Electrical Sector) “Electrical Machine Winding Technician”**

- Comply with Work Health and Safety Policies

- Obey the Workplace Policies and Procedures
- Follow Basic Communication Skills (General)
- Operate Computer Functions(General)
- Perform Safe Transportation of Faulty Machine

**National Vocational Certificate level 2, in (Electrical Sector) “Electrical Machine Winding Technician”**

- Comply Personal Health and Safety Guidelines
- Communicate the Workplace Policy and Procedure
- Perform Basic Communication (Specific)
- Perform Basic Computer Application (Specific)
- Maintain Tools/ Equipment and Machinery
- Perform on-site Inspection/testing of machine
- Carry out Mechanical De- Installation of Machine
- Ensure Electrical isolation of Machine

**National Vocational Certificate level 3, in (Electrical Sector) “Electrical Machine Winding Technician”**

- Apply Work Health and Safety Practices (WHS)
- Identify and Implement Workplace Policy and Procedures
- Communicate at Workplace
- Perform Computer Application Skills
- Manage Personal Finances

- Disassemble Machine at Workshop
- Estimate repair /replacement cost
- Diagnose fault of machine (motor)
- Perform Motor Rewinding
- Perform Transformer Rewinding
- Carry out Re- Assembly of Machine

**National Vocational Certificate level 4, in (Electrical Sector) “Electrical Machine Winding Technician”**

- Contribute to Work Related Health and Safety (WHS) Initiatives
- Analyse Workplace Policy and Procedures
- Perform Advanced Communication
- Develop Advance Computer Application Skills
- Manage Humane resources
- Develop Entrepreneurial Skills
  
- Repair / replace allied parts of machine (Motor)
  
- Repair / replace allied parts of machine (Transformer)

## 1.2 Purpose of training

The aim of the training is to produce employable skilled manpower to improve the existing capacity of Electrical sector. This training will provide the requisite skills, knowledge and competence to the trainees to carry out **winding of Electrical Machines (Motor & Transformer) and Repair/replace allied parts of electrical machines** as well. It will also enable the existing skilled workers who gained their competencies in the said field through informal and non formal means of training and who are desirous to recognize their competence level through the assessment tool of Recognition of Prior Learning (RPL). This training will enable them to meet the challenges in the field as “**Electrical Machine Winding Technician**” in the industry and will prepare such a competitive skilled workforce who will be globally acceptable and the unemployed youth who get the training will find employment or become successful entrepreneurs

## 1.3 Overall objectives of training program

The Electrical Machine Winding Technician Qualifications level 1-4 consists of the theoretical and practical details along with the professional attitude of technicians required to perform the tasks assigned as a **Electrical Machine Winding Technician** in electrical industries/Workshop. The main objectives of the qualification are as follows:

- Performing on-site Testing/ Inspection of E/ Machine
- Carrying out Electrical isolation of Machine
- Carrying out Mechanical de coupling of Machine
- Performing safe transportation of faulty Machine
- Disassembling of faulty Machine
- Detecting faults in E/ Machine
- Performing Cost estimation for the repair/ replacement work
- Repairing /replacement of allied parts of Electric Machine (Motor/Transformer)
- Maintaining Tools/ equipment and Machinery
- Carrying out Rewinding of Motor/ Transformer
- Re-assembling of Electric machine
- Development of entrepreneurial skills

## 1.4 Date of Validation

The level 1-4 of National vocational qualification on **Electrical Machine Winding Technician** has been validated by the Qualifications Development Committee (QDC) members on-12/11/2019-----and will remain in currency until Oct. 2022.



## 1.5 Codes of Qualifications

The International Standard Classification of Education (ISCED) is a framework for assembling, compiling and analyzing cross-nationally comparable statistics on education and training. ISCED codes for these qualifications are assigned as follows:

ISCED Classification for Electrical Machine Winding Technician level 1-4	
Code	Description
<b>0713 E&amp;E 024</b>	National Vocational Certificate level 1, in (Electrical Sector) “Electrical Machine Winding Technician”
<b>0713 E&amp;E 025</b>	National Vocational Certificate level 2, in (Electrical Sector) “Electrical Machine Winding Technician”
<b>0713 E&amp;E 026</b>	National Vocational Certificate level 3, in (Electrical Sector) “Electrical Machine Winding Technician”
<b>0713 E&amp;E 027</b>	National Vocational Certificate level 4, in (Electrical Sector) “Electrical Machine Winding Technician”

## 1.6 Members of Qualifications Development Committee

The following members participated in the qualifications development and of these qualifications:

S#	Name	Designation	Contact No	Email	Organization	Role in Q. D. C
1.	Mr. Arif Hussain Shah	Sr. Manager Electrical			Pak China Chemicals, Faisalabad	Work shop Participants
2.	Mr. Jaffar Ali	Motor Winder / Owner			Mian Electric, Lahore	Work shop Participants
3.	Mr. Aqeel Ahmad	Motor Winder / Owner			Hafiz Electric Repairing Works, Lahore	Work shop Participants
4.	Engr. Safdar Ali	Deputy Manager Technical			Millat Equipment Ltd., Lahore	Work shop Participants

S#	Name	Designation	Contact No	Email	Organization	Role in Q. D. C
5.	Mr. Muhammad Naheed	Electrical Motor Winder			Creative Electronics – Sky Power, Lahore	Work shop Participants
6.	Mr. Zafar Iqbal	Director			Zafar Electric and Mechanical Workshop, Gujranwala.	Work shop Participants
7.	Mr. Afzal Bashir	Senior Instructor			P-TEVTA, GCT, Sialkot	Work shop Participants
8.	Mr. Hakim Ali Ujjan	Assistant Professor			S-TEVTA, GCT, Hyderabad	Work shop Participants
9.	Mr. M. Mahboob Butt	Chief Instructor	0335-4004652	<a href="mailto:mmahboobbutt@gmail.com">mmahboobbutt@gmail.com</a>	P-TEVTA, GCT, Sahiwal	Work shop Participants
10.	Mr. Umar Zaman Khan	Assistant Professor			KP-TEVTA, GCT, Swat	Work shop Participants
11.	Mr. Maqsood Ahmad	Chief Instructor			PVTC / VTI, Lahore	Work shop Participants
12.	Mr. Abdul Razzaq	Senior Instructor			P-TEVTA, GCT, Gujranwala	Work shop Participants
13.	Mr. Ahmed Bux Lilla	Manager			Transfopower, Lahore	Work shop Participants
14.	Mr. Ibrahim Sarfraz	Application Engineer			KSB Pumps, Lahore	Work shop Participants
15.	Engr. Abdul Maqsood	Principal / DACUM Facilitator	0300-9030560	<a href="mailto:Wadood22@yahoo.com">Wadood22@yahoo.com</a>	KP-TEVTA, Mardan	DACUM Facilitator
16.	Mr. Ayoub Elahi	Data Center Officer	0323-9877097	<a href="mailto:ayoubelahi@hotmail.com">ayoubelahi@hotmail.com</a>	UOL, Lahore	Co Facilitator
17.	Mr. Saad Saeed	Provincial Coordinator			GFA, Lahore	Provincial Coordinator

## 1.7 Entry level of trainees

The entry requirement for National Vocational Certificate level 1-4, in (Electrical Sector) “Electrical Machine Winding Technician” are given below:

Title	Entry requirements
National Vocational Certificate	Entry for assessment for this qualification is open. However, entry into formal training

Title	Entry requirements
level 1, in (Electrical Sector) “Electrical Machine winding Technician”	institutes, based on this qualification may require skills and knowledge equivalent to middle (school /Grade 8 certificate).
National Vocational Certificate level 2, in (Electrical Sector) “Electrical Machine Winding Technician”	Entry for assessment for this qualification is open. However entry into formal training institute for this qualification is a person having National Vocational Certificate level 1, in (Electrical Sector) “Electrical Machine Winding Technician”
National Vocational Certificate level 3, in (Electrical Sector) “Electrical Machine Winding Technician”	Entry for assessment for this qualification is open. However entry into formal training institute for this qualification is a person having National Vocational Certificate level 2, in (Electrical Sector) “Electrical Machine Winding Technician”
National Vocational Certificate level 4, in (Electrical Sector) “Electrical Machine Winding Technician”	Entry for assessment for this qualification is open. However entry into formal training institute for this qualification is a person having National Vocational Certificate level 3, in (Electrical Sector) “Electrical Machines Winding Technician”

**a. Minimum qualification for teachers/instructor**

- Should have completed intermediate or equivalent qualifications
- Must be a holder of G -I Certificate or Three years DAE in Electrical Technology.
- Must be able to communicate effectively
- Must have at least 4 years teaching experience.

**b. Medium of Instruction**

Urdu, local language

**c. Duration of the course**

The proposed curriculum is composed of **32 Modules** that will be covered in 1800 **Learning hours**.

The distribution of contact hours is given below:

Total contact Hrs = 1800 Or Credit hours =180

**Theory: 360 hours (20%)**

**Practical: 1440 hours (80%) institute com industry attachment**

## 2. Categorization and Levelling of the Competency Standards

Code	NVQF-Level	S#	Name of Duty or (Module)	Category	Level Description	Learning Hours	Credit Hours
101200826	Level-1	1	Comply with work health and safety policies	Generic	1	30	3
101200827		2	Obey the workplace policies and procedures	Generic	1	20	2
101200828		3	Follow Basic Communication Skills (General)	Generic	1	50	5
061100855		4	Operate Computer Functions(General)	Generic	1	50	5
0713001124		5	Perform Safe Transportation of Faulty Machine	Technical	1	90	9
<b>Total Learning &amp; Credit Hours of Level – 1</b>						<b>240</b>	<b>24</b>

### 3. Overview of the curriculum for “ Electrical Machine Winding Technician” (Level 1-4)

Module Title and Aim	Learning Units	Theory <sup>1</sup> Days/hours	Workplace <sup>2</sup> Days/hours	Timeframe of modules
<b>Module A. Perform Safe Transportation of Faulty Machine</b>	<b>LU1.</b> Prepare for work to perform safe transportation of fault machine <b>LU2.</b> Install/Adjust Tri Pod and chain Block to lift the Machine <b>LU3.</b> Lift the Machine through Tri Pod and chain block <b>LU4.</b> Load Machine on the Loader <b>LU5.</b> Load machine on Fork Lifter <b>LU6.</b> Ensure safe shifting of Machine to Workshop <b>LU7.</b> Ensure safe unloading of Machine at Workshop <b>LU8.</b> Maintain Inventory Record	<b>18</b>	<b>72</b>	<b>90</b>
<b>Module B.</b> Comply with Work Health and Safety Policies	<b>Lu1.</b> Work safely at work place <b>Lu2.</b> Communicate work health and safety (WHS) assess at work place <b>Lu3.</b> Minimize risks to personal safety at work place <b>Lu4.</b> Minimize risks to public safety	<b>6</b>	<b>24</b>	<b>30</b>
<b>Module C.</b> . Obey the Workplace Policies and Procedures	<b>LU1.</b> Obey the workplace personal appearance and hygiene <b>LU2.</b> Follow work ethics <b>LU3.</b> Demonstrate the Work place behaviors <b>LU4.</b> Communicate workplace policy& procedures	<b>4</b>	<b>16</b>	<b>20</b>

	<b>LU5. Review the implementation of workplace policy &amp; procedures</b>			
<b>Module D.</b> Follow Basic Communication Skills (General)	<b>LU1. Adopt Effective listening to Skills</b> <b>LU2. Develop Non verbal communication with peers</b> <b>LU3. Prepare for Interview to get a job</b> <b>LU4. Use communication platform at workplace</b> <b>LU5. Identify communication barriers to improve interpersonal skills</b>	10	40	50
<b>Module E.</b> Operate Computer Functions (General)	<b>LU1. Set up the computer for use</b> <b>LU2. Organize files in folder</b> <b>LU3. Shut down computer system</b>	10	40	50

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Module-A  
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## 4. Detail of Modules

# Part-I Core/Technical Modules

### Module A: 0713001124 Perform Safe Transportation of Faulty Machine

**Objective:** This Module covers the knowledge & skills required to Perform Safe Transportation of Faulty Machine through Prepare for work, Install/Adjust Tri Pod and chain Block to lift the Machine, Lift the Machine through Tri Pod and chain block, Load Machine on the Loader, Load machine on Fork Lifter, Ensure safe shifting of Machine to Workshop, Ensure safe unloading of Machine at Workshop, Maintain Inventory Record

Duration: 90 Hours

Theory: 18 Hours

Practice: 72 Hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Prepare for work to perform safe transportation of faulty machine	<p><b>The trainee is able to:</b></p> <ul style="list-style-type: none"> <li>Identify the required PPE's</li> <li>Collect the required PPE's</li> <li>Identify the required tools and equipment</li> <li>Collect the required tools and equipment</li> <li>Ensure functional condition of PPE's/Tools and</li> </ul>	<ul style="list-style-type: none"> <li>Prepare list Recognition of required Tools, Equipment and PPEs for mechanical De-Installation of Machine</li> <li>Procedure and Importance of risk Assessment techniques for checking</li> </ul>	<p><b>Th.</b> 2 Hrs. <b>Pr.</b> 4Hrs.</p>	<p><b>Tools</b></p> <ul style="list-style-type: none"> <li>Screw driver set</li> <li>Combination plier</li> <li>Spanner set</li> <li>Allen key set</li> <li>Portable search light</li> <li>Adjustable Screw Wrench</li> <li>Pipe Wrench</li> <li>Hammer</li> <li>Hack Saw</li> <li>Cold Chisel</li> </ul> <p><b>Consumable Material</b></p>	Class room/Lab/ Workshop

	<p>equipment</p> <ul style="list-style-type: none"> <li>• Ensure safe working conditions</li> <li>➤ Clear Passage</li> <li>➤ Cleanliness</li> <li>➤ Adequate light</li> <li>➤ Ventilation</li> </ul>	<p>physical conditions/status of Electrical Machines(Mot or And Transformer)</p> <ul style="list-style-type: none"> <li>• Importance of functional conditions of required Tools, Equipment and PPEs and their use</li> <li>• Importance of safe working condition regarding</li> <li>• Clear passage</li> <li>• Cleanliness</li> <li>• Adequate light</li> <li>• Ventilation</li> </ul>		<ul style="list-style-type: none"> <li>• Safety Gloves</li> <li>• Tags</li> </ul>	
<p><b>LU2.</b> Install/Adjust Tri Pod and chain Block to lift the Machine</p>	<p><b>The trainee is able to:</b></p> <ul style="list-style-type: none"> <li>• Wear the required PPE's</li> <li>• Pick the required tools and equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Importance and use of required PPEs</li> <li>• Describe use of chain Block and Tri-Pod</li> </ul>	<p><b>Th.</b> <b>2 Hrs.</b> <b>Pr.</b> <b>16 Hrs.</b></p>	<p><b>Tools</b></p> <ul style="list-style-type: none"> <li>• Combination plier</li> <li>• Spanner Set</li> <li>• Hammer</li> <li>• Cold Chisel</li> <li>• Tri-Pod</li> </ul>	<p>Class room/Lab/ Workshop</p>

	<ul style="list-style-type: none"> <li>• Prepare place for installation of tripod and chain block</li> <li>• Install tripod and chain block</li> <li>• Adjust tripod and chain block</li> </ul>	<ul style="list-style-type: none"> <li>• Preparation of Place for installation of Tri-Pod and Chain Block</li> <li>• Installation Techniques of Tri-Pod and Chain Block</li> <li>• Adjustment/Balancing Techniques of Tri-Pod and Chain Block</li> </ul>		<ul style="list-style-type: none"> <li>• Chain Block</li> <li>• Toe Bar</li> </ul> <p><b>Consumable Material</b></p> <ul style="list-style-type: none"> <li>• Safety Gloves</li> <li>• Tags</li> </ul>	
<p><b>LU3.</b> Lift the Machine through Tri Pod and chain block</p>	<p><b>The trainee is able to:</b></p> <ul style="list-style-type: none"> <li>• Wear the required PPE's</li> <li>• Pick the required tools and equipment</li> <li>• Identify eye bolt/hook of the machine</li> <li>• Fasten chain using U bolt shackle with eye bolt/hook of machine</li> <li>• Lift the machine up to safe and</li> </ul>	<ul style="list-style-type: none"> <li>• Importance and use of required PPEs</li> <li>• Importance and use of Eye Bolt/Hook</li> <li>• Fastening Techniques of Chain Block with Machine</li> <li>• Use of U shackle Bolt for fastening</li> <li>• Method of lifting machine</li> </ul>	<p><b>Th.</b> <b>3Hrs.</b> <b>Pr.</b> <b>16 Hrs.</b></p>	<p><b>Tools</b></p> <ul style="list-style-type: none"> <li>• Combination plier</li> <li>• Spanner Set</li> <li>• Hammer</li> <li>• Cold Chisel</li> <li>• Tri-Pod</li> <li>• Chain Block</li> <li>• Toe Bar</li> <li>• U shackle Bolt</li> </ul> <p><b>Consumable Material</b></p> <ul style="list-style-type: none"> <li>• Safety Gloves</li> </ul>	<p>Class room/Lab/ Workshop</p>

	required height	with the help of Tri-Pod and Chain Block			
<b>LU4.</b> Load Machine on the Loader	<p><b>The trainee is able to:</b></p> <ul style="list-style-type: none"> <li>• Wear the required PPE's</li> <li>• Pick the required tools and equipment</li> <li>• Ensure right positioning of loader for loading the machine</li> <li>• Perform loading of machine on the loader</li> <li>• Un-bolt the U bolt shackle of chain from eye bolt/hook of machine</li> <li>• Fasten the machine at loader</li> </ul>	<ul style="list-style-type: none"> <li>• Importance and use of required PPEs</li> <li>• Selection of loader according to size and weight of Machine</li> <li>• Importance of safe and secure positioning of loader for lifting the machine</li> <li>• Describe the loading procedure of machine on the loader using Tri-Pod and Chain Block</li> <li>• Un-Bolting the U shackle of</li> </ul>	<p><b>Th.</b> <b>2 Hrs.</b></p> <p><b>Pr.</b> <b>10 Hrs.</b></p>	<p><b>Tools</b></p> <ul style="list-style-type: none"> <li>• Combination plier</li> <li>• Spanner Set</li> <li>• Hammer</li> <li>• Cold Chisel</li> <li>• Tri-Pod</li> <li>• Chain Block</li> <li>• Toe Bar</li> <li>• U shackle Bolt</li> <li>• Wooden Wedges/Used old Tyre</li> </ul> <p><b>Consumable Material</b></p> <ul style="list-style-type: none"> <li>• Safety Gloves</li> <li>• Tags</li> </ul>	Class room/Lab/Workshop

		Tri-Pod from machine and fastening Technique of machine at loader for safe Transportation			
<b>LU5.</b> Load machine on Fork Lifter	<p><b>The trainee is able to:</b></p> <ul style="list-style-type: none"> <li>• Wear the required PPE's</li> <li>• Pick the required tools and equipment</li> <li>• Ensure right positioning of fork lifter to load the machine</li> <li>• Ensure safe loading of machine on the fork lifter</li> </ul>	<ul style="list-style-type: none"> <li>• Importance and use of required PPEs</li> <li>• Define Fork Lifter</li> <li>• Selection of right Fork Lifter according to size and weight of Machine</li> <li>• Importance of safe and secure positioning of Fork Lifter for lifting the machine</li> <li>• Describe the loading procedure of</li> </ul>	<p><b>Th.</b> <b>2 Hrs.</b></p> <p><b>Pr.</b> <b>12 Hrs.</b></p>	<p><b>Tools</b></p> <ul style="list-style-type: none"> <li>• Fork Lifter</li> <li>• Toe Bar</li> <li>• Fastening Belt</li> </ul> <p><b>Consumable Material</b></p>	Class room/Lab/ Workshop

		machine on the Fork Lifter			
<b>LU6.</b> Ensure safe shifting of Machine to Workshop	<p><b>The trainee is able to:</b></p> <ul style="list-style-type: none"> <li>• Wear the required PPE's</li> <li>• Pick the required tools and equipment</li> <li>• Fasten properly machine at loader / fork lifter to avoid slipping during transportation</li> <li>• Perform safe shifting of Machine to Workshop</li> </ul>	<ul style="list-style-type: none"> <li>• Importance and use of required PPEs</li> <li>• Fastening Techniques of Machine at Loader/Fork Lifter</li> <li>• Importance of safe and secure shifting of Machine to workshop</li> </ul>	<p><b>Th.</b> <b>3 Hrs.</b></p> <p><b>Pr.</b> <b>7 Hrs.</b></p>	<p><b>Tools</b></p> <ul style="list-style-type: none"> <li>• Fork Lifter</li> <li>• Toe Bar</li> <li>• Fastening Belt</li> <li>• Chain Block</li> <li>• Tri-Pod</li> <li>• Loader</li> </ul> <p><b>Consumable Material</b></p>	Class room/Lab/ Workshop
<b>LU7.</b> Ensure safe unloading of Machine at Workshop	<p><b>The trainee is able to:</b></p> <ul style="list-style-type: none"> <li>• Wear the required PPE's</li> <li>• Pick the required tools and equipment</li> <li>• Prepare site for safe unloading/placing of machine</li> <li>• Un load the machine from fork</li> </ul>	<ul style="list-style-type: none"> <li>• Importance and use of required PPEs</li> <li>• Preparation of Site for safe unloading/Placing of Machine in workshop</li> <li>• Describe Unloading Techniques/Procedure of</li> </ul>	<p><b>Th.</b> <b>2 Hrs.</b></p> <p><b>Pr.</b> <b>5 Hrs.</b></p>	<p><b>Tools</b></p> <ul style="list-style-type: none"> <li>• Fork Lifter</li> <li>• Toe Bar</li> <li>• Fastening Belt</li> <li>• Chain Block</li> <li>• Tri-Pod</li> <li>• Loader</li> </ul> <p><b>Consumable Material</b></p>	Class room/Lab/ Workshop

	<p>lifter</p> <ul style="list-style-type: none"> <li>• Prepare place for installation of tripod and chain block</li> <li>• Install tripod and chain block</li> <li>• Adjust tripod and chain block</li> <li>• Ensure right positioning of loader for unloading the machine</li> <li>• Bolt the U bolt shackle of chain with eye bolt/hook of machine</li> <li>• Un-fasten the machine at loader</li> <li>• Perform unloading of machine from the loader</li> <li>• Un-bolt the U bolt shackle of chain from eye bolt of machine</li> </ul>	<p>Machine from loader using Tri-Pod and Chain Block</p> <ul style="list-style-type: none"> <li>• Describe Unloading Techniques/Procedure of Machine from loader using Fork Lifter</li> </ul>			
<b>LU8.</b> Maintain	<b>The trainee is able to:</b> <ul style="list-style-type: none"> <li>• Record receiving</li> </ul>	<ul style="list-style-type: none"> <li>• Define Inventory</li> </ul>	<b>Th.</b> <b>2 Hrs.</b>	<b>Tools</b> <ul style="list-style-type: none"> <li>• Computer</li> </ul>	Class room/Lab/

Inventory Record	of machine <ul style="list-style-type: none"> <li>• Allot inventory number to machine</li> <li>• Tag machine according to inventory number</li> </ul>	<ul style="list-style-type: none"> <li>• Importance of Maintaining Inventory Record</li> <li>• Procedure of allotting Inventory Number and Machine Tagging</li> </ul>	<b>Pr. 2Hrs.</b>	System/Laptop <ul style="list-style-type: none"> <li>• Printer</li> </ul> <b>Consumable Material</b> <ul style="list-style-type: none"> <li>• Lead Pencil</li> <li>• Rubber</li> <li>• Tag</li> <li>• Inventory register</li> </ul>	Workshop
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### Critical Evidence(s) Required

The candidate needs to produce any or all of the following documents/evidences:

1. **Portfolio**
2. **Assignment(s)/Project(s)**
3. **Relevant Certification(s)**
4. **Relevant Job/Experience Letter**

Furthermore, the candidate must execute **demonstration(s)**, which may include but are not limited to, the following:

- Install tripod and chain block
- Adjust tripod and chain block
- Perform loading of machine on the loader
- Perform loading /unloading of machine on the fork lifter



# ELECTRICAL MACHINE WINDING TECHNICIAN



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Module-B  
CBT Curriculum

National Vocational Certificate Level 1

Version 1 - September, 2018

## Part-II Generic Competencies / Modules

### Module B: Comply Work Health and Safety Policies

**Objective:** This unit describes the performance outcomes, skills and knowledge required to apply general work health and safety requirements in the workplace. Communicate work and health safety assess at work place. It describes generic work health and safety responsibilities applicable to employees without managerial or supervisory responsibilities.

**Duration: 30 Hours**

**Theory: 6 Hours**

**Practice: 24 Hours**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU1. Work safely at work place</b>	<p><b>The trainee is able to:</b></p> <ul style="list-style-type: none"> <li>• Identify relevant organizational safety policies and procedures</li> <li>• Categorize tools and equipment as per requirements</li> <li>• Maintain tools and equipment</li> <li>• Follow established</li> </ul>				

	<p>safety procedures during work activities</p> <ul style="list-style-type: none"> <li>• Identify existing or potential safety issues to designated persons</li> <li>• Report work-related incidents and accidents to supervisor</li> <li>• Take necessary measures to minimizing risks</li> </ul>				
<p><b>LU2. Communicate work health and safety (WHS) assess at work place</b></p>	<p><b>The trainee is able to:</b></p> <ul style="list-style-type: none"> <li>• Raise work health and safety issues with supervisor.</li> <li>• Contribute to workplace meetings and other consultative processes for work health and safety management at the workplace</li> <li>• Make suggestions for</li> </ul>				

	improving work health and safety practices				
<b>LU3. Minimize risks to personal safety at work place</b>	<p><b>The trainee is able to:</b></p> <ul style="list-style-type: none"> <li>• Identify situations that may endanger the personal safety</li> <li>• Document the incident regarding personal safety at work place</li> <li>• Eliminate workplace hazards regarding personal safety</li> <li>• Identify damaged items and equipment for personal safety</li> <li>• Notify supervisor regarding damaged items and equipment for personal safety</li> </ul>				
<b>LU4. Minimize risks to public safety</b>	<p><b>The trainee is able to:</b></p> <ul style="list-style-type: none"> <li>• Identify situations that may endanger the public safety</li> <li>• Document the incident at work sites</li> <li>• Eliminate workplace hazards at work sites</li> <li>• Identify damaged</li> </ul>				

	items and equipment related to public safety <ul style="list-style-type: none"> <li>• Notify Situation that may endanger situation for safety measures.</li> </ul>				
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**Knowledge and Understanding**

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- K1:** Identify the commonly used tools and equipment used at workplace.
- K2:** Rights and responsibilities of employers and employees
- K3:** Consultative processes to manage and monitor health and safety issues to enable active participation in maintaining a safe workplace
- K4:** State potential hazards in the workplace
- K5:** State commonly used hazard signs and safety symbols

**Critical Evidence(s) Required**

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:  
 Identify health and safety policies to maintain and avoid any unwanted incident.

# ELECTRICAL MACHINE WINDING TECHNICIAN



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Module-C  
CBT Curriculum

National Vocational Certificate Level 1

Version 1 - September, 2018

## Module C: Obey the Workplace Policies and Procedures

**Objective:** This unit describes the skills and knowledge required to develop and implement a workplace policy & procedures and to modify the policy to suit changed circumstances. It applies to individuals with managerial responsibilities who undertake work developing approaches to create, monitor and improve strategies and policies within workplaces and engage with a range of relevant stakeholders and specialists

**Duration: 20 Hours**

**Theory: 4 Hours**

**Practice: 16 Hours**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU1. Obey the workplace personal appearance and hygiene</b>	<b>The trainee is able to:</b> <ul style="list-style-type: none"> <li>• Wear suitable clothes for the workplace and respect local and cultural contexts</li> <li>• Meet specific company dress code requirements</li> </ul>				
<b>LU2. Follow work ethics</b>	<b>The trainee is able to:</b> <ul style="list-style-type: none"> <li>• Follow company value/ ethics code/ conduct policies and</li> </ul>				

	<p>guidelines</p> <ul style="list-style-type: none"> <li>• Use company resources in accordance with company ethical standards</li> <li>• Conduct personal behavior and relationships in accord with company policy &amp; procedures</li> <li>• Demonstrate ethical behavior with co-workers</li> <li>• Report work incident situations or resolve accordingly</li> </ul>				
<p><b>LU3. Demonstrate the Workplace behaviors</b></p>	<p><b>The trainee is able to:</b></p> <ul style="list-style-type: none"> <li>• Practice the positive behavior</li> <li>• Avoid arguing</li> <li>• Adopt flexibility in behavior to accept the resistance</li> </ul>				



<b>LU4. Communicate workplace policy &amp; procedures</b>	<b>The trainee is able to:</b> <ul style="list-style-type: none"> <li>• Listen directions carefully</li> <li>• Ask relevant questions politely</li> <li>• Avoid to use abusive language/ expression</li> <li>• Respect co-workers and others</li> </ul>				
<b>LU5. Review the implementation of workplace policy &amp; procedures</b>	<b>The trainee is able to:</b> <ul style="list-style-type: none"> <li>• Ensure proper implementation of policies</li> <li>• Enlist the gaps for improvement</li> <li>• Follow the feedback, if any</li> </ul>				

**Knowledge and Understanding**

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- K1:** Rules, regulations and SOPs applicable to the organization
- K2:** Turnaround time to achieve target/goal.
- K3:** Operational hierarchal levels in an organization.

### **Critical Evidence(s) Required**

The candidate needs to produce following critical evidence(s) to be competent in this competency standard:

Follow work place policy personal appearances adopting company values/ ethics/ codes and broader policies for ensuring work place SOP's

# ELECTRICAL MACHINE WINDING TECHNICIAN



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Module-D  
CBT Curriculum

National Vocational Certificate Level 1

Version 1 - September, 2018

## Module D: Follow Basic Communication Skills(General)

**Objective:** After successful completion of this module you will be able to listen attentively, develop non-verbal communication, and identify communication barriers, interview preparation for job and different communication platforms in the workplace and throughout your career.

This unit of competency is designed to manage the workers and other personnel that can help in improving work quality and quantity through basic communication skills

**Duration: 50 Hours**

**Theory: 12 Hours**

**Practice: 38 Hours**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. <b>Adopt Effective listening to communicate appropriately</b>	<p><b>The trainee is able to:</b></p> <ul style="list-style-type: none"> <li>• Listen attentively to others to improve communication skills</li> <li>• Avoid interrupting while listening others</li> <li>• Ask questions to ensure understanding</li> <li>• Receive and follow instructions as given by</li> </ul>				

	<p>supervisor Give the speaker regular feedback to communicate appropriately</p>				
<p><b>LU2.Develop Non verbal communication with peers</b></p>	<p><b>The trainee is able to:</b></p> <ul style="list-style-type: none"> <li>• Maintain eye contact to improve communication</li> <li>• Use facial expressions and gestures</li> <li>• Use Body language to communicate appropriately</li> <li>• Participate within Peers</li> </ul>				
<p><b>LU3.Prepare for Interview to get a job</b></p>	<p><b>The trainee is able to:</b></p> <ul style="list-style-type: none"> <li>• Prepare yourself for interview to employer</li> <li>• Follow schedule according to the sequence of interview</li> <li>• Use communication techniques used while appearing in interview</li> <li>• Provide basic evidence</li> </ul>				

	<p>of related skill</p> <ul style="list-style-type: none"> <li>• Respond appropriately to strong client emotional reactions</li> </ul>				
<p><b>LU4.Use communication platform at workplace</b></p>	<p><b>The trainee is able to:</b></p> <ul style="list-style-type: none"> <li>• Convey message using different communication plate forms</li> <li>• Face to face</li> <li>• Video chat</li> <li>• Phone calls/messages</li> <li>• Social Media</li> </ul>				
<p><b>LU5.Identify communication barriers to improve interpersonal skills</b></p>	<p><b>The trainee is able to:</b></p> <ul style="list-style-type: none"> <li>• Identify communication barriers to improve communication skills with each other .i.e. <ul style="list-style-type: none"> <li>a. Attitudinal barrier</li> <li>b. Physical Barrier</li> <li>c. Long differences</li> <li>d. Conflicting information</li> <li>e. Differing status, position /self-expression</li> </ul> </li> <li>• Use strategies to overcome these barriers</li> </ul>				

	in the client-counsellor relationship				
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## Knowledge and Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out the tasks covered in this competency standard. This includes the knowledge of:

- K1:** Minimizing communication barriers
- K2:** Listening, and responding with an open mind in a more effective way.
- K3:** appropriate communication methods.
- K4:** verbal and non-verbal messages appropriately.
- K5:** Confidence building
- K6:** Body language
- K7:** Appropriate Voice tone
- K8:** Interpersonal skills
- K9:** listening Skills

## Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Find a job through social media resources
  1. Prepare yourself to appear in interview by following points:
    - Effective listening skills
    - Body language

- Work in groups of 3-5 members.
  1. Think of a situation when you tried to communicate with another person. Or when somebody tried to communicate with you, and it failed.
  2. Think about the problems or barriers that interfered with the communication.
    - List the reasons for failure identified by your group.

- Non-verbal communication

Have activity cards:

- Worried
- Happy
- Disappointed
- Laughing
- Annoying

Participants to draw one of the activity cards. Without speaking, communicate the feeling or emotion on the card to the rest of the group. Have one participant at time get up in front of the group.



# ELECTRICAL MACHINE WINDING TECHNICIAN



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Module-E  
CBT Curriculum

National Vocational Certificate Level 1

Version 1 - September, 2018

## Module E: Operate Computer Functions(General)

**Objective:** The competency Standard describe skills and knowledge required to setup a computer system, organize files in folders, and shutdown a computer system.

**Duration: 50 Hours**

**Theory: 12 Hours**

**Practice: 38 Hours**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
<b>LU1. Set up the computer for use</b>	<p><b>The trainee is able to:</b></p> <ul style="list-style-type: none"> <li>• Identify physical components of computer</li> <li>• Identify peripheral devices of the computer</li> <li>• Connect all components of computer</li> <li>• Follow procedures to turn on the computer system</li> </ul>				
<b>LU2. Organize files in folder</b>	<p><b>The trainee is able to:</b></p> <ul style="list-style-type: none"> <li>• Create</li> </ul>				

	<p>folders/subfolders with suitable names</p> <ul style="list-style-type: none"> <li>• Save files in relevant folders.</li> <li>• Rename and move folders in different drives..</li> <li>• Move folders and files using drag and drop techniques</li> <li>• Save folders and files on different media</li> <li>• Search for folders/subfolders and files using appropriate tool bars</li> <li>• Delete Folder files</li> <li>• Restore deleted folder files</li> </ul>				
<p><b>LU3. Shut down computer system</b></p>	<p><b>The trainee is able to:</b></p> <ul style="list-style-type: none"> <li>• Save any work to</li> </ul>				

	be retained <ul style="list-style-type: none"> <li>• Close open application programs correctly</li> <li>• Shut down computer</li> <li>• Switch off any unused peripheral devices</li> <li>• Ensure computer safety</li> </ul>				
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**Knowledge and Understanding**

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out the tasks covered in this competency standard. This includes the knowledge of:

- K1:** Basic parts of a computer
- K2:** Definition of computer
- K3:** Definition of Drives
- K4:** enlist computer component

**Critical Evidence(s) Required**

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Switch on the computer
- Attach Computer component

- Switch on Peripheral devices
- Make a folder in any partition(drive) in hard disk
- Give name to the folder
- Save file in the folder
- delete the folder/File
- Shut down computer

The evidence should integrate employability skills with workplace tasks and job roles and verify competency is able to be transferred to other circumstances and environments

### 5. Complete List of Tools, Equipment, Machines and Consumables

Worker traits	Entry Requirements	Duration of training required	Career paths
<ul style="list-style-type: none"> <li>• Able-Bodied</li> <li>• Strong</li> <li>• Devoted</li> <li>• Motivated</li> <li>• Hard Working</li> <li>• Honest</li> <li>• Punctual</li> <li>• Knowledgeable</li> <li>• Friendly</li> <li>• Interpersonal Skills</li> </ul>	<ul style="list-style-type: none"> <li>• Minimum Primary and Preferably Middle/Matric</li> </ul> <p><b>Trainer</b></p> <ul style="list-style-type: none"> <li>• Transformer and Motor Winding Technician (Level 4) with</li> </ul>	<p>Total contact Hrs 1800</p> <p>Or Credit hours. 180</p>	<ul style="list-style-type: none"> <li>• Motor Winding Technician</li> <li>• Transformer Winding Technician</li> <li>• Self-Owned Workshop/Entrepreneur</li> <li>• Trainer</li> <li>• Assessor</li> <li>• Electrical Machine Winding Expert</li> </ul>

<ul style="list-style-type: none"> <li>• Creative</li> <li>• Team Worker</li> <li>• Collaborative</li> <li>• Confident</li> <li>• Competent</li> <li>• Innovative</li> <li>• Cooperative</li> </ul>	<p>5 Years relevant field Experience</p> <ul style="list-style-type: none"> <li>• DAE Electrical with 3 Years relevant field Experience</li> <li>• BS Tech Electrical with 2 Years relevant field Experience</li> <li>• BSc Engineering Electrical with 1 Year relevant field Experience</li> </ul>		<p><b>Future Trends</b></p> <p>The paradigm shift of life style from simple to mechanized one is witnessing immense increase in the demand of electrical machines. The subsequent repair/rewinding work of the machines has been creating more opportunities /jobs prospects for the skilled workers in the trade of Electrical Machines Winding Technicians.</p>
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Related Knowledge	Tools / Equipment
<ul style="list-style-type: none"> <li>• Basic Concept of Electricity and Magnetism</li> <li>• Define Voltage, Current, Resistance, Power &amp; Energy</li> <li>• Define DC and AC (Single Phase, Three Phase)</li> <li>• Define Ohm's Law, calculation using basic ohm's law formula</li> <li>• Knowledge of Basic Electric Circuits (Series, Parallel, Open, Close, Ground, Short)</li> <li>• Define Conductors, Insulators, Semiconductors</li> <li>• Understanding Laws of Resistance</li> <li>• Concept of Voltage Drop</li> <li>• Define frequency, conductance, inductance, capacitance, impedance, power factor</li> <li>• State disadvantages of low power factor and methods of improvement of</li> </ul>	<ul style="list-style-type: none"> <li>• Combination Pliers 8"</li> <li>• Long Nose Pliers 6"</li> <li>• Flat Nose Pliers 6"</li> <li>• Round Nose Pliers 6"</li> <li>• Screw Driver Set (Flat &amp; Phillips) Size 4", 6", 8", 10", 12"</li> <li>• Tweezers of different shapes &amp; sizes 4", 6"</li> <li>• Hammer (200, 500, 1000) grams</li> <li>• Mallet / Rubber Hammer (200, 500) grams</li> <li>• Cold Chisel 8", 12"</li> <li>• Gas Welding Plant</li> <li>• Winding Machine <ul style="list-style-type: none"> <li>➤ Manual (Small and Large size)</li> <li>➤ Motorized</li> <li>➤ Automatic</li> </ul> </li> <li>• Elenkey Set size 1 – 10 mm</li> <li>• Bench Vice size 4", 6"</li> <li>• Digital Weight Balance up to 500 KG</li> <li>• Oven 0- 300°C, 3 Cubic Ft inner chamber size, 230 V 50 Hz (For Drying purpose of</li> </ul>

Related Knowledge	Tools / Equipment
<p>power factor</p> <ul style="list-style-type: none"> <li>• Define self and mutual induction</li> <li>• Knowledge of Star Delta Connections and relation between phase and line quantities</li> <li>• Define Electrical measuring Units</li> <li>• Use of Measuring Instruments (Voltmeter, Ampere-meter, Ohm meter, wattmeter, multi-meter, Insulation Tester (Megger), TTR Meter, Clamp on Meter, Tachometer, Growler, Phase sequence meter Energy meter, Power factor meter, LCR meter, Frequency meter etc.)</li> <li>• Use of CT and PT in measurements</li> <li>• Know about Tagging , Padlocking and Coupling Techniques</li> <li>• Define motor, Working principle and types</li> <li>• Define starting and running current / torque of motor</li> </ul>	<p>Winding)</p> <ul style="list-style-type: none"> <li>• Scriber 6"</li> <li>• Center Punch 4",6"</li> <li>• Vernier Caliper size 8"(Digital / Analog)</li> <li>• Standard Wire Gauge</li> <li>• Micrometer 0-25 mm , 1" (Digital/Analog)</li> <li>• Steel rule (300mm &amp; 1M)</li> <li>• Steel Measuring Tape 10M</li> <li>• Try Square (8",12")</li> <li>• Bearing Puller (4",6",12")</li> <li>• Grease Gun (12")</li> <li>• Oil Can (6")</li> <li>• Ratchet Type Spanner Set 4mm – 36mm</li> <li>• Adjustable screw wrench (6",8",12")</li> <li>• Pedestal Drill Machine ½" Chuck, 4 Ft</li> <li>• Portable Electric Drill Machine ½" Chuck</li> <li>• Hi Carbon Steel Drill Bit Set (1mm-12mm)</li> <li>• Tap &amp; Die Set (3mm-12mm)</li> <li>• Stators Iron core of motor without winding (24,30,32,36,48 Slots)</li> <li>• Pedestal Fan Motor (Assorted No of Slots)</li> </ul>



Related Knowledge	Tools / Equipment
<ul style="list-style-type: none"> <li>• Define cork screw rule, Lenz law, Fleming left and right hand rules</li> <li>• Define transformer, Its working principle and types</li> <li>• Define transformer turn ratio (TTR) and nominal transformation voltage ratio</li> <li>• Define vector group of transformer winding</li> <li>• Define different types of motor winding diagrams (Lap, Wave, Chain and set)</li> <li>• Draw different types of motor winding diagrams (Lap, Wave, Chain and set)</li> <li>• Importance of Machine Inventory at workplace</li> <li>• Importance of preventive maintenance of machines</li> <li>• Use of Tri Pod and Chain Block</li> <li>• Adjustment / fasten techniques of tri pod and chain block</li> <li>• Describe Safe transportation techniques of Machines through loader</li> </ul>	<ul style="list-style-type: none"> <li>• Ceiling Fan Motor (Assorted No of Slots)</li> <li>• Soldering Iron (60watt,100watt,200watt)</li> <li>• Soldering Gun 100 Watt or above</li> <li>• Blow Lamp</li> <li>• Regulator Core Laminations</li> <li>• Transformer Core (Core Type, Shell Type)1KVA,5KVA</li> <li>• Transformer Single Phase 1KVA</li> <li>• Transformer Three Phase 10KVA</li> <li>• Single Phase Variable Transformer (Variac 0-250V,2KVA)</li> <li>• Three Phase Variable Transformer (Variac 0-500V,5KVA)</li> <li>• Tri Pod 10 feet with Chain Block1 Ton</li> <li>• Single Phase TTR Meter</li> <li>• Transformer Testing Module</li> <li>• Digital Insulation Tester (Megger), (Multi Range)</li> <li>• Transformer Oil Testing Equipment</li> <li>• Welding Plant (5KVA)</li> <li>• Digital Clamp on Meter</li> <li>• Digital Multi Meter</li> <li>• Pipe Wrench (8",12",18")</li> <li>• Grip Pliers (8")</li> <li>• Pliers for locking / unlocking Spring washer</li> </ul>

Related Knowledge	Tools / Equipment
<p>/ fork lifter</p> <ul style="list-style-type: none"> <li>• Importance of Numbering for position of machine parts</li> <li>• Importance of marking for adjustment / alignment of Machine Parts</li> <li>• Estimation and Costing of repair / replacement work</li> <li>• Importance of Safe storage of Machines and Materials</li> <li>• Filtration techniques of Transformer oil</li> <li>• Know about quality standards of transformer oil</li> <li>• Testing techniques of Transformer oil</li> <li>• De-hydration of transformer oil</li> <li>• De Hydration of Silica Gel</li> <li>• Importance of Tap Changer of Transformer</li> <li>• State procedure of Removing Faulty Winding Coils</li> <li>• State Procedure of Preparing Winding Coils</li> </ul>	<p>(Inner / Outer)</p> <ul style="list-style-type: none"> <li>• Air Compressor with Pneumatic Gun</li> <li>• Dust Blower</li> <li>• Coil Former Adjustable (6",8",10",12",18") Equal and Unequal size</li> <li>• Hacksaw 12"</li> <li>• Flat File 12"</li> <li>• Half Round File 12"</li> <li>• Round File 8"</li> <li>• Triangular File 8"</li> <li>• Tachometer (0-5000 rpm) Digital / Analog</li> <li>• Temperature laser gun</li> <li>• Pressure Gauge</li> <li>• Power Analyzer</li> <li>• Testing Bench</li> <li>• Growler</li> <li>• Portable Voltmeter 0- 500V AC/DC Digital / Analog</li> <li>• Portable Ammeter 0- 30A AC/DC Digital / Analog</li> <li>• Portable Wattmeter 0- 500W AC/DC Digital / Analog</li> <li>• Portable Frequency meter 0- 100Hz Digital / Analog</li> <li>• Portable Power Factor meter 0.5-0- 0.5 Lead / Lag Digital / Analog</li> <li>• Phase Sequence Meter 500 V</li> </ul>

Related Knowledge	Tools / Equipment
<ul style="list-style-type: none"> <li>• Importance and use of latheroid Paper, varnish, Coil binding, Sleeving</li> <li>• Understanding of Jointing, soldering and taping techniques of coils</li> <li>• Importance of coils baking</li> <li>• Importance of Winding Test at different stages</li> <li>• Understanding of Coil fastening, assembling and disassembling Techniques</li> <li>• Use of Winding Machine (Manual and Automatic)</li> <li>• Understand Preparation and Setting of Coil Former</li> <li>• Know about adjustment techniques for insertion of coils in core slots, core limb</li> <li>• Importance of Wedges</li> <li>• Understand construction features of Motors and Transformer</li> <li>• Importance of Data plate reading of machines</li> </ul>	<ul style="list-style-type: none"> <li>• High Voltage Probe</li> <li>• Digital Energy Meter Single and Three Phase</li> <li>• LCR Meter</li> <li>• Electrician Knife Cutter</li> <li>• Thimble Press 1.5mm<sup>2</sup> to 16mm<sup>2</sup></li> <li>• Thimble Press (Hydraulic) 16mm<sup>2</sup> to 300mm<sup>2</sup></li> <li>• Phase Tester</li> <li>• Wire / Cable Cutter 8"</li> <li>• Wire Stripper 6"</li> </ul>

<b>Related Knowledge</b>	<b>Tools / Equipment</b>
<ul style="list-style-type: none"><li data-bbox="465 197 896 233">• Importance of using PPE'S</li></ul>	

## 6. List of Consumables

- Handbooks
- Design books
- Pencils
- Rubber
- Sharpeners
- Paper Cutter
- Seizers
- Colours
- White charts
- Brown sheets
- White board markers
- Permanent markers
- File cover and files
- Latheroid Paper Size 7, 10 & 12 No.
- Milinex Paper Size 7, 10 & 12 No.
- Nomex Paper Size 7, 10 & 12 No.
- Sleeve Size 1 to 14 No.
- Soldering Wire
- Soldering Flux
- Soldering Paste
- Cotton Tape ½" – 2"
- Glass Tape ½"- 2"
- Binding Thread
- Varnish (Non Conductive)
- Lugs
- Thimble
- Cable Paper 0.06mm

- Press Pan Paper 0.1mm - 0.7mm
- Press Pan Sheet 1mm – 4mm
- Grease
- Kerosene oil
- Mobil Oil
- Transformer Oil
- Silica Gel
- Glue
- Wedges
- Cork Sheet
- Copper Winding Wire 18 to 34 SWG
- Sand Paper 1, 1.5 No.
- Electronic Contact Cleaner
- W D 40 Spray Tin
- Safety Goggles
- Electrical Safety Gloves
- Heat Resistance Gloves
- Washing Gloves
- Working Gloves
- Cotton Gloves
- Safety Shoes (Antistatic)
- Working Apron
- Dust Mask

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|  | <ul style="list-style-type: none"><li>➤ Safety Helmet</li><li>➤ Safety Ladder</li><li>➤ Safety Belt</li><li>➤ Safety Rubber Mat 10- 20mm</li><li>➤ PVC Flexible Cable 23/0.0076"&amp;40/0.0076"</li><li>➤ PVC 3/0.029"Cable</li><li>➤ PVC 7/0.029" to 7/0.064" Cable</li></ul> |
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