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ELECTRICAL MACHINE WINDING TECHNICIAN



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CBT Curriculum

National Vocational Certificate Level 2

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.

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
0713 E&E 024	National Vocational Certificate level 1, in (Electrical Sector) "Electrical Machine Winding Technician"
0713 E&E 025	National Vocational Certificate level 2, in (Electrical Sector) "Electrical Machine Winding Technician"
0713 E&E 026	National Vocational Certificate level 3, in (Electrical Sector) "Electrical Machine Winding Technician"
0713 E&E 027	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
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	mmahboobbutt@gmail.com	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

S#	Name	Designation	Contact No	Email	Organization	Role in Q. D. C
14.	Mr. Ibrahim Sarfraz	Application Engineer			KSB Pumps, Lahore	Work shop Participants
15.	Engr. Abdul Maqsood	Principal / DACUM Facilitator	0300-9030560	Wadood22@yahoo.com	KP-TEVTA, Mardan	DACUM Facilitator
16.	Mr. Ayoub Elahi	Data Center Officer	0323-9877097	ayoubelahi@hotmail.com	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 level 1, in (Electrical Sector) “Electrical Machine winding Technician”	Entry for assessment for this qualification is open. However, entry into formal training 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	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

Title	Entry requirements
Technician”	(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
0713001126		6	Perform on-site Inspection/testing of machine	Technical	2	110	11
0713001128		7	Ensure Electrical isolation of Machine	Technical	2	110	11
0713001127		8	Carry out Mechanical De- Installation of Machine	Technical	2	110	11
0713001125		9	Maintain Tools/ Equipment and Machinery	Technical	2	50	5
102200844	Level-2	10	Comply Personal Health and Safety Guidelines	Generic	2	30	3
041700839		11	Communicate the Workplace Policy and Procedure	Generic	2	20	2
001100851		12	Perform Basic Communication (Specific)	Generic	2	30	3
061100856		13	Perform Basic Computer Application (Specific)	Generic	2	40	4
Total Learning & Credit Hours of Level - 2						500	50

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

Module Title and Aim	Learning Units	Theory ¹ Days/hours	Workplace ² Days/hours	Timeframe of modules
Module A. Perform on-site Inspection/testing of machine	LU1. Take feedback from the operator	22	88	110
	LU2. Check Physical status/condition of Machine			
	LU3. Check data plate of machine for specifications.			
	LU4. Conduct Megger test of the Machine			
	LU5. Carry out Transformer's oil test			
	LU6. Perform Transformer Turn Ratio Test			
	LU7. Check Terminals/Terminal plate of Machine			

<p>Module B. Ensure Electrical Isolation of Machine</p>	<p>LU1. Prepare for Work to ensure Electrical Isolation of Machine</p> <p>LU2. Wear PPE's</p> <p>LU3. Isolate Machine from Electrical Supply</p> <p>LU4. Perform Tagging of Machine</p> <p>LU5. Document the Electrical Isolation of Machine</p> <p>LU6. Communicate with machine operator and other personnel</p> <p>LU7. De-energise machine</p>	<p>22</p>	<p>88</p>	<p>110</p>
<p>Module C. Carry out Mechanical De-Installation of Machine</p>	<p>LU1. Prepare for work to Carry out Mechanical De-Installation of Machine</p> <p>LU2. Isolate Machine from Pneumatic/hydraulic Supply</p> <p>LU3. Isolate Machine from Fuel Supply</p> <p>LU4. Isolate Machine from Gear Box</p> <p>LU5. Isolate Machine from Pulley</p> <p>LU6. Perform De-Coupling of Machine</p> <p>LU7. De- Install Machine from Foundation</p>	<p>22</p>	<p>88</p>	<p>110</p>
<p>Module D. Maintain Tools / Equipment and Machinery</p>	<p>LU1. Prepare for work to maintain tools / equipment and machinery</p> <p>LU2. Maintain Tools and equipment</p> <p>LU3. Perform Preventive maintenance of tools and equipment</p> <p>LU4. Perform Corrective maintenance of tools and equipment</p> <p>LU5. Ensure Electrical/Thermal Insulation of tools and equipment</p> <p>LU6. Calibrate measuring instruments</p> <p>LU7. Maintain Winding Machines</p> <p>LU8. Manage Inventory of tools/equipment and Machinery</p>	<p>10</p>	<p>40</p>	<p>50</p>
<p>Module E. Comply Personal</p>	<p>LU1. Identify Personal Hazards at Workplace</p>	<p>6</p>	<p>24</p>	<p>30</p>

Health and Safety Guidelines	LU2. Apply Personal Protective and Safety Equipment (PPE) LU3. Comply Occupational Safety and Health (OSH) LU4. Dispose of hazardous Waste/materials from the designated area.			
Module F. Communicate the Workplace Policy and Procedure	LU1. Identify workplace communication procedures LU2. Communicate at workplace LU3. Draft Written Information LU4. Review Documents	4	16	20
Module G. Perform Basic Communication (Specific)	LU1. Communicate in a team to achieve intended outcomes LU2. Follow Supervisor's instructions as per organizational SOPs LU3. Develop Generic communication skills at workplace	6	24	30
Module H. Perform Basic Computer Application (Specific)	LU1. Create Word Documents LU2. Use internet for Browsing	8	32	40

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Module-A
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4. Detail of Modules

Part-I Core/Technical Modules

Module A: 0713001126 Perform on-site Inspection / testing of machine

Objective: This Module covers the knowledge & skills required to perform on site pre inspection / testing of Machine through taking feedback from the operator, Check Physical status/condition of Machine, Check data plate of machine for specifications, Conduct Megger test of the Machine, Carry out Transformer's oil test, Perform Total Turn Ratio Test of Transformer, Repair/Replace Terminal plate of Motor.

Duration: 110Hours

Theory: 22 Hours

Practice: 88Hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Take feedback from the operator	<p>The trainee is able to:</p> <ul style="list-style-type: none"> Perform site visit Collect information from the machine operator regarding the fault Record the data 	<ul style="list-style-type: none"> Importance of site visit; Importance/Purpose of getting feedback from the operator Symptoms of Electric Machine Faults and Importance of Data recording Principles and characteristics of Electricity, Magnetism, Electro-magnetism and Electronics etc. Basic communication 	<p>Th. 12 Hrs. Pr. 9 Hrs.</p>	<p>Tools</p> <p>Consumables Items</p> <ul style="list-style-type: none"> Led Pencil, Rubber, Sharpener, Writing Pad 	Classroom

		techniques			
LU2. Check Physical status/condition of Machine	<p>The trainee is able to:</p> <ul style="list-style-type: none"> • Perform physical checking of machine by: <ul style="list-style-type: none"> ➤ Seeing ➤ Touching ➤ Smelling • Analyse for loose fitting • Analyse for open / loose/burnt connections • Analyse for true connections as per circuit diagram 	<ul style="list-style-type: none"> • Purpose of Physical Checking of Machine;Techniques of Physical Checking of Machine • Checking Techniques for loose fitting, loose /Flash/open/Burnt connection • Effects of loose connection • Interpretation of Circuit Diagram and analysing true connection as per circuit diagram • Procedure and Importance of risk Assessment techniquesfor checking physical conditions/status of Electrical Machines(Motor And Transformer) 	<p>Th. 2 Hrs. Pr. 11Hrs.</p>	<p>Tools</p> <ul style="list-style-type: none"> • Spanner Set Screw Driver Set • Allen key Set • Clamp Meter • Safety Belt • Ladder <p>Consumables Items</p> <ul style="list-style-type: none"> • Hand Gloves • Safety Shoes • Safety Goggles 	Classroom/Lab/Workshop
LU3. Check data plate of	<p>The trainee is able to:</p> <ul style="list-style-type: none"> • Locate the 	<ul style="list-style-type: none"> • Understanding location of Machine 	<p>Th.1Hrs. Pr.</p>	<p>Tools</p> <ul style="list-style-type: none"> • Magnifier Glass 	Lab/Workshop

<p>machine for specifications</p>	<p>Data/Name Plate of Machine</p> <ul style="list-style-type: none"> • Read data of Machine • Record data of Machine 	<p>Data Plate</p> <ul style="list-style-type: none"> • Understanding of Machine Specification 	<p>10 Hrs.</p>	<p>Consumables Items</p> <ul style="list-style-type: none"> • Led Pencil, Rubber, Sharpener, Writing Pad • Anti-rusting lubricant (WD-40) • Sand Paper • Duster Cloth/Cotton Waste 	
<p>LU4. Conduct Megger test of the Machine</p>	<p>The trainee is able to:</p> <ul style="list-style-type: none"> • Identify the required tools and equipment for conduct of Megger Test • Collect the required tools and equipment • Disconnect the Supply Cables • Perform testing with Megger <ul style="list-style-type: none"> ➤ Ground/Earth Fault ➤ Short Circuit ➤ Open Circuit 	<ul style="list-style-type: none"> • Identification of required Tools and Equipment for conduct of Megger Test • Disconnection Sequence of supply Cables • Use of Megger for conduct of Open, Short, Ground, Earth leakage tests 	<p>Th. 2Hrs. Pr. 15 Hrs.</p>	<p>Tools</p> <ul style="list-style-type: none"> • Megger (Insulation Tester) with Leads • Screw Driver Set • Spanner Set • Combination Plier • Allen Key Set <p>Consumables Items</p> <ul style="list-style-type: none"> • Led Pencil, Rubber, Sharpener, Writing Pad 	<p>Lab/Workshop</p>

	<ul style="list-style-type: none"> Record test result 				
<p>LU5. Carry out Transformer's oil test</p>	<p>The trainee is able to:</p> <ul style="list-style-type: none"> Identify the required tools and equipment Collect the required tools and equipment Disconnect the Supply Cables Take Oil Sample for test Perform oil testing <ul style="list-style-type: none"> ➤ High Voltage/Breakdown Test ➤ Moisture Test ➤ Flash Point Test Record test results 	<ul style="list-style-type: none"> Recognition of the required tools equipment, PPEs and their use to carry out Transformer Oil Test Methods to Take Oil Sample from Transformer Understanding of Oil Testing Techniques for High Voltage, Break Down, Moisture and Flash Point Tests 	<p>Th. 2Hrs. Pr. 15 Hrs.</p>	<p>Tools</p> <ul style="list-style-type: none"> Transformer Oil Testing Equipment Sample Beaker Screw Driver Set Spanner Set Combination Plier <p>Consumables Items</p> <ul style="list-style-type: none"> Led Pencil, Rubber, Sharpener, Writing Pad Duster Cloth/Cotton Waste 	Class Room/Lab/Workshop
<p>LU6. Perform Transformer Turn Ratio Test</p>	<p>The trainee is able to:</p> <ul style="list-style-type: none"> Identify the required tools and equipment Collect the required tools Disconnect the 	<ul style="list-style-type: none"> Recognition of the required tools, equipment and PPEs for Turn Ratio Test of Transformer Method of conducting TTR Test 	<p>Th. 2Hrs. Pr. 14 Hrs.</p>	<p>Tools</p> <ul style="list-style-type: none"> Single Phase TTR Meter <p>Consumables Items</p> <ul style="list-style-type: none"> Led Pencil, Rubber, 	Class Room/Lab/Workshop

	<p>Supply Cables</p> <ul style="list-style-type: none"> • Perform TTR Test • Compare TTR test result with the specifications as per Data Plate • Record test result 	<ul style="list-style-type: none"> • Importance of Comparing TTR Test results with the nominal/Specified voltage and Turn Ratio 		<p>Sharpener, Writing Pad</p> <ul style="list-style-type: none"> • Duster Cloth/Cotton Waste 	
<p>LU7. Check Terminals/Terminal plate of Machine</p>	<p>The trainee is able to:</p> <ul style="list-style-type: none"> • Inspect the Terminal Plate of Machine • Check the physical condition of nut bolts • Check space/gap between the terminals • Check the condition of linking strips for connection • Check the space condition for rusting/carbonizing between terminals 	<ul style="list-style-type: none"> • Understand effects of rusting /Carbonizing, Inter Terminal space, condition of linking strips and nut bolts • Checking Techniques of rusting /Carbonizing, Inter Terminal space, condition of linking strips and nut bolts 	<p>Th. 1 Hrs. Pr. 14 Hrs.</p>	<p>Tools</p> <ul style="list-style-type: none"> • Screw Driver Set • Spanner Set • Combination Plier <p>Consumables Items</p> <ul style="list-style-type: none"> • Duster Cloth/Cotton Waste • Sand Paper • Anti-Rusting Lubricant(WD-40) 	<p>Class Room/Lab/Workshop</p>
	<p>ng between terminals</p>				

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:

- Prepare a list of PPEs
- Demonstrate the use of at least one of the PPEs in front of assessor as per assessors directions
- Differentiate between safe and unsafe tools.
- Perform Megger Test (Open/Short Circuit and Ground Fault)
- Perform Transformer Oil Test (High Voltage/Breakdown Test, Moisture Test, Flash Point Test)
- Perform Total Turn Ratio Test
- Analyse for loose, burnt, short and true connections

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Module-B
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Module B: 0713001128 Ensure Electrical Isolation of Machine

Objective: This Module covers the knowledge & skills required to Ensure Electrical isolation of Machine through ‘Prepare for work’ , Ensure Use of PPE’s, Isolate Machine from Electrical Supply , Perform Tagging of Machine , Document the Electrical Isolation of Machine, Communicate with machine operator and other personnel, De-energise machine .

Duration: 110 Hours

Theory: 22 Hours

Practice: 88 Hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Prepare for Work to ensure Electrical Isolation of Machine	<p>The trainee is able to:</p> <ul style="list-style-type: none"> • Identify the required PPE’s • Collect the required PPE’s • Identify the required tools and equipment • Collect the required tools and equipment • Ensure functional condition of PPE’s/Tools and equipment • Prepare the required tags for isolation 	<ul style="list-style-type: none"> • Recognition of required Tools, Equipment and PPEs • Importance of functional conditions of required Tools, Equipment and PPEs and their use • Importance of Tagged display for isolation 	<p>Th. 3 Hrs.</p> <p>Pr. 5 Hrs.</p>	<p>Tools</p> <ul style="list-style-type: none"> • Spanner Set Screw Driver Set • Allen key Set • Clamp Meter • Safety Belt • Ladder <p>Consumables Items</p> <ul style="list-style-type: none"> • Hand Gloves • Safety Shoes • Safety Goggles 	Class Room/Lab /Workshop
LU2. Wear PPE’s	<p>The trainee is able to:</p> <ul style="list-style-type: none"> • Wear PPE’s as per job requirement • Clean the PPE’s after 	<ul style="list-style-type: none"> • Selection of required PPE’s for electrical isolation of 	<p>Th. 3Hrs.</p> <p>Pr.</p>	<p>Tools</p> <ul style="list-style-type: none"> • Spanner Set Screw Driver Set • Allen key Set 	Class Room/Lab /Workshop

	<p>use</p> <ul style="list-style-type: none"> • Perform proper storing of the PPE's after use. 	<p>machine</p> <ul style="list-style-type: none"> • Demonstration of wearing proper PPEs • Cleaning Techniques of PPE's • Storing Techniques of PPE's 	<p>5 Hrs.</p>	<ul style="list-style-type: none"> • Clamp Meter • Safety Belt • Ladder <p>Consumables Items</p> <ul style="list-style-type: none"> • Hand Gloves • Safety Shoes • Safety Goggles 	
<p>LU3. Isolate Machine from Electrical Supply</p>	<p>The trainee is able to:</p> <ul style="list-style-type: none"> • Identify the machine for isolation • Collect the required tools for isolation • Identify the supply Sources/points to be isolated • Identify the supply disconnecting devices • Take on board the concerned department for electrical isolation • Switch off the supply sources • Perform electrical isolation of machine. 	<ul style="list-style-type: none"> • Importance of Electrical isolation of Machine • Recognition of supply sources/Points • Types and importance of supply disconnecting devices and their working Principle 	<p>Th. 3Hrs.</p> <p>Pr. 14 Hrs.</p>	<p>Tools</p> <p>Consumables Items</p> <p>Different types of</p> <ul style="list-style-type: none"> • Main Switches • Circuit Breakers • Isolators • Starters 	<p>Class Room/Lab /Workshop</p>

<p>LU4. Perform Tagging of Machine</p>	<p>The trainee is able to:</p> <ul style="list-style-type: none"> • Collect required tagging • Perform tagging of faulty Machine 	<ul style="list-style-type: none"> • Importance of Tagging • Tagging Types and Techniques 	<p>Th. 3Hrs.</p> <p>Pr. 10 Hrs.</p>	<p>Tools</p> <p>Consumables Items</p> <p>Different types of</p> <ul style="list-style-type: none"> • Tags 	<p>Class Room/Lab /Workshop</p>
<p>LU5. Document the Electrical Isolation of Machine</p>	<p>The trainee is able to:</p> <ul style="list-style-type: none"> • Enlist the tagged Machines • Document nature of the faults • Record the electrical isolation of machine 	<ul style="list-style-type: none"> • Importance of Documentation regarding Electrical isolation of Machine 	<p>Th. 3Hrs.</p> <p>Pr. 18 Hrs.</p>	<p>Tools</p> <p>Consumables Items</p> <ul style="list-style-type: none"> • Led Pencils • Rubber • Sharpener • Writing sheets/Cards • Permanent Marker 	<p>Class Room/Lab /Workshop</p>
<p>LU6. Communicate with machine operator and other personnel</p>	<p>The trainee is able to:</p> <ul style="list-style-type: none"> • Identify nature of fault of machine • Diagnose the causes of fault • Communicate nature of fault of machine to operation department • Prepare memo/(MWR) Maintenance Work Request for maintenance of machines 	<ul style="list-style-type: none"> • Types of Faults and their causes of Electrical Machines • Importance of communicating nature of Faults and medium of Communication • Method of preparation (MWR) Maintenance 	<p>Th. 4 Hrs.</p> <p>Pr. 20 Hrs.</p>	<p>Tools</p> <p>Consumables Items</p> <ul style="list-style-type: none"> • Pen • MWR Book/Sheet/Performance 	<p>Class Room/Lab /Workshop</p>

		Work Request			
LU7. De-Energize Machine	The trainee is able to: <ul style="list-style-type: none"> Identify the required tools and equipment for De-energize the machine Collect the required tools and equipment for De-energize the machine Identify the part of the machine to be De-energize Perform de-energizing of machine 	<ul style="list-style-type: none"> Importance of de-energizing of machine Method of de-energizing of machine 	Th. 3 Hrs. Pr. 16 Hrs.	Tools <ul style="list-style-type: none"> AVO meter Clamp on meter Screw driver set Combination plier Spanner set Elenkey set Portable search light Consumables Items	Class Room/Lab /Workshop

Critical Evidence(s) Required

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

5. Portfolio
6. Assignment(s)/Project(s)
7. Relevant Certification(s)
8. Relevant Job/Experience Letter

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

- Identify the required PPE's
- Identify the required tools and equipment
- Identify the supply Sources/points to be isolated
- Identify the supply disconnecting devices
- Identify nature of fault of machine
- Identify the part of the machine to be De-energized
- Perform de-energizing of machine

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Module-C
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National Vocational Certificate Level 2

Version 1 - September, 2018

Module C: 0713001127 Carry out Mechanical De- Installation of Machine

Objective:This Module covers the knowledge & skills required to Carry out Mechanical De- Installation of Machine through Prepare for work, Isolate Machine from Pneumatic Supply, Isolate Machine from Fuel Supply, Isolate Machine from Gear Box, Isolate Machine from Pulley , Perform De-Coupling of Machine , De- Install Machine from Foundation

Duration: 110 Hours

Theory: 22 Hours

Practice: 88 Hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Prepare for work to Carry out Mechanical De-Installation of Machine	The trainee is able to: <ul style="list-style-type: none"> Identify the required PPE's Collect the required PPE's Identify the required tools and equipment Collect the required tools and equipment Ensure functional condition of PPE's/Tools and 	<ul style="list-style-type: none"> Prepare list & Recognition of required Tools, Equipment and PPEs for mechanical De-Installation of Machine (Motor/Transformer) Importance of functional conditions of required Tools, Equipment and PPEs 	Th.3Hrs. Pr. 5 Hrs.	Tools <ul style="list-style-type: none"> Spanner Set Screw Driver Set Allen key Set Clamp Meter Safety Belt Ladder Screw wrench Consumables Items	Class room

	<p>equipment</p> <ul style="list-style-type: none"> • Ensure safe working conditions ➤ Clear Passage ➤ Cleanliness ➤ Adequate light ➤ Ventilation 	<p>and their use</p> <ul style="list-style-type: none"> • Importance of safe working condition regarding • Clear passage • Cleanliness • Adequate light • Ventilation • Knowledge about means of sourcing of Motor/transformer • Interpretation of technical information regarding the Machine (Motor/Transformer 		<ul style="list-style-type: none"> • Hand Gloves • Safety Shoes • Safety Goggles 	
<p>LU2. Isolate Machine from Pneumatic/hydraulic Supply</p>	<p>The trainee is able to:</p> <ul style="list-style-type: none"> • Wear the required PPE's • Identify the required tools and equipment • Locate the main valve of Pneumatic/hydraulic supply to the machine • Shut off the main valve of 	<ul style="list-style-type: none"> • Identify and Demonstrate the correct use of PPEs • Description and types of Pneumatic supplies attached with Motor • Description and types of Hydraulic supplies attached with Motor. • Function of 	<p>Th. 3 Hrs. Pr. 18 Hrs.</p>	<p>Tools</p> <ul style="list-style-type: none"> • Screw driver set • Combination plier • Spanner set • Elenkey set • Portable search light • Adjustable Screw Wrench 	<p>Class room/Lab/ Workshop</p>

	<p>Pneumatic/hydraulic supply to the machine</p> <ul style="list-style-type: none"> • Identify parts to be isolated from pneumatic/hydraulic supply • Perform isolation of all the pneumatic/hydraulic supplies to the machine • Perform dead plugging of all the pneumatic/hydraulic supplies • Maintain Record of pneumatic/hydraulic supplies isolation • Perform Tagging of the isolated pneumatic/hydraulic supplies 	<p>Pneumatic/ Hydraulic supplies</p> <ul style="list-style-type: none"> • Techniques/sequence of isolation of Pneumatic/Hydraulic supplies from Motor • Importance of isolation of Motor from Pneumatic/Hydraulic supplies 		<ul style="list-style-type: none"> • Pipe Wrench • Hammer • Hack Saw • Cable Knife <p>Consumable Material</p> <ul style="list-style-type: none"> • Dead Plugs • Teflon tape • Safety Gloves 	
<p>LU3. Isolate Machine from Fuel Supply</p>	<p>The trainee is able to:</p> <ul style="list-style-type: none"> • Wear the required PPE's • Identify the required tools and equipment • Locate the main 	<ul style="list-style-type: none"> • Identify and demonstrate correct use of PPEs • Importance of isolation from fuel supply 	<p>Th. 3 Hrs. Pr. 13 Hrs.</p>	<p>Tools</p> <ul style="list-style-type: none"> • Screw driver set • Combination plier • Spanner set 	<p>Class room/Lab/ Workshop</p>

	<p>valve of fuel supply to the machine</p> <ul style="list-style-type: none"> • Perform de activation of the main valve of fuel supply to the machine • Identify parts to be isolated from fuel supplies • Perform isolation of all the fuel supplies to the machine • Perform dead plugging of all the fuel supplies • Maintain Record of fuel supplies isolation • Perform Tagging of the isolated fuel supplies 	<ul style="list-style-type: none"> • Techniques/sequence of isolation of fuel supply • Importance of dead plugging of fuel supply • Techniques of carrying out dead plugging of fuel supply 		<ul style="list-style-type: none"> • Elenkey set • Portable search light • Adjustable Screw Wrench • Pipe Wrench • Hammer • Hack Saw • Cable Knife • Fire Extinguisher <p>Consumable Material</p> <ul style="list-style-type: none"> • Dead Plugs • Teflon tape • Safety Gloves • Tags 	
<p>LU4. Isolate Machine from Gear Box</p>	<p>The trainee is able to:</p> <ul style="list-style-type: none"> • Wear the required PPE's • Identify the required tools and equipment • Locate the gear box of the machine • Perform marking on 	<ul style="list-style-type: none"> • Demonstrate to wear PPEs • Importance of isolation from gear box • Techniques/sequence of isolation of Machine from gear 	<p>Th. 3Hrs. Pr. 15 Hrs.</p>	<p>Tools</p> <ul style="list-style-type: none"> • Screw driver set • Combination plier • Spanner set • Elenkey set • Portable 	<p>Class room/Lab/ Workshop</p>

	<p>driver, driven and foundation for proper alignment and placement of parts</p> <ul style="list-style-type: none"> • Perform isolation of Gear Box • Record isolation of Gear Box • Perform Tagging on Gear Box and driven end 	<p>box</p> <ul style="list-style-type: none"> • Importance of Marking on Driver, Driven and Foundation for proper alignment and placement of parts 		<p>search light</p> <ul style="list-style-type: none"> • Adjustable Screw Wrench • Pipe Wrench • Hammer • Hack Saw <p>Consumable Material</p> <ul style="list-style-type: none"> • Safety Gloves • Tags 	
<p>LU5. Isolate Machine from Pulley</p>	<p>The trainee is able to:</p> <ul style="list-style-type: none"> • Wear the required PPE's • Identify the required tools and equipment • Locate the pulley of the machine • Perform isolation of pulley • Record isolation of pulley • Perform Tagging on pulley and its allied parts 	<ul style="list-style-type: none"> • Demonstrate to wear PPEs • Importance of isolation from Pulley • Techniques/sequence of isolation of Machine from Pulley • Importance of Tagging on pulley 	<p>Th. 3 Hrs. Pr. 12 Hrs.</p>	<p>Tools</p> <ul style="list-style-type: none"> • Screw driver set • Combination plier • Spanner set • Elenkey set • Portable search light • Adjustable Screw Wrench • Pipe Wrench • Hammer • Hack Saw <p>Consumable Material</p>	<p>Class room/Lab/ Workshop</p>

				<ul style="list-style-type: none"> • Safety Gloves • Tags 	
LU6. Perform De-Coupling of Machine	The trainee is able to: <ul style="list-style-type: none"> • Wear the required PPE's • Identify the required tools and equipment • Locate the parts of the machine to be De-coupled • Perform marking on parts to be De-coupled for realignment/readjustment • Perform De-coupling of the machine • Record De-coupling of the machine • Perform Tagging on De-coupled parts of the machine 	<ul style="list-style-type: none"> • Demonstrate to wear PPEs • Understanding the parts of Machine to be De-Coupled • Importance of De-Coupling of Machine • Advantages of Position Marking of Coupling Parts for Re-Alignment • Techniques/sequence of De-Coupling of Machine • Importance of Tagging 	Th. 3 Hrs. Pr. 13 Hrs.	Tools <ul style="list-style-type: none"> • Screw driver set • Combination plier • Spanner set • Allen key set • Portable search light • Adjustable Screw Wrench • Pipe Wrench • Hammer • Hack Saw Consumable Material <ul style="list-style-type: none"> • Safety Gloves • Tags 	Class room/Lab/Workshop
LU7. De-Install Machine from Foundation	The trainee is able to: <ul style="list-style-type: none"> • Wear the required PPE's • Identify the required tools and equipment • Identify machine to 	<ul style="list-style-type: none"> • Demonstrate to wear PPEs • Identification of Machine to be De-Installed from foundation 	Th. 4Hrs. Pr. 12 Hrs.	Tools <ul style="list-style-type: none"> • Screw driver set • Combination plier • Spanner set 	Class room/Lab/Workshop

	<p>be de-installed from foundation</p> <ul style="list-style-type: none"> • Perform de-installation of machine from foundation • Record de-installation of machine • Perform tagging on the de-installed machine 	<ul style="list-style-type: none"> • Techniques/sequence of De-Installation of Machine from foundation • Importance of Tagging 		<ul style="list-style-type: none"> • Allen key set • Portable search light • Adjustable Screw Wrench • Pipe Wrench • Hammer • Hack Saw • Cold Chisel <p>Consumable Material</p> <ul style="list-style-type: none"> • Safety Gloves • Tags 	
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Critical Evidence(s) Required

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

9. Portfolio

10. Assignment(s)/Project(s)

11. Relevant Certification(s)

12. Relevant Job/Experience Letter

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

- Identify parts to be isolated from pneumatic/hydraulic supply
- Perform isolation of all the pneumatic/hydraulic supplies to the machine
- Perform dead plugging of all the pneumatic/hydraulic supplies
- Perform marking on driver, driven and foundation for proper alignment and placement of parts
- Perform isolation of Gear Box

- Perform isolation of pulley
- Locate the parts of the machine to be De-coupled
- Perform de-coupling of machine.
- Perform de-installation of machine from foundation

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Module-D
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Version 1 - September, 2018

Module D: 0716001125 Maintain Tools/ Equipment and Machinery

Objective:This Module covers the knowledge & skills required to Maintain Tools/ Equipment and Machinery through Prepare for work , Maintain Tools and equipment , Ensure Insulation of Tools and Equipment , Calibrate measuring instruments , Perform Lubrication of tools and equipment , Maintain Machines , Manage Inventory of tools/equipment and Machinery

Duration: 50 Hours

Theory: 10 Hours

Practice: 40 Hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Prepare for work to maintain tools / equipment and machinery	<p>The trainee is able to:</p> <ul style="list-style-type: none"> • Prepare list of the PPE'S required for Winding Technician. • Identify the required PPE'S • Collect the required PPE'S • Ensure working / functional condition of PPE'S • Prepare list of the tools / equipment required for Winding Technician • Identify the tools/equipment required for Winding Technician • Collect the tools/equipment required for Winding Technician 	<ul style="list-style-type: none"> • Identification of PPE's, tools/equipment and materials required for maintenance. • Enlisting of tools , PPEs and materials required for Maintenance. • Importance of functional conditions of required Tools, Equipment and PPEs and their use • Importance of safe working condition regarding <ul style="list-style-type: none"> ○ Clear passage ○ Cleanliness 	<p>Th. 1Hrs. Pr. 3 Hrs.</p>	<p>Tools</p> <ul style="list-style-type: none"> • Spanner Set <p>Screw Driver Set</p> <ul style="list-style-type: none"> • Allen key Set • Clamp Meter <p>Consumables Items</p> <ul style="list-style-type: none"> • Hand Gloves • Safety Shoes • Safety Goggles 	<p>Class room / workshop / labs</p>

		<ul style="list-style-type: none"> ○ Adequate light ○ Ventilation 			
LU2. Maintain Tools and equipment	The trainee is able to: <ul style="list-style-type: none"> • Display list of the tools / equipment required for winding technician • Match the available tools / equipment with the displayed list • Prepare list of missing tools and equipment • Arrange the missing tools and equipment 	<ul style="list-style-type: none"> • Importance of maintaining / displaying list of tools / equipments required for winding technician • Matching techniques for the available tools / equipments with the displayed list. • Importance of pin pointing of missing tools and equipments • Arrangement procedure for the missing tools and equipment. 	Th. 1 Hrs. Pr. 5 Hrs.	Tools <ul style="list-style-type: none"> • Spanner Set Screw Driver Set <ul style="list-style-type: none"> • Allen key Set • Clamp Meter Consumables Items <ul style="list-style-type: none"> • Hand Gloves • Safety Shoes • Safety Goggles • Led Pencil, Rubber, Sharpener, Writing Pad Duster Cloth/Cotton Waste	Class room / workshop / labs
LU3. Perform Preventive	The trainee is able to:	<ul style="list-style-type: none"> • Importance of checking physical 	Th. 2 Hrs.	Tools	Class room /

<p>maintenance of tools and equipment</p>	<ul style="list-style-type: none"> • Check physical condition of tools and equipment • Perform cleaning of tools and equipment • Perform lubrication of tools and equipment • Ensure proper storage of tools and equipment 	<p>condition of the tools / equipments.</p> <ul style="list-style-type: none"> • Define preventive maintenance. • Describe Techniques of preventive maintenance: <ul style="list-style-type: none"> ○ Cleaning ○ Lubrication • Storing techniques of tools in the tools 	<p>Pr. 6 Hrs.</p>	<ul style="list-style-type: none"> • Spanner Set <p>Screw Driver Set</p> <ul style="list-style-type: none"> • Allen key Set • Clamp Meter <p>Consumables Items</p> <ul style="list-style-type: none"> • Hand Gloves • Safety Shoes • Safety Goggles • Led Pencil, Rubber, Sharpener, Writing Pad <p>Duster Cloth/Cotton Waste</p>	<p>workshop / labs</p>
<p>LU4. Perform Corrective maintenance of tools and equipment</p>	<p>The trainee is able to:</p> <ul style="list-style-type: none"> • Check working/functional condition of tools and equipment 	<ul style="list-style-type: none"> • Importance of checking working condition of the tools/equipment. • Define corrective 	<p>Th. 2Hrs. Pr. 7 Hrs.</p>	<p>Tools</p> <ul style="list-style-type: none"> • Spanner Set <p>Screw Driver Set</p>	<p>Class room / workshop / labs</p>

	<ul style="list-style-type: none"> • Perform Corrective maintenance of tools and equipment regarding: <ul style="list-style-type: none"> ➤ Sharpening ➤ Adjustment ➤ Balancing ➤ Tightness ➤ Jamming ➤ Breakage ➤ Calibration 	<ul style="list-style-type: none"> • Describe Techniques of corrective maintenance: <ul style="list-style-type: none"> ○ Sharpening ○ Adjustment ○ Balancing ○ Tightness ○ Jamming ○ Breakage ○ Calibration ○ Sharpening • Storing techniques of tools / equipments & machinery. 		<ul style="list-style-type: none"> • Allen key Set • Clamp Meter <p>Consumables Items</p> <ul style="list-style-type: none"> • Hand Gloves • Safety Shoes • Safety Goggles • Led Pencil, Rubber, Sharpener, Writing Pad • Duster Cloth/Cotton Waste 	
LU5. Ensure Electrical/Thermal Insulation of tools and equipment	<p>The trainee is able to:</p> <ul style="list-style-type: none"> • Check Electrical Insulation of tools and equipment • Maintain electrical insulation of tools and 	<ul style="list-style-type: none"> • Define Electrical / thermal insulation of tools/ equipment. Importance of checking Electrical / Thermal of tools / equipments. 	<p>Th. 1 Hrs. Pr. 6 Hrs.</p>	<p>Tools</p> <ul style="list-style-type: none"> • Spanner Set <p>Screw Driver Set</p> <ul style="list-style-type: none"> • Allen key Set 	<p>Class room / workshop / labs</p>

	<p>equipment</p> <ul style="list-style-type: none"> • Check Thermal Insulation of tools and equipment • Maintain Thermal insulation of tools and equipment • Ensure proper storage of tools and equipment 	<ul style="list-style-type: none"> • Techniques of maintaining Electrical / thermal insulation of tools/equipment. 		<ul style="list-style-type: none"> • Clamp Meter <p>Consumables Items</p> <ul style="list-style-type: none"> • Hand Gloves • Safety Shoes • Safety Goggles • Duster Cloth/Cotton Waste 	
LU6. Calibrate measuring instruments	<p>The trainee is able to:</p> <ul style="list-style-type: none"> • Check calibration of measuring instruments • Set calibration of measuring instruments <p>P3: Compare calibration with the standard/Pre-calibrated instrument</p>	<ul style="list-style-type: none"> • Define calibration of measuring instruments. • Calibration techniques of measuring instruments. • Techniques for comparing calibration with the standard/Pre-calibrated instrument 	<p>Th. 1 Hrs. Pr. 5 Hrs.</p>	<p>Tools</p> <ul style="list-style-type: none"> • Spanner Set <p>Screw Driver Set</p> <ul style="list-style-type: none"> • Allen key Set • Clamp Meter 	Class room / workshop / labs
LU7. Maintain Winding Machines	<p>The trainee is able to:</p> <ul style="list-style-type: none"> • Check physical condition of winding 	<ul style="list-style-type: none"> • Define winding machine. • Importance of 	<p>Th. 1 Hrs. Pr.</p>	<p>Tools</p> <ul style="list-style-type: none"> • Spanner Set 	Class room / workshop

	<p>machines</p> <ul style="list-style-type: none"> • Perform cleaning of winding machines • Perform lubrication of winding machines • Check calibration of turns counter of winding machines • Set calibration of turns counter of winding machines • Replace turns counter of winding machines • Ensure safe covering/storing of winding machines 	<p>checking physical condition of winding machine.</p> <ul style="list-style-type: none"> • Techniques for cleaning, lubrication of winding machine. • Importance of setting calibration of turns counter of winding machine. • Replacement techniques of turn counter winding machine and its safe covering / storing. 	5 Hrs.	<p>Screw Driver Set</p> <ul style="list-style-type: none"> • Allen key Set • Clamp Meter • Duster Cloth/Cotton Waste 	/ labs
LU8. . Manage Inventory of tools/equipment and Machinery	<p>The trainee is able to:</p> <ul style="list-style-type: none"> • Collect relevant inventory forms/stock register • Record receiving of tools, equipment and machinery in inventory forms/stock register • Maintain record of tools and equipment in stock register 	<ul style="list-style-type: none"> • Arrangement of relevant inventory forms/stock register. • Enlisting procedure of faulty tools / equipments & machinery. • Demand generation for provision/replacement of faulty tools • Inventory management techniques. 	Th. 1 Hrs. Pr. 3 Hrs.	<p>Consumables:</p> <ul style="list-style-type: none"> • Led Pencil, Rubber, Sharpener, Writing Pad <p>Duster Cloth/Cotton Waste</p>	Class room / workshop / labs

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:

- Prepare list of the PPE'S required for winding technician
- Identify the required PPE'S
- Prepare list of the tools / equipment required for winding technician
- Identify the tools/equipment required for winding technician
- Check working/functional condition of tools and equipment
- Perform Preventive maintenance of tools and equipment
- Perform Corrective maintenance of tools and equipment regarding (Sharpening, Adjustment, Balancing, Tightness, Jamming, Breakage, Calibration)
- Maintain electrical insulation of tools and equipment
- Maintain thermal insulation of tools and equipment
- Maintain record of tools and equipment in stock register.

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Module-E
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Part-II Generic Competencies / Modules

Module E: Comply Personal Health and Safety Guidelines

Objective: This Competency Standard identifies the competencies required to protect/apply occupational Safety, health and Environment at workplace according to the industry's approved guidelines, procedures and interpret environmental rules/regulations. Trainee will be expected to identify and use Personal Protective Equipment (PPE) according to the work place requirements. The underpinning knowledge regarding Observe Occupational Safety and Health (OSH) will be sufficient to provide the basis for the job at workplace.

Duration: 30 Hours

Theory: 06 Hours

Practice: 24 Hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Identify Personal Hazards at Workplace	The trainee is able to: <ul style="list-style-type: none">• Identify risk to personal health• Identify hygiene and safety at work place• Identify processes• Identify tools, equipment and consumable materials that have the potential to cause harm• Report, identified risk to Health, hygiene and safety to concerned				
LU2. Apply Personal Protective and Safety Equipment (PPE)	The trainee is able to: <ul style="list-style-type: none">• List the Personal Protective equipment• Select personal protective equipment in terms of type and quantity according to work orders.• Wear personal protective equipment according to job requirements.• Clean personal protective equipment				

	<ul style="list-style-type: none"> • Stored Personal Protective equipments in proper place after use. 				
<p>LU3. Comply Occupational Safety and Health (OSH)</p>	<p>The trainee is able to:</p> <ul style="list-style-type: none"> • Maintain cleanliness and hygiene as per organizational policy • Comply with Health, hygiene and safety precautions before starting work • Comply organizational Health, hygiene and safety guidelines during work • Deal with resolvable problems according to prescribed procedures • Report un resolvable problems to concerned • Place the tools equipment etc at their prescribed place after completion of work 				
<p>LU4. Dispose of hazardous Waste/materials from the</p>	<p>The trainee is able to:</p> <ul style="list-style-type: none"> • Identify hazardous waste materials which needs to be disposed off 				

<p>designated area.</p>	<ul style="list-style-type: none"> • Segregate hazardous or non-hazardous waste carefully from the designated area as per approved procedure • Use proper disposal hazardous containers for dispose-off hazardous waste as per procedure • Take necessary precautions like putting masks and gloves while disposing hazardous waste/ materials as per standard operating procedure 				
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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: Explain safety rules and regulations of organization

K2: List Personal protection and safety Equipment

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K3: Describe meaning of Safety signs and symbols

K4: Demonstrate understanding of safety related Standard Operating Procedure/guidelines

K5: Describe waste disposal SOPs

K6: Explain best practices relating to clean and safe work environment

Critical Evidence(s) Required

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

A person who demonstrates competency in this unit must be able to provide evidence of maintaining personal health and hygiene practices. 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.

Module F: Communicate the Workplace Policy and Procedure

Objective: This unit describes the performance outcomes, skills and knowledge required to develop communication skills in the workplace. It covers gathering, conveying and receiving information, along with completing assigned written information under direct supervision.

Duration: 20 Hours

Theory: 04 Hours

Practice: 16 Hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Identify workplace communication procedures	The trainee is able to: <ul style="list-style-type: none">• Identify organizational communication requirements and workplace procedures with assistance from relevant authority• Identify appropriate lines of communication with supervisors and colleagues.• Seek advice on the communication method/equipment most appropriate for the task				
LU2. Communicate at workplace	The trainee is able to: <ul style="list-style-type: none">• Use effective questioning, and active listening and speaking skills to gather and convey information• Use appropriate non-verbal behavior at all				

	<p>times</p> <ul style="list-style-type: none"> • Encourage, acknowledge and act upon constructive feedback 				
<p>LU3. Draft Written Information</p>	<p>The trainee is able to:</p> <ul style="list-style-type: none"> • Identify and comply with required range of written materials in accordance with organizational policy and procedures • Draft and present assigned written information for approval, ensuring it is written clearly, concisely and within designated timeframes. • Ensure written information meets required standards of style, format and detail. • Seek assistance and/or feedback to aid communication skills 				

	development				
<p>LU4. Review Documents</p>	<p>The trainee is able to:</p> <ul style="list-style-type: none"> • Check draft for suitability of tone for audience, purpose, format and communication style • Check draft for readability, grammar, spelling, sentence and paragraph construction and correct any inaccuracies or gaps in content. • Check draft for sequencing and structure • Check draft to ensure it meets organizational requirements • Ensure draft is proofread, where appropriate, by supervisor or colleague 				

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Module-G
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Knowledge and Understanding

- K1:** Key provisions of relevant regulations that may affect aspects of business operations, such as privacy laws
- K2:** Organizational policies, plans and procedures.
- K3:** Barriers to communication
- K4:** Communication model
- K5:** Verbal and written communication techniques

Critical Evidence(s) Required

A person who demonstrates competency in this unit must be able to provide evidence of the ability to develop communication skills in the workplace. It covers gathering, conveying and receiving information, along with completing assigned written information under direct supervision. 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.

Module G: Perform Basic Communication (Specific)

Objective: This unit describes the skills and knowledge required to assist in the development of communication competence by providing information regarding different forms of communication and their appropriate use.

By the end of this program, learners will be able, to communicate more effectively and efficiently by: working in a team, follow supervisor's instructions and develop generic communication work skills at workplace

Duration: 30 Hours

Theory: 06 Hours

Practice: 24 Hours

Learning Unit	Learning Outcomes	Learning	Duration	Materials	Learning
		Elements		Required	Place
LU1. Communicate in a team to achieve intended outcomes	The trainee is able to: <ul style="list-style-type: none">• Treat team members with respect• Maintain positive relationships to achieve common organizational goals• Get work related information from team• Identify interrelated work activities to avoid confusion• Adopt communication skills, which are designed in a team.• Identify problems in communication with a team• Resolve Communication barrier through				

	discussion and mutual agreement				
LU2. Follow Supervisor's instructions as per organizational SOPs	The trainee is able to: <ul style="list-style-type: none"> • Receive the instructions from Supervisor • Carry out the instructions of the supervisor • Report to the supervisor as per organizational SOPs 				
LU3. Develop Generic communication skills at workplace	The trainee is able to: <ul style="list-style-type: none"> • Develop basic reading skills • Develop Basic writing Skills • Develop basic listening skills 				

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 Learn and understand Types of communication

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- K2:** Basic Reading Skills
- K3:** Basic Writing skills
- K4:** Basic Verbal communication skills
- K5:** Basic Problem solving skills
- K6:** Basic Self-Management Skills
- K7:** Basic Technology Skills
- K8:** Basic Interview Skills
- K9:** Basic Workplace dress code
- K10:** Basic The role of team members and functionality of the teams

Critical Evidence(s) Required

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

Make a list of appropriate communication skills with colleagues and supervisors

Module H: Perform Basic Computer Application(Specific)

Objective: This unit describes the skills and knowledge required to use spreadsheet to prepare a page of document, develops familiarity with Word, Excel, Access, PowerPoint, email, and computer graphics basics.

It applies to individuals who perform a range of routine tasks in the workplace using a fundamental knowledge of spreadsheets, Microsoft office and computer graphics in under direct supervision or with limited responsibility.

Duration: 40 Hours

Theory: 08 Hours

Practice: 32 Hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Create Word Documents	<p>The trainee is able to:</p> <ul style="list-style-type: none">• Open word processing application• Create a word document• Customize page layout with relevant name setting• Set up page in a word document• Edit word document as required• Use simple formatting tools when creating the document• Save word document to directory• Insert table in a word document• Insert appropriate images into document as necessary• Insert header/footer in a word document• Insert section break in a word document• Set style in word document• Select basic Print settings• Print the document				

LU2. Use internet for Browsing	The trainee is able to: <ul style="list-style-type: none"> • Use search engines to open website • Search data on different topics • Refine search to increase relevance of information or content • Navigate a website to access the information or content required 				
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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:** Describing formatting styles and their effect on formatting, readability and appearance of documents
- K2:** Outline purpose, use and function of word-processing software.
- K3:** Editing in MS Word
- K4:** Formatting in MS word
- K5:** Use of different search engines
- K6:** Use of different web pages

Critical Evidence(s) Required

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

- Identify the components of computer
- Follow organizational ergonomic work health and safety (WHS) requirements and practices
- Create, open and retrieve documents using customized basic settings

- Format documents by creating tables and adding text, objects and images
- Save and prints documents.
- Download data through web browser

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

<ul style="list-style-type: none"> • Creative • Team Worker • Collaborative • Confident • Competent • Innovative • Cooperative 	<p>5 Years relevant field Experience</p> <ul style="list-style-type: none"> • DAE Electrical with 3 Years relevant field Experience • BS Tech Electrical with 2 Years relevant field Experience • BSc Engineering Electrical with 1 Year relevant field Experience 		<p>Future Trends</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"> • Basic Concept of Electricity and Magnetism • Define Voltage, Current, Resistance, Power & Energy • Define DC and AC (Single Phase, Three Phase) • Define Ohm's Law, calculation using basic ohm's law formula • Knowledge of Basic Electric Circuits (Series, Parallel, Open, Close, Ground, Short) • Define Conductors, Insulators, Semiconductors • Understanding Laws of Resistance • Concept of Voltage Drop • Define frequency, conductance, inductance, capacitance, impedance, power factor • State disadvantages of low power factor and methods of improvement of 	<ul style="list-style-type: none"> • Combination Pliers 8" • Long Nose Pliers 6" • Flat Nose Pliers 6" • Round Nose Pliers 6" • Screw Driver Set (Flat & Phillips) Size 4", 6", 8", 10", 12" • Tweezers of different shapes & sizes 4", 6" • Hammer (200, 500, 1000) grams • Mallet / Rubber Hammer (200, 500) grams • Cold Chisel 8", 12" • Gas Welding Plant • Winding Machine <ul style="list-style-type: none"> ➤ Manual (Small and Large size) ➤ Motorized ➤ Automatic • Elenkey Set size 1 – 10 mm • Bench Vice size 4", 6" • Digital Weight Balance up to 500 KG • Oven 0- 300°C, 3 Cubic Ft inner chamber size, 230 V 50 Hz (For Drying purpose of

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

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

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

Related Knowledge	Tools / Equipment
<ul style="list-style-type: none"> • Importance and use of latheroid Paper, varnish, Coil binding, Sleeving • Understanding of Jointing, soldering and taping techniques of coils • Importance of coils baking • Importance of Winding Test at different stages • Understanding of Coil fastening, assembling and disassembling Techniques • Use of Winding Machine (Manual and Automatic) • Understand Preparation and Setting of Coil Former • Know about adjustment techniques for insertion of coils in core slots, core limb • Importance of Wedges • Understand construction features of Motors and Transformer • Importance of Data plate reading of machines 	<ul style="list-style-type: none"> • High Voltage Probe • Digital Energy Meter Single and Three Phase • LCR Meter • Electrician Knife Cutter • Thimble Press 1.5mm² to 16mm² • Thimble Press (Hydraulic) 16mm² to 300mm² • Phase Tester • Wire / Cable Cutter 8" • Wire Stripper 6"
Related Knowledge	Tools / Equipment
<ul style="list-style-type: none"> • Importance of using PPE'S 	

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">➤ Safety Helmet➤ Safety Ladder➤ Safety Belt➤ Safety Rubber Mat 10- 20mm➤ PVC Flexible Cable 23/0.0076"&40/0.0076"➤ PVC 3/0.029"Cable➤ PVC 7/0.029" to 7/0.064" Cable |
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