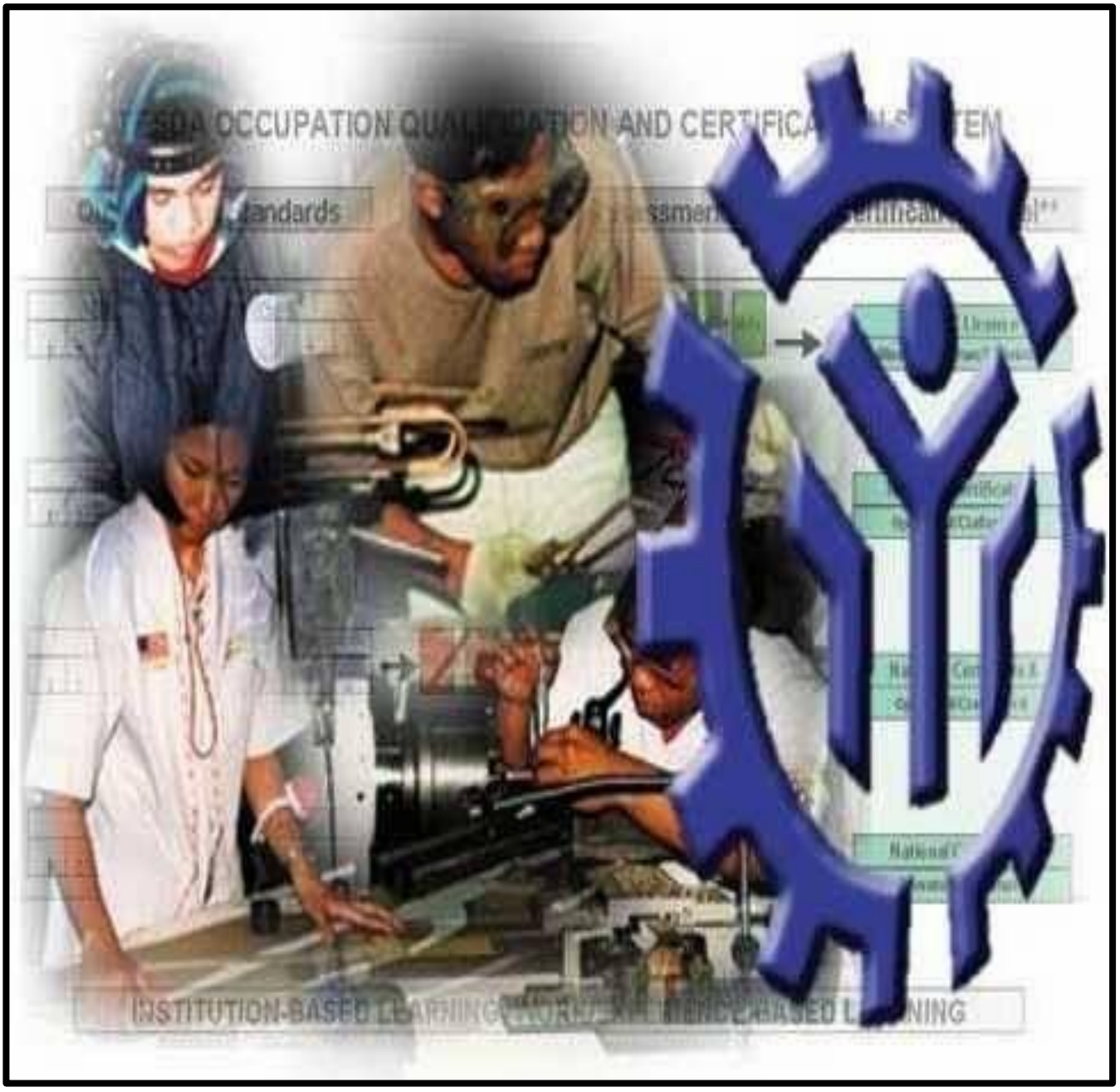
COMPETENCY STANDARDS

WIND TURBINE MAINTENANCE SERVICES LEVEL III



UTILITIES SECTOR

TECHNICAL EDUCATION AND SKILLS DEVELOPMENT AUTHORITY
East Service Road, South Luzon Expressway (SLEX), Taguig City, Metro Manila

Technical Education and Skills Development Act of 1994
(Republic Act No. 7796)

Section 22, "Establishment and Administration of the National Trade Skills Standards" of the RA 7796 known as the TESDA Act mandates TESDA to establish national occupational skill standards. The Authority shall develop and implement a certification and accreditation program in which private industry group and trade associations are accredited to conduct approved trade tests, and the local government units to promote such trade testing activities in their respective areas in accordance with the guidelines to be set by the Authority.

The Competency Standards (CS) serve as basis for the:

1 Institutional Competency assessment and training certification;
2 Registration and delivery of training programs; and
3 Development of curriculum and assessment instruments.

Each CS has 3 sections:

Section 1 **Definition of Competency Standards** - refers to the group of competencies that describes the different functions of the qualification.

Section 2 **The Competency Standards** - gives the specifications of competencies required for effective work performance.

Section 3 **Training Arrangements** - contains information and requirements in designing training program for competency standards. It includes trainee entry requirements, trainer's qualification and list of tools, materials and equipment.

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UTILITIES SECTOR

WIND TURBINE MAINTENANCE SERVICES LEVEL III

COMPETENCY STANDARDS FOR
WIND TURBINE MAINTENANCE SERVICES LEVEL III

SECTION 1 COMPETENCY STANDARDS DESCRIPTION

The **Wind Turbine Maintenance Services Level III** competency standards consist of competencies that a person must have in order to perform routine wind turbine maintenance, inspect wind turbine towers, climb wind tower towers to repair equipment or replace parts, troubleshoot and test wind turbine systems, replace wind turbine parts, collect data on wind turbine.

Inclusive to each of the aforementioned competencies, is the task of a wind turbine technician.

The person must also have competencies use hand tools, perform mensuration and calculation, prepare and interpret technical drawing, apply quality standards, terminate and connect electrical wiring and electronic circuits, maintain tools and equipment, comply with environmental protection procedures, perform computer operations, perform mensuration and calculation, read, interpret and apply specifications and manuals and perform basic electrical works

The Units of Competency comprising this Competency Standards include the following:

Code	BASIC COMPETENCIES
400311319	Lead workplace communication
400311320	Lead small teams
400311321	Apply critical thinking and problem-solving techniques in the workplace
400311322	Work in a diverse environment
400311323	Propose methods of applying learning and innovation in the organization
400311324	Use information systematically
400311325	Evaluate occupational safety and health work practices
400311326	Evaluate environmental work practices
400311327	Facilitate entrepreneurial skills for micro-small-medium enterprises (MSMEs)

Code	COMMON COMPETENCIES
ELC311205	Use Hand Tools
ELC311201	Perform Mensuration and Calculation
ELC311202	Prepare and Interpret Technical Drawing
ELC311204	Apply Quality Standards
ELC311206	Terminate and Connect Electrical Wiring and Electronic Circuits
ELC311212	Maintain tools and equipment
UTL311206	Comply with environmental protection procedures
UTL311207	Perform Computer Operations
UTL311201	Observe Procedures, Specifications and Manuals of Instructions
HVC724201	Perform Basic Electrical Works

Code	CORE COMPETENCIES
AB-UTL0102800313301	Perform routine wind turbine maintenance
AB-UTL0102800313302	Inspect wind turbine towers
AB-UTL0102800313303	Climb wind turbine towers to repair/replace parts.
AB-UTL0102800313304	Troubleshoot and test wind turbine systems
AB-UTL0102800313305	Collect data on wind turbine

A person who has achieved this Competency Standards is competent to be:

- Wind Turbine Technician

SECTION 2 COMPETENCY STANDARDS

This section gives the details of the contents of the basic, common and core units of competency required in **WIND TURBINE MAINTENANCE SERVICES.**

BASIC COMPETENCIES

UNIT OF COMPETENCY : LEAD WORKPLACE COMMUNICATION

UNIT CODE : 400311319

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to lead in the effective dissemination and discussion of ideas, information, and issues in the workplace. This includes preparation of written communication materials.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Communicate information about workplace processes	1.1 Relevant ***communication method*** is selected based on workplace procedures 1.2 Multiple operations involving several topics/areas are communicated following enterprise requirements 1.3 Questioning is applied to gain extra information 1.4 Relevant sources of information are identified in accordance with workplace/ client requirements 1.5 Information is selected and organized following enterprise	1.1. Organization requirements for written and electronic communication methods 1.2. Effective verbal communication methods 1.3. Business writing 1.4. Workplace etiquette	1.1 Organizing information 1.2 Conveying intended meaning 1.3 Participating in a variety of workplace discussions 1.4 Complying with organization requirements for the use of written and electronic communication methods 1.5 Effective business writing 1.6 Effective clarifying and probing skills 1.7 Effective questioning techniques (clarifying and probing)

	procedures 1.6 Verbal and written reporting is undertaken when required 1.7 Communication and negotiation skills are applied and maintained in all relevant situations		
2. Lead workplace discussions	2.1 Response to workplace issues is sought following enterprise procedures 2.2 Response to workplace issues is provided immediately 2.3 Constructive contributions are made to ***workplace discussions*** on such issues as production, quality and safety 2.4 Goals/ objectives and action plans undertaken in the workplace are communicated promptly	2.2 Organization requirements for written and electronic communication methods 2.3 Effective verbal communication methods 2.4 Workplace etiquette	2.1 Organizing information 2.2 Conveying intended meaning 2.3 Participating in variety of workplace discussions 2.4 Complying with organization requirements for the use of written and electronic communication methods 2.5 Effective clarifying and probing skills

3. Identify and communicate issues arising in the workplace	3.1 Issues and problems are identified as they arise 3.2 Information regarding problems and issues are organized coherently to ensure clear and effective communication 3.3 Dialogue is initiated with appropriate personnel 3.4 Communication problems and issues are raised as they arise 2.5 Identify barriers in communication to be addressed appropriately	3.1 Organization requirements for written and electronic communication methods 3.2 Effective verbal communication methods 3.3 Workplace etiquette 3.4 Communication problems and issues 3.5 Barriers in communication	3.1 Organizing information 3.2 Conveying intended meaning 3.3 Participating in a variety of workplace discussions 3.4 Complying with organization requirements for the use of written and electronic communication methods 3.5 Effective clarifying and probing skills 3.6 Identifying issues 3.7 Negotiation and communication skills

RANGE OF VARIABLES

VARIABLE	RANGE
1. Methods of communication	May include: 1.1. Non-verbal gestures 1.2. Verbal 1.3. Face-to-face 1.4. Two-way radio 1.5. Speaking to groups 1.6. Using telephone 1.7. Written 1.8. Internet
2. Workplace discussions	May include: 2.1. Coordination meetings 2.2. Toolbox discussion 2.3. Peer-to-peer discussion

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1. Dealt with a range of communication/information at one time 1.2. Demonstrated leadership skills in workplace communication 1.3. Made constructive contributions in workplace issues 1.4. Sought workplace issues effectively 1.5. Responded to workplace issues promptly 1.6. Presented information clearly and effectively written form 1.7. Used appropriate sources of information 1.8. Asked appropriate questions 1.9. Provided accurate information
2. Resource Implications	The following resources **MUST** be provided: 2.1 Variety of Information 2.2 Communication tools 2.3 Simulated workplace
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1. Case problem 3.2. Third-party report 3.3. Portfolio 3.4. Interview 3.5. Demonstration/Role-playing
4. Context for Assessment	4.1. Competency may be assessed in the workplace or in a simulated workplace environment

UNIT OF COMPETENCY : **LEAD SMALL TEAMS**

UNIT CODE : 400311320

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes to lead small teams including setting, maintaining and monitoring team and individual performance standards.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Provide team leadership	1.1 ***Work requirements*** are identified and presented to team members based on company policies and procedures 1.2 Reasons for instructions and requirements are communicated to team members based on company policies and procedures 1.3 ***Team members' and leaders' concerns*** are recognized, discussed and dealt with based on company practices	1.1 Facilitation of team work 1.2 Company policies and procedures relating to work performance 1.3 Performance standards and expectations 1.4 Monitoring individual's and team's performance vis a vis client's and group's expectations	1.1 Communication skills required for leading teams 1.2 Group facilitation skills 1.3 Negotiating skills 1.4 Setting performance expectation
2. Assign responsibilities	2.1. Responsibilities are allocated having regard to the skills, knowledge and aptitude required to undertake the assigned task based on company policies. 2.2. Duties are allocated having regard to individual preference, domestic and personal considerations, whenever possible	2.1. Work plan and procedures Work requirements and targets 2.2. Individual and group expectations and assignments 2.3. Ways to improve group leadership and membership	2.1. Communication skills 2.2. Management skills 2.3. Negotiating skills 2.4. Evaluation skills 2.5. Identifying team member's strengths and rooms for improvement

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Set performance expectations for team members	3.1 Performance expectations are established based on client needs 3.2 Performance expectations are based on individual team members knowledge, skills and aptitude 3.3 Performance expectations are discussed and disseminated to individual team members	3.1 One's roles and responsibilities in the team 3.2 Feedback giving and receiving 3.3 Performance expectation	3.1 Communication skills 3.2 Accurate empathy 3.3 Congruence 3.4 Unconditional positive regard 3.5 Handling of Feedback
4. Supervise team performance	4.1. **Performance is monitored** based on defined performance criteria and/or assignment instruction 4.2. Team members are provided with ***feedback*****,** positive support and advice on strategies to overcome any deficiencies based on company practices 4.3. ***Performance issues*** which cannot be rectified or addressed within the team are referred to appropriate personnel according to employer policy. 4.4. Team members are kept informed of any changes in the priority allocated to assignments or	4.1 Performance Coaching 4.2 Performance management 4.3 Performance Issues	4.1. Communication skills required for leading teams 4.2. Coaching skill

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	tasks which might impact on client/customer needs and satisfaction 4.5. Team operations are monitored to ensure that employer/client needs and requirements are met 4.6. Follow-up communication is provided on all issues affecting the team 4.7. All relevant documentation is completed in accordance with company procedures		

RANGE OF VARIABLES

VARIABLE	RANGE
1. Work requirements	May include: 1.1. Client Profile 1.2. Assignment instructions
2. Team members and leaders' concerns	May include: 2.1 Roster 2.2 Shift details
3. Monitor performance	May include: 3.1. Formal process 3.2. Informal process
4. Feedback	May include: 4.1. Formal process 4.2. Informal process
5. Performance issues	May include: 5.1. Work output 5.2. Work quality 5.3. Team participation 5.4. Compliance with workplace protocols 5.5. Safety 5.6. Customer service

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1. Maintained or improved individuals and/or team performance given a variety of possible scenario 1.2. Assessed and monitored team and individual performance against set criteria 1.3. Represented concerns of a team and individual to next level of management or appropriate specialist and to negotiate on their behalf 1.4. Allocated duties and responsibilities, having regard to individual's knowledge, skills and aptitude and the needs of the tasks to be performed 1.5. Set and communicated performance expectations for a range of tasks and duties within the team and provided feedback to team members
2. Resource Implications	The following resources must be provided: 2.1. Access to relevant workplace or appropriately simulated environment where assessment can take place 2.2. Materials relevant to the proposed activity or task
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1. Written Examination 3.2. Oral Questioning 3.3. Portfolio
4. Context for Assessment	4.1. Competency may be assessed in the workplace or in a simulated workplace environment

UNIT OF COMPETENCY : **APPLY CRITICAL THINKING AND PROBLEM-SOLVING TECHNIQUES IN THE WORKPLACE**

UNIT CODE : 400311321

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to solve problems in the workplace including the application of problem-solving techniques and to determine and resolve the root cause/s of specific problems in the workplace.

ELEMENTS	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Examine specific workplace challenges	1.1. Variances are examined from normal operating **parameters;** and product quality. 1.2. Extent, cause and nature of the specific problem are defined through observation, investigation and ***analytical techniques***. 1.3. ***Problems*** are clearly stated and specified.	1.1. Competence includes a thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations. 1.2. Competence to include the ability to apply and explain, enough for the identification of fundamental causes of specific workplace challenges. 1.2.1. Relevant equipment and operational processes. 1.2.2. Enterprise goals, targets and measures. 1.2.3. Enterprise quality OHS and	1.1 Using range of analytical techniques (e.g., planning, attention, simultaneous and successive processing of information) in examining specific challenges in the workplace. 1.2 Identifying extent and causes of specific challenges in the workplace.

		environmental requirement. 1.2.4. Enterprise information systems and data collation 1.2.5. Industry codes and standards	
2. Analyze the causes of specific workplace challenges	2.1 Possible causes of specific problems are identified based on experience and the use of problem-solving tools **/** analytical techniques. 2.2 Possible cause statements are developed based on findings. 2.3 Fundamental causes are identified per results of investigation conducted.	2.1 Competence includes a thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations. 2.2 Competence to include the ability to apply and explain, sufficient for the identification of fundamental cause, determining the corrective action and provision of recommendation. 2.3 Relevant equipment and operational processes. 2.4 Enterprise goals, targets and measures. 2.5 Enterprise quality OSH and environmental requirement. 2.6 Enterprise information systems and data collation. 2.7 Industry codes and standards.	2.1 Using range of analytical techniques (e.g., planning, attention, simultaneous and successive processing of information) in examining specific challenges in the workplace. 2.2 Identifying extent and causes of specific challenges in the workplace. 2.3 Providing clear-cut findings on the nature of each identified workplace challenges.

3. Formulate resolutions to specific workplace challenges	3.1 All possible options are considered for resolution of the problem. 3.2 Strengths and weaknesses of possible options are considered. 3.3 Corrective actions are determined to resolve the problem and possible future causes. 3.4 **Action *plans*** are developed identifying measurable objectives, resource needs and timelines in accordance with safety and operating procedures	3.1 Competence to include the ability to apply and explain, sufficient for the identification of fundamental cause, determining the corrective action and provision of recommendations 3.1.1. Relevant equipment and operational processes 3.1.2. Enterprise goals, targets and measures 3.1.3. Enterprise quality OSH and environmental requirement 3.1.4. Principles of decision-making strategies and techniques 3.1.5. Enterprise information systems and data collation 3.2. Industry codes and standards	3.1 Using range of analytical techniques (e.g., planning, attention, simultaneous and successive processing of information) in examining specific challenges in the workplace. 3.2 Identifying extent and causes of specific challenges in the workplace. 3.3 Providing clear-cut findings on the nature of each identified workplace challenges. 3.4 Devising, communicating, implementing and evaluating strategies and techniques in addressing specific workplace challenges.
4. Implement action plans and communicate results	4.1. Action plans are implemented and evaluated. 4.2. Results of plan implementation and recommendations are prepared. 4.3. Recommendations are presented to appropriate personnel. 4.4. Recommendations are followed-up, if required.	4.1. Competence to include the ability to apply and explain, sufficient for the identification of fundamental cause, determining the corrective action and provision of recommendations 4.2. Relevant equipment and operational processes	4.1. Using range of analytical techniques (e.g., planning, attention, simultaneous and successive processing of information) in examining specific challenges in the workplace. 4.2. Identifying extent and

		4.3. Enterprise goals, targets and measures 4.4. Enterprise quality, OSH and environmental requirement 4.5. Principles of decision-making strategies and techniques 4.6. Enterprise information systems and data collation 4.7. Industry codes and standards	causes of specific challenges in the workplace. 4.3. Providing clear-cut findings on the nature of each identified workplace challenges. 4.4. Devising, communicating, implementing and evaluating strategies and techniques in addressing specific workplace challenges.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Parameters	May include: 1.1. Processes 1.2. Procedures 1.3. Systems
2. Analytical techniques	May include: 2.1. Brainstorming 2.2. Intuitions/Logic 2.3. Cause and effect diagrams 2.4. Pareto analysis 2.5. SWOT analysis 2.6. Gant chart, Pert CPM and graphs 2.7. Scattergrams
3. Problems	May include: 3.1. Routine, non – routine and complex workplace and quality problems 3.2. Equipment selection, availability and failure 3.3. Teamwork and work allocation problem 3.4. Safety and emergency situations and incidents 3.5. Risk assessment and management
4. Action plans	May include: 4.1. Priority requirements 4.2. Measurable objectives 4.3. Resource requirements 4.4. Timelines 4.5. Co-ordination and feedback requirements 4.6. Safety requirements 4.7. Risk assessment 4.8. Environmental requirements

EVIDENCE GUIDE

1. Critical aspect of Competency	Assessment requires evidence that the candidate: 1.1. Examined specific workplace challenges. 1.2. Analyzed the causes of specific workplace challenges. 1.3. Formulated resolutions to specific workplace challenges. 1.4. Implemented action plans and communicated results on specific workplace challenges.
2. Resource Implication	2.1. Assessment will require access to an operating plant over an extended period of time, or a suitable method of gathering evidence of operating ability over a range of situations. A bank of scenarios / case studies / what ifs will be required as well as bank of questions which will be used to probe the reason behind the observable action.
3. Method of Assessment	Competency in this unit may be assessed through**:** 3.1. Observation 3.2. Case Formulation 3.3. Life Narrative Inquiry 3.4. Standardized test The unit will be assessed in a holistic manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations, which will include disruptions to normal, smooth operation. Simulation may be required to allow for timely assessment of parts of this unit of competency. Simulation should be based on the actual workplace and will include walk through of the relevant competency components. These assessment activities should include a range of problems, including new, unusual and improbable situations that may have happened.
4. Context of Assessment	4.1. In all workplace, it may be appropriate to assess this unit concurrently with relevant teamwork or operation units.

UNIT OF COMPETENCY : WORK IN A DIVERSE ENVIRONMENT

UNIT CODE : 400311322

UNIT DESCRIPTOR : This unit covers the outcomes required to work effectively in a workplace characterized by diversity in terms of religions, beliefs, races, ethnicities and other differences.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Develop an individual's cultural awareness and sensitivity	1.1. Individual differences with clients, customers and fellow workers are recognized and respected in accordance with enterprise policies and core values. 1.2. Differences are responded to in a sensitive and considerate manner 1.3. **Diversity** is accommodated using appropriate verbal and non-verbal communication.	1.1. Understanding cultural diversity in the workplace 1.2. Norms of behavior for interacting and dialogue with specific groups (e. g., Muslims and other non-Christians, non- Catholics, tribes/ethnic groups, foreigners) 1.3. Different methods of verbal and non- verbal communication in a multicultural setting.	1.1. Applying cross-cultural communication skills (i.e. different business customs, beliefs, communication strategies) 1.2. Showing affective skills – establishing rapport and empathy, understanding, etc. 1.3. Demonstrating openness and flexibility in communication 1.4. Recognizing diverse groups in the workplace and community as defined by divergent culture, religion, traditions and practices

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Work effectively in an environment that acknowledges and values cultural diversity	2.1. Knowledge, skills and experiences of others are recognized and documented in relation to team objectives. 2.2. Fellow workers are encouraged to utilize and share their specific qualities, skills or backgrounds with other team members and clients to enhance work outcomes. 2.3. Relations with customers and clients are maintained to show that diversity is valued by the business.	2.1. Value of diversity in the economy and society in terms of workforce development 2.2. Importance of inclusiveness in a diverse environment 2.3. Shared vision and understanding of and commitment to team, departmental, and organizational goals and objectives 2.4. Strategies for customer service excellence	2.1. Demonstrating cross- cultural communication skills and active listening 2.2. Recognizing diverse groups in the workplace and community as defined by divergent culture, religion, traditions and practices 2.3. Demonstrating collaboration skills 2.4. Exhibiting customer service excellence

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Identify common issues in a multicultural and diverse environment	3.1. **Diversity-related conflicts** within the workplace are effectively addressed and resolved. 3.2. Discriminatory behaviors towards customers/stakeholders are minimized and addressed accordingly. 3.3. Change management policies are in place within the organization.	3.1. Value, and leverage of cultural diversity 3.2. Inclusivity and conflict resolution 3.3. Workplace harassment 3.4. Change management and ways to overcome resistance to change 3.5. Advanced strategies for customer service excellence	3.1 Addressing diversity-related conflicts in the workplace 3.2 Eliminating discriminatory behavior towards customers and co- workers 3.3 Utilizing change management policies in the workplace

RANGE OF VARIABLES

VARIABLE	RANGE
1. Diversity	This refers to diversity in both the workplace and the community and may include divergence in: 1.1 Religion 1.2 Ethnicity, race or nationality 1.3 Culture 1.4 Gender, age or personality 1.5 Educational background
2. Diversity-related conflicts	May include conflicts that result from: 2.1 Discriminatory behaviors 2.2 Differences of cultural practices 2.3 Differences of belief and value systems 2.4 Gender-based violence 2.5 Workplace bullying 2.6 Corporate jealousy 2.7 Language barriers 2.8 Individuals being differently-abled persons 2.9 Ageism (negative attitude and behavior towards old people)

EVIDENCE GUIDE

1. Critical aspect of competency	Assessment requires evidence that the candidate: 1.1 Adjusted language and behavior as required by interactions with diversity 1.2 Identified and respected individual differences in colleagues, clients and customers 1.3 Applied relevant regulations, standards and codes of practice
2. Resource Implication	The following resources should be provided: 2.1 Access to workplace and resources 2.2 Manuals and policies on Workplace Diversity
3. Method of assessment	Competency in this unit may be assessed through: 3.1 Demonstration or simulation with oral questioning 3.2 Group discussions and interactive activities 3.3 Case studies/problems involving workplace diversity issues 3.4 Third-party report 3.5 Written examination 3.6 Role Plays
4. Context of assessment	4.1. Competency assessment may occur in workplace or any appropriately simulated environment

UNIT OF COMPETENCY : **PROPOSE METHODS OF APPLYING LEARNING AND INNOVATION IN THE ORGANIZATION**

UNIT CODE : **400311323**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to assess general obstacles in the application of learning and innovation in the organization and to propose practical methods of such in addressing organizational challenges.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Assess work procedures, processes and systems in terms of innovative practices	1.1. ***Reasons*** for innovation are incorporated to work procedures 1.2. ***Models of innovation*** are researched 1.3. ***Gaps or barriers*** to innovation in one's work area are analyzed 1.4. Staff who can support and foster innovation in the work procedure are identified	1.1. Seven habits of highly effective people 1.2. Character strengths that foster innovation and learning (Christopher Peterson and Martin Seligman, 2004) 1.3. Five minds of the future concepts (Gardner, 2007) 1.4. Adaptation concepts in neuroscience (Merzenich, 2013) 1.5. Trans theoretical model of behavior change (Prochaska, DiClemente, & Norcross, 1992)	1.1. Demonstrating collaboration and networking skills 1.2. Applying basic research and evaluation skills 1.3. Generating insights on how to improve organizational procedures, processes and systems through innovation

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Generate practical action plans for improving work procedures, processes	2.1. Ideas for innovative work procedure to foster innovation using individual and group techniques are conceptualized 2.2. Range of ideas with other team members and colleagues are evaluated and discussed 2.3. Work procedures and processes subject to change are selected based on workplace requirements (feasible and innovative) 2.4. Practical action plans are proposed to facilitate simple changes in the work procedures, processes and systems 2.5. ***Critical inquiry*** is applied and used to facilitate discourse on adjustments in the simple work procedures, processes and systems	2.1. Seven habits of highly effective people 2.2. Character strengths that foster innovation and learning (Christopher Peterson and Martin Seligman, 2004) 2.3. Five minds of the future concepts (Gardner, 2007) 2.4. Adaptation concepts in neuroscience (Merzenich, 2013) 2.5. Trans-theoretical model of behavior change (Prochaska, DiClemente, & Norcross, 1992)	2.1. Assessing readiness for change on simple work procedures, processes and systems 2.2. Generating insights on how to improve organizational procedures, processes and systems through innovation 2.3. Facilitating action plans on how to apply innovative procedures in the organization.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Evaluate the effectiveness of the proposed action plans	3.1. Work structure is analyzed to identify the impact of the new work procedures 3.2. Co-workers/key personnel is consulted to know who will be involved with or affected by the work procedure 3.3. Work instruction operational plan of the new work procedure is developed and evaluated 3.4. Feedback and suggestion are recorded 3.5. Operational plan is updated 3.6. Results and impact on the developed work instructions are reviewed 3.7. Results of the new work procedure are evaluated 3.8. Adjustments are recommended based on results gathered	3.1. Five minds of the future concepts (Gardner, 2007) 3.2. Adaptation concepts in neuroscience (Merzenich, 2013) 3.3. Transtheoretical model of behavior change (Prochaska, DiClemente, & Norcross, 1992)	3.1. Generating insights on how to improve organizational procedures, processes and systems through innovation 3.2. Facilitating action plans on how to apply innovative procedures in the organization 3.3. Communicating results of the evaluation of the proposed and implemented changes in the workplace procedures and systems 3.4. Developing action plans for continuous improvement on the basic systems, processes and procedures in the organization

RANGE OF VARIABLES

VARIABLE	RANGE
1. Reasons	May include: 1.1 Strengths and weaknesses of the current systems, processes and procedures 1.2 Opportunities and threats of the current systems, processes and procedures
2. Models of innovation	May include: 2.1 Seven habits of highly effective people. 2.2 Five minds of the future concepts (Gardner, 2007) 2.3 Neuroplasticity and adaptation strategies
3. Gaps or barriers	May include: 3.1 Machine 3.2 Manpower 3.3 Methods 3.4 Money
4. Critical Inquiry	May include: 4.1 Preparation 4.2 Discussion 4.3 Clarification of goals 4.4 Negotiate towards a Win-Win outcome 4.5 Agreement 4.6 Implementation of a course of action 4.7 Effective verbal communication. See our pages: Verbal Communication and Effective Speaking 4.8 Listening 4.9 Reducing misunderstandings is a key part of effective negotiation 4.10 Rapport Building 4.11 Problem Solving 4.12 Decision Making 4.13 Assertiveness 4.14 Dealing with Difficult Situations

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Established the reasons why innovative systems are required 1.2 Established the goals of a new innovative system 1.3 Analyzed current organizational systems to identify gaps and barriers to innovation 1.4 Assessed work procedures, processes and systems in terms of innovative practices 1.5 Generate practical action plans for improving work procedures, and processes 1.6 Reviewed the trial innovative work system and adjusted reflect evaluation feedback, knowledge management systems and future planning 1.7 Evaluated the effectiveness of the proposed action plans
2. Resource Implication	The following resources must be provided: 2.1 Pens, papers and writing implements 2.2 Cartolina 2.3 Manila papers
3. Method of assessment	Competency in this unit may be assessed through: 3.1 Psychological and behavioral Interviews 3.2 Performance evaluation 3.3 Life narrative inquiry 3.4 Review of portfolios of evidence and third-party workplace reports of on-the-job performance 3.5 Sensitivity analysis 3.6 Organizational analysis 3.7 Standardized assessment of character strengths and virtues applied
4. Context of assessment	4.1. Competency may be assessed individually in the actual workplace or simulation environment in TESDA accredited institutions.

UNIT OF COMPETENCY : USE INFORMATION SYSTEMATICALLY

UNIT CODE : 400311324

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to use technical information systems, apply Information Technology (IT) systems and edit, format and check information.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Use technical information	1.1. ***Information*** is collated and organized into a suitable form for reference and use 1.2. Stored information is classified so that it can be quickly identified and retrieved when needed 1.3. Guidance is offered to people who need to find and use information	1.1. Application in collating information 1.2. Procedures for inputting, maintaining and archiving information 1.3. Guidance to people who need to find and use information 1.4. Organize information 1.5. Classify stored information for identification and retrieval 1.6. Operate the technical information system by using agreed procedures	1.1. Collating information 1.2. Operating appropriate and valid procedures for inputting, maintaining and archiving information 1.3. Advising and offering guidance to people who need to find and use information 1.4. Organizing information into a suitable form for reference and use 1.5. Classifying stored information for identification and retrieval 1.6. Operating the technical information system by using agreed procedures

2. Apply Information Technology (IT)	2.1. ***Technical information*** system is operated using agreed procedures 2.2. Appropriate and valid procedures are operated for inputting, maintaining and archiving information 2.3. ***Software*** required are utilized to execute the project activities 2.4. Information and data obtained are handled, edited, formatted and checked from a range of internal and external ***sources*** 2.5. Information is extracted, entered, and processed to produce the outputs required by ***customers*** 2.6. Own skills and understanding are shared to help others 2.7. Specified ***security measures*** are implemented to protect the confidentiality and integrity of project data held in IT systems	2.1. Attributes and limitations of available software tools 2.2. Procedures and work instructions for the use of IT 2.3. Operational requirements for IT systems 2.4. Sources and flow paths of data 2.5. Security systems and measures that can be used 2.6. Extract data and format reports 2.7. Methods of entering and processing information 2.8. WWW enabled applications	2.1. Identifying attributes and limitations of available software tools 2.2. Using procedures and work instructions for the use of IT 2.3. Describing operational requirements for IT systems 2.4. Identifying sources and flow paths of data 2.5. Determining security systems and measures that can be used 2.6. Extracting data and format reports 2.7. Describing methods of entering and processing information 2.8. Using WWW applications

3. Edit, format and check information	3.1. Basic editing techniques are used 3.2. Accuracy of documents are checked 3.3. Editing and formatting tools and techniques are used for more complex documents 3.4. Proofreading techniques are used to check that documents look professional	3.1. Basic file handling techniques 3.2. Techniques in checking documents 3.3. Techniques in editing and formatting 2.9. Proofreading techniques	3.1. Using basic file-handling techniques is used for the software 3.2. Using different techniques in checking documents 3.3. Applying editing and formatting techniques 3.4. Applying proofreading techniques

RANGE OF VARIABLES

VARIABLE	RANGE
1. Information	May include: 1.1 Property 1.2 Organizational 1.3 Technical reference
2. Technical information	May include: 2.1 Paper based 2.2 Electronic
3. Software	May include: 3.1 Spreadsheets 3.2 Databases 3.3 Word processing 3.4 Presentation
4. Sources	May include: 4.1 Other IT systems 4.2 Manually created 4.3 Within own organization 4.4 Outside own organization 4.5 Geographically remote
5. Customers	May include: 5.1 Colleagues 5.2 Company and project management 5.3 Clients
6. Security measures	May include: 6.1 Access rights to input 6.2 Passwords 6.3 Access rights to outputs 6.4 Data consistency and back-up 6.5 Recovery plans

EVIDENCE GUIDE

1. Critical aspect of competency	Assessment requires evidence that the candidate: 1.1. Used technical information systems and information technology 1.2. Applied Information Technology (IT) systems 1.3. Edited, formatted and checked information
2. Resource Implication	The following resources should be provided: 2.1. Computers 2.2. Software and IT system
3. Method of assessment	Competency in this unit should be assessed through: 3.1. Direct Observation 3.2. Oral interview and written test
4. Context of Assessment	4.1. Competency may be assessed individually in the actual workplace or through accredited institution

UNIT OF COMPETENCY : **EVALUATE OCCUPATIONAL SAFETY AND HEALTH WORK PRACTICES**

UNIT CODE : **400311325**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to interpret Occupational Safety and Health practices, set OSH work targets, and evaluate effectiveness of Occupational Safety and Health work instructions.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Interpret Occupational Safety and Health practices	1.1. ***OSH work practices issues*** are identified relevant to work requirements 1.2. OSH work standards and procedures are determined based on applicability to nature of work 1.3. Gaps in work practices are identified related to relevant OSH work standards	1.1. OSH work practices issues 1.2. OSH work standards 1.3. General OSH principles and legislations 1.4. Company/ workplace policies/ guidelines 1.5. Standards and safety requirements of work process and procedures	1.1. Communication skills 1.2. Interpersonal skills 1.3. Critical thinking skills 1.4. Observation skills
2. Set OSH work targets	2.1. Relevant work information is gathered necessary to determine OSH work targets 2.2. ***OSH Indicators*** based on gathered information are agreed upon to measure effectiveness of workplace OSH policies and	2.1. OSH work targets 2.2. OSH Indicators 2.3. OSH work instructions 2.4. Safety and health requirements of tasks 2.5. Workplace guidelines on providing feedback on OSH and security	2.1. Communication skills 2.2. Collaborating skills 2.3. Critical thinking skills 2.4. Observation skills

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	procedures 2.3. Agreed OSH indicators are endorsed for approval from appropriate personnel 2.4. ***OSH work instructions*** are received in accordance with workplace policies and procedures*	concerns 2.6. OSH regulations Hazard control procedures 2.7. OSH trainings relevant to work	
3. Evaluate effectiveness of Occupational Safety and Health work instructions	3.1. OSH Practices are observed based on workplace standards 3.2. Observed OSH practices are measured against approved ***OSH metrics*** 3.3. Findings regarding effectiveness are assessed and gaps identified are implemented based on OSH work standards	3.1. OSH Practices 3.2. OSH metrics 3.3. OSH Evaluation Technique 3.4. OSH work standards	3.1. Critical thinking Skills 3.2. Evaluating skills

RANGE OF VARIABLES

VARIABLE	RANGE
1. OSH Work Practices Issues	May include: 1.1 Workers' experience/observance on presence of work hazards 1.2 Unsafe/unhealthy administrative arrangements (prolonged work hours, no break-time, constant overtime, scheduling of tasks) 1.3 Reasons for compliance/non-compliance to use of PPEs or other OSH procedures/policies/ guidelines
2. OSH Indicators	May include: 2.1 Increased of incidents of accidents, injuries 2.2 Increased occurrence of sickness or health complaints/symptoms 2.3 Common complaints of workers related to OSH 2.4 High absenteeism for work-related reasons
3. OSH Work Instructions	May include: 3.1 Preventive and control measures**,** and targets 3.2 Eliminate the hazard (i.e., get rid of the dangerous machine 3.3 Isolate the hazard (i.e. keep the machine in a closed room and operate it remotely; barricade an unsafe area off) 3.4 Substitute the hazard with a safer alternative (i.e., replace the machine with a safer one) 3.5 Use administrative controls to reduce the risk (i.e. give trainings on how to use equipment safely; OSH-related topics, issue warning signages, rotation/shifting work schedule) 3.6 Use engineering controls to reduce the risk (i.e. use safety guards to machine) 3.7 Use personal protective equipment 3.8 Safety, Health and Work Environment Evaluation 3.9 Periodic and/or special medical examinations of workers
4. OSH metrics	May include: 4.1 Statistics on incidence of accidence and injuries 4.2 Morbidity (Type and Number of Sickness) 4.3 Mortality (Cause and Number of Deaths) 4.4 Accident Rate

EVIDENCE GUIDE

1. Critical aspect of competency	Assessment requires evidence that the candidate: 1.1. Identify OSH work practices issues relevant to work requirements 1.2. Identify gaps in work practices related to relevant OSH work standards 1.3. Agree upon OSH Indicators based on gathered information to measure effectiveness of workplace OSH policies and procedures 1.4. Receive OSH work instructions in accordance with workplace policies and procedures 1.5. Compare Observed OSH practices with against approved OSH work instructions 1.6. Assess findings regarding effectiveness based on OSH work standards
2. Resource Implication	The following resources must be provided: 2.1. Facilities, materials, tools and equipment necessary for the activity
3. Method of Assessment	Competency in this unit may be assessed through: 3.1. Observation/Demonstration with oral questioning 3.2. Third party report 3.3. Written exam
4. Context of Assessment	4.1 Competency may be assessed in the workplace or in a simulated work place setting

UNIT OF COMPETENCY : EVALUATE ENVIRONMENTAL WORK PRACTICES

UNIT CODE : 400311326

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitude to interpret environmental Issues, establish targets to evaluate environmental practices and evaluate effectiveness of environmental practices

ELEMENTS	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Interpret environmental practices, policies and procedures	1.1. ***Environmental work practices*** issues are identified relevant to work requirements 1.2. Environmental standards and procedures and nature of work are determined based on applicability to nature of work 1.3. Gaps in work practices related to Environmental Standards and Procedures are identified	1.1. Environmental issues 1.2. Environmental Work Procedures 1.3. Environmental Laws 1.4. Environmental Hazardous and Non-Hazardous Materials 1.5. Environmental required license, registration or certification	1.1. Analyzing Environmental Issues and Concerns 1.2. Critical thinking 1.3. Problem Solving 1.4. Observation Skills
2. Establish targets to evaluate environmental practices	2.1. Relevant information is gathered necessary to determine environmental work targets 2.2. ***Environmental Indicators*** based on gathered information are set to measure environmental work targets 2.3. Indicators are	2.1. Environmental indicators 2.2. Relevant environment personnel or expert 2.3. Relevant environmental trainings and seminars	2.1. Investigative skills 2.2. Critical thinking 2.3. Problem solving 2.4. Observation skills

	verified with appropriate personnel		
3. Evaluate effectiveness of environmental practices	3.1. Work environmental practices are recorded based on workplace standards 3.2. Recorded work environmental practices are compared against planned indicators 3.3. Findings regarding effectiveness are assessed and gaps identified are implemented based on environment work standards and procedures 3.4. Results of environmental assessment are conveyed to appropriate personnel	3.1. Environmental Practices 3.2. Environmental Standards and Procedures	3.1. Documentation and Record Keeping Skills 3.2. Critical thinking 3.3. Problem Solving 3.4. Observation Skills

RANGE OF VARIABLES

VARIABLE	RANGE
1. Environmental Practices Issues	May include: 1.1 Water Quality 1.2 National and Local Government Issues 1.3 Safety 1.4 Endangered Species 1.5 Noise 1.6 Air Quality 1.7 Historic 1.8 Waste 1.9 Cultural
2. Environmental Indicators	May include: 2.1 Noise level 2.2 Lighting (Lumens) 2.3 Air Quality - Toxicity 2.4 Thermal Comfort 2.5 Vibration 2.6 Radiation 2.7 Quantity of the Resources 2.8 Volume

EVIDENCE GUIDE

1. Critical aspect of competency	Assessment requires evidence that the candidate: 1.1. Identified environmental issues relevant to work requirements 1.2. Identified gaps in work practices related to Environmental Standards and Procedures 1.3. Gathered relevant information necessary to determine environmental work targets 1.4. Set environmental indicators based on gathered information to measure environmental work targets 1.5. Recorded work environmental practices are recorded based on workplace standards 1.6. Conveyed results of environmental assessment to appropriate personnel
2. Resource Implication	The following resources must be provided: 2.1. Workplace/Assessment location 2.2. Legislation, policies, procedures, protocols and local ordinances relating to environmental protection 2.3. Case studies/scenarios relating to environmental protection
3. Method of Assessment	Competency in this unit may be assessed through: 3.1. Written/ Oral Examination 3.2. Interview/Third Party Reports 3.3. Portfolio (citations/awards from GOs and NGOs, certificate of training – local and abroad) 3.4. Simulations and role-plays
4. Context of Assessment	4.1. Competency may be assessed in actual workplace or at the designated TESDA center.

UNIT OF COMPETENCY : **FACILITATE ENTREPRENEURIAL SKILLS FOR MICRO- SMALL- MEDIUM ENTERPRISES (MSMEs)**

UNIT CODE : **400311327**

UNIT DESCRIPTOR : This unit covers the outcomes required to build, operate and a micro/small-scale enterprise.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Develop and maintain micro-small-medium enterprise (MSMEs) skills in the organization	1.1 Appropriate ***business strategies*** are determined and set for the enterprise based on current and emerging business environment. 1.2 ***Business operations*** are monitored and controlled following established procedures. 1.3 Quality assurance measures are implemented consistently. 1.4 Good relations are maintained with staff/workers. 1.5 Policies and procedures on occupational safety and health and environmental concerns are constantly observed.	1.1. Business models and strategies 1.2. Types and categories of businesses 1.3. Business operation 1.4. Basic Bookkeeping 1.5. Business internal controls 1.6. Basic quality control and assurance concepts 1.7. Government and regulatory processes	1.1 Basic bookkeeping/ accounting skills 1.2 Communication skills 1.3 Building relations with customer and employees 1.4 Building competitive advantage of the enterprise

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Establish and maintain client-base/ market	2.1 Good customer relations are maintained 2.2 New customers and markets are identified, explored and reached out to. 2.3 Promotions/Incentives are offered to loyal customers 2.4 Additional products and services are evaluated and tried where feasible. 2.5 ***Promotional/advertising initiatives*** are carried out where necessary and feasible.	2.1 Public relations concepts 2.2 Basic product promotion strategies 2.3 Basic market and feasibility studies 2.4 Basic business ethics	2.1 Building customer relations 2.2 Individual marketing skills 2.3 Using basic advertising (posters/ tarpaulins, flyers, social media, etc.)
3. Apply budgeting and financial management skills	3.1 Enterprise is built up and sustained through judicious control of cash flows. 3.2 Profitability of enterprise is ensured though appropriate ***internal controls***. 3.3 Unnecessary or lower-priority expenses and purchases are avoided.	3.1 Cash flow management 3.2 Basic financial management 3.3 Basic financial accounting 3.4 Business internal controls	3.1 Setting business priorities and strategies 3.2 Interpreting basic financial statements 3.3 Preparing business plans

RANGE OF VARIABLES

VARIABLE	RANGE
1. Business strategies	May include: 1.1. Developing/Maintaining niche market 1.2. Use of organic/healthy ingredients 1.3. Environment-friendly and sustainable practices 1.4. Offering both affordable and high-quality products and services 1.5. Promotion and marketing strategies (e. g., on- line marketing)
2. Business operations	May include: 2.1. Purchasing 2.2. Accounting/Administrative work 2.3. Production/Operations/Sales
3. Promotional/ Advertising initiatives	May include: 3.1. Use of tarpaulins, brochures, and/or flyers 3.2. Sales, discounts and easy payment terms 3.3. Use of social media/Internet 3.4. “Service with a smile” 3.5. Extra attention to regular customers
4. Internal controls	May include: 4.1 Accounting systems 4.2 Financial statements/reports 4.3 Cash management

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Demonstrated basic entrepreneurial skills 1.2 Demonstrated ability to conceptualize and plan a micro/small enterprise 1.3 Demonstrated ability to manage/operate a micro/small-scale business
2. Resource Implications	The following resources should be provided: 2.1 Simulated or actual workplace 2.2 Tools, materials and supplies needed to demonstrate the required tasks 2.3 References and manuals
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1 Written examination 3.2 Demonstration/observation with oral questioning 3.3 Portfolio assessment with interview 3.4 Case problems
4. Context of Assessment	4.1 Competency may be assessed in workplace or in a simulated workplace setting 4.2 Assessment shall be observed while tasks are being undertaken whether individually or in-group

COMMON COMPETENCIES

UNIT TITLE : **USE HAND TOOLS**

UNIT CODE : **ELC311205**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes on the safe use, handling and maintenance of tools.

ELEMENT	PERFORMANCE CRITERIA *Italicized Bold* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Plan and prepare for tasks to be undertaken	1.1. Tasks to be undertaken are properly identified 1.2. Appropriate ***hand tools*** are identified and selected according to the task requirements	1.1. Planning and preparing task/ activity 1.2. Electronics hand tools and their uses 1.3. Function, operation and 1.4. Common faults in electronics hand tools	1.1. Preparing required tasks 1.2. Communication Skills 1.3. Using hand tools properly
2. Prepare hand tools	2.1 Appropriate hand tools are checked for proper operation and safety 2.2 Unsafe or faulty tools are identified and marked for repair according to standard company procedure	2.1 Checking and safety requirements in handling tools 2.2 Standard procedures in checking, identification and marking of safe 2.3 Unsafe/ faulty tools	2.1 Identifying and checking hand tools 2.2 Marking of safe or unsafe/ faulty hand tools
3. Use appropriate hand tools and test equipment	3.1. Tools are used according to tasks undertaken 3.2. All safety procedures in using tools are observed at all times and appropriate ***personal***	3.1. Safety requirements in using electronics hand tools and test equipment 3.2. Electronics hand tools for adjusting, dismantling, assembling, finishing, and cutting.	3.1. Reading skills required to interpret work instruction and numerical skills 3.2. Using PPE properly 3.3. Problem solving in emergency situation

ELEMENT	PERFORMANCE CRITERIA *Italicized Bold* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	protective equipment (PPE) are used 3.3. Malfunctions, unplanned or unusual events are reported to the supervisor	3.3. Processes, Operations, 3.4. Systems 3.5. Proper usage and care of hand tools 3.6. Types and uses of test equipment 3.7. Common faults in the use of hand tool	
4. Maintain hand tools	4.1. Tools are not dropped to avoid damage 4.2. Routine ***maintenance*** of tools undertaken according to standard operational procedures, principles and techniques 4.3. Tools are stored safely in appropriate locations in accordance with manufacturer's specifications or standard operating procedures	4.1. Safety requirements in maintenance of hand tools 4.2. Processes, Operations, 4.3. Systems 4.4. Maintenance of tools 4.5. Storage of hand tools	4.1. Checking and cleaning hand tools 4.2. Storing hand tools properly

RANGE OF VARIABLES

VARIABLE	RANGE
1. Hand tools	May include: 1.1. Hand tools for adjusting, dismantling, assembling, finishing, and cutting. 1.2. Tool set includes the following but not limited to: screw drivers, pliers, punches, wrenches, files
2. Personal Protective Equipment (PPE)	May include: 2.1. Gloves 2.2. Protective eyewear 2.3. Apron/overall
3. Maintenance	May include: 3.1 Cleaning 3.2 Lubricating 3.3 Tightening 3.4 Simple tool repairs 3.5 Hand sharpening 3.6 Adjustment using correct procedures

EVIDENCE GUIDE

1. Critical aspect of competency	Assessment requires evidence that the candidate: 1.1 Demonstrated safe working practices at all times 1.2 Communicated information about processes, events or tasks being undertaken to ensure a safe and efficient working environment 1.3 Planned tasks in all situations and reviewed task requirements as appropriate 1.4 Performed all tasks to specification 1.5 Maintained and stored tools in appropriate location
2. Method of assessment	Competency in this unit must be assessed through: 2.1 Observation 2.2 Oral questioning
3. Resource Implication	Tools may include the following but not limited to: 3.1 Screw drivers 3.2 Pliers 3.3 Punches 3.4 Wrenches 3.5 Files
4. Context of Assessment	4.1. Assessment may be conducted in the workplace or in a simulated work environment

UNIT TITLE : **PERFORM MENSURATION AND CALCULATION**

UNIT CODE : **ELC311201**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes and values needed identify, care, handle and use measuring instruments

ELEMENT	PERFORMANCE CRITERIA *Italicized Bold* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Select measuring instruments	1.1. Object or component to be measured is identified 1.2. Correct specifications are obtained from relevant source 1.3. Measuring tools are selected in line with job requirements	1.1 Category of measuring instruments 1.2 Types and uses of measuring instruments 1.3 Shapes and Dimensions 1.4 Formulas for volume, areas, perimeters of plane and geometric figures	1.1. Identifying and selecting measuring instruments 1.2. Visualizing objects and shapes
2. Carry out measurements and calculation	2.1. Appropriate ***measuring instrument*** is selected to achieve required outcome 2.2. Accurate measurements are obtained for job 2.3. ***Calculation*** needed to complete work tasks are performed using the four basic process of addition (+), subtraction (-), multiplication (x), and division (/) 2.4. Calculation involving fractions, percentages and mixed numbers are	2.1. Calculation & measurement 2.2. Four fundamental operations 2.3. Linear measurement 2.4. Dimensions 2.5. Unit conversion 2.6. Ratio and proportion	2.1. Performing calculation by addition, subtraction, multiplication and division; 2.2. Interpreting formulas for volume, areas, perimeters of plane and geometric figures 2.3. Handling of measuring instruments

ELEMENT	PERFORMANCE CRITERIA ***Italicized Bold*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	used to complete workplace tasks. 2.5. Numerical computation is self-checked and corrected for accuracy 2.6. Instruments are read to the limit of accuracy of the tool.		
3. Maintain measuring instruments	3.1. Measuring instruments are not dropped to avoid damage 3.2. Measuring instruments are cleaned before and after using. 3.3. Proper storage of instruments undertaken according to manufacturer's specifications and standard operating procedures.	3.1. Types of measuring instruments and their uses 3.2. Safe handling procedures in using measuring instruments 3.3. Four fundamental operations of mathematics 3.4. Formula for volume, 3.5. area, perimeter and other geometric figures	3.1. Handling and maintaining measuring instruments

RANGE OF VARIABLES

VARIABLE	RANGE
1. Measuring instrument	May include: 1.1. Straight edge 1.2. Torque gauge 1.3. Try square 1.4. Protractor 1.5. Combination gauge 1.6. Steel rule
2. Calculation	May include: 2.1. Volume 2.2. Area 2.3. Displacement 2.4. Inside diameter 2.5. Circumference 2.6. Length 2.7. Thickness 2.8. Outside diameter 2.9. Taper 2.10. Out of roundness

EVIDENCE GUIDE

1. Critical aspect of competency	Assessment requires evidence that the candidate: 1.1. Selected proper measuring instruments according to tasks 1.2. Carried out measurement and calculations 1.3. Maintained and stores instruments
2. Method of assessment	Competency in this unit must be assessed through: 2.1. Observation 2.2. Oral questioning
3. Resource implication	The following resources should be provided 3.1. Place of assessment 3.2. Measuring instruments 3.3. Straight edge 3.4. Torque gauge 3.5. Try square 3.6. Protractor 3.7. Combination gauge 3.8. Steel rule
4. Context of Assessment	4.1. Assessment may be conducted in the workplace or in a simulated environment

UNIT TITLE : **PREPARE AND INTERPRET TECHNICAL DRAWING**

UNIT CODE : **ELC311202**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes and values needed to prepare/interpret diagrams, engineering abbreviation and drawings, symbols, dimension.

ELEMENT	PERFORMANCE CRITERIA *Italicized Bold* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify different kinds of technical drawings	1.1. Correct ***technical drawing*** is selected according to job requirements. 1.2. Technical drawings are segregated in accordance with the types and kinds of drawings	1.1. Types of technical drawings 1.2. Applications for technical drawing 1.3. Methods of technical drawings 1.4. Symbols 1.5. Mark-up/Notation of Drawings	1.1. Reading skills required to interpret work instruction 1.2. Interpreting electrical/ electronic signs and symbols
2. Interpret technical drawing	2.1 Components, assemblies or objects are recognized as required. 2.2 ***Dimensions*** of the key features of the objects depicted in the drawing are correctly identified. 2.3 ***Symbols*** used in the drawing are identified and interpreted correctly. 2.4 Drawing is checked and validated against job requirements or equipment in accordance with standard operating procedures.	2.1. Trade Mathematics 2.2. Linear measurement 2.3. Dimension 2.4. Unit conversion 2.5. Blueprint Reading and Plan Specification 2.6. Architectural, electrical, electronics, mechanical plan, symbols and abbreviations 2.7. Drawing standard symbols 2.8. Trade Theory 2.9. Basic technical	2.1. Interpreting drawing/ orthographic drawing 2.2. Interpreting technical plans 2.3. Matching specification details with existing resources 2.4. Safety handling of drawing instruments

ELEMENT	PERFORMANCE CRITERIA *Italicized Bold* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
		drawing 2.10. Types technical plans 2.11. Various types of drawing 2.12. Notes and specifications	
3. Prepare/ make changes to electrical/ electronic schematics and drawings	3.1. Electrical/electronic schematic is drawn and correctly identified. 3.2. Correct drawing is identified, equipment is selected and used in accordance with job requirements.	3.1. Drawing conventions 3.2. Dimensioning Conventions 3.3. Mathematics 3.4. Four fundamental operations 3.5. Percentage 3.6. Fraction 3.7. Algebra 3.8. Geometry	3.1. Reading skills required to interpret work instruction 3.2. Communication skills 3.3. Preparing/ Making electrical/ electronic signs and symbols 3.4. Computing formulas
4. Store technical drawings and equipment/ instruments	4.1. Care and maintenance of drawings are undertaken according to company procedures. 4.2. Technical drawings are recorded and inventory is prepared in accordance with company procedures. 4.3. Proper storage of ***instruments*** is undertaken according to company procedures.	4.1. Effective ways to catalogue and store technical drawings 4.2. Manual methods of handling, storing and maintaining paper drawings 4.3. Storing drawing in digital forms 4.4. Scanner 4.5. CAD	4.1. Handling and storing of drawings 4.2. Scanning and storing drawings in digital form 4.3. Matching specification details with existing resources 4.4. Handling of drawing instruments

RANGE OF VARIABLES

VARIABLE	RANGE
1. Technical drawings	May include: 1.1. Schematic diagrams 1.2. Charts 1.3. Block diagrams 1.4. Lay-out plans 1.5. Location plans 1.6. Process and instrumentation diagrams 1.7. Loop diagrams 1.8. System Control Diagrams
2. Dimensions	May include: 2.1. Length 2.2. Width 2.3. Height 2.4. Diameter 2.5. Angles
3. Symbols	May include: 3.1. NEC- National Electric Code 3.2. IEC -International Electrotechnical Commission 3.3. ASME - American Society of Mechanical Engineers 3.4. IEEE - Institute of Electrical and Electronics Engineers 3.5. ISA - Instrumentation System and Automation Society
4. Instruments	May include: 4.1. Components/dividers 4.2. Drawing boards 4.3. Rulers 4.4. T-square 4.5. Calculator

EVIDENCE GUIDE

1. Critical aspect of competencies	Assessment requires evidence that the candidate: 1.1. selected correct technical drawing in line with job requirements 1.2. correctly identified the objects represented in the drawing 1.3. identified and interpreted symbols used in the drawing correctly 1.4. prepared/produced electrical/electronic drawings including all relevant specifications 1.5. stored diagrams/equipment
2. Method of assessment	Competency in this unit must be assessed through: 2.1. Practical tasks involving interpretation of a range of technical drawings 2.2. Oral questioning
3. Resource implication	3.1. Drawings 3.2. Diagrams 3.3. Charts 3.4. Plans
4. Context of Assessment	4.1. Assessment may be conducted in the workplace or in a simulated environment

UNIT TITLE : **APPLY QUALITY STANDARDS**

UNIT CODE : **ELC311204**

UNIT DESCRIPTOR : This unit covers the knowledge, skills, (and) attitudes and values needed to apply quality standards in the workplace. The unit also includes the application of relevant safety procedures and regulations, organization procedures and customer requirements

ELEMENT	PERFORMANCE CRITERIA ***Italicized Bold*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Assess quality of received materials or components	1.1. Work instructions are obtained and work is carried out in accordance with standard operating procedures 1.2. Received ***materials or component parts*** are checked against workplace standards and specifications 1.3. Faulty material or components related to work are identified and isolated 1.4. ***Faults*** and any identified causes are recorded and/or reported to the supervisor concerned in accordance with workplace procedures 1.5. Faulty materials or components are replaced in accordance with workplace procedures	1.1. Relevant production processes, materials and products 1.2. Characteristics of materials, software and hardware used in production processes 1.3. Quality checking procedures 1.4. Quality Workplace procedures 1.5. Identification of faulty materials related to work	1.1. Reading skills required to interpret work instruction 1.2. Critical thinking 1.3. Interpreting work instructions

ELEMENT	PERFORMANCE CRITERIA ***Italicized Bold*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Assess own work	2.1. ***Documentation*** relative to quality within the company is identified and used 2.2. Completed work is checked against workplace standards relevant to the task undertaken 2.3. Faulty pieces are identified and isolated 2.4. Information on the quality and other indicators of production performance is recorded in accordance with workplace procedures 2.5. In cases of deviations from specified ***quality standards***, causes are documented and reported in accordance with the workplace' standards operating procedures	2.1. Safety and environmental aspects of production processes 2.2. Fault identification and reporting 2.3. Workplace procedure in documenting completed work 2.4. Workplace Quality Indicators	2.1. Carry out work in accordance with OHS policies and procedures

ELEMENT	PERFORMANCE CRITERIA ***Italicized Bold*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Engage in quality improvement	3.1. Process improvement procedures are participated in relation to workplace assignment 3.2. Work is carried out in accordance with process improvement procedures 3.3. Performance of operation or quality of product or service to ensure ***customer*** satisfaction is monitored	3.1. Quality improvement processes 3.2. Company customers defined	3.1. Solution providing and decision-making 3.2. Practice company process improvement procedure

RANGE OF VARIABLES

VARIABLE	RANGE
1. Materials or component parts	May include: 1.1. Materials: 1.1.1. wires 1.1.2. cables, soldering lead 1.1.3. electrical tape 1.2. Components: 1.2.1. ICs 1.2.2. Diodes
2. Faults	May include: 2.1. Components/materials not according to specification 2.2. Components/materials contain manufacturing defects 2.3. Components/materials do not conform with government regulation i.e., PEC, environmental code 2.4. Components/materials have safety defect
3. Documentation	May include: 3.1. Organization work procedures 3.2. Manufacturer's instruction manual 3.3. Customer requirements 3.4. Forms
4. Quality standards	May include: 4.1. Materials 4.2. Component parts 4.3. Final product 4.4. Production processes
5. Customer	May include: 5.1. Co-worker 5.2. Supplier 5.3. Client 5.4. Organization receiving the product or service

EVIDENCE GUIDE

1. Critical aspect of competency	Assessment must show that the candidate: 1.1. Carried out work in accordance with the company's standard operating procedures 1.2. Performed task according to specifications 1.3. Reported defects detected in accordance with standard operating procedures 1.4. Carried out work in accordance with the process improvement procedures
2. Method of assessment	The assessor may select two (2) of the following assessment methods to objectively assess the candidate: 2.1. Observation 2.2. Questioning 2.3. Practical demonstration
3. Resource implication	3.1. Materials and component parts and equipment to be used in a real or simulated electronic production situation
4. Context of Assessment	4.1. Assessment may be conducted in the workplace or in a simulated environment.

UNIT TITLE : **TERMINATE AND CONNECT ELECTRICAL WIRING AND ELECTRONICS CIRCUIT**

UNIT CODE : **ELC311206**

UNIT DESCRIPTOR : This unit covers the knowledge, skills, (and) attitudes and values needed to terminate and connect electrical wiring and electronic circuits

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Plan and prepare for termination/ connection of electrical wiring/electronics circuits	1.1. ***Materials*** are checked according to specifications and tasks 1.2. Appropriate ***tools and equipment*** are selected according to tasks requirements 1.3. Task is planned to ensure OH & S guidelines and procedures are followed 1.4. Electrical wiring/electronic circuits are correctly prepared for connecting/ termination in accordance with instructions and work site procedures	1.1. Use of tools 1.2. Use of test instruments/ equipment 1.3. Electrical theory 1.4. Principals of AC and DC 1.5. OH & S guidelines and procedures 1.6. Basic electrical and electronic devices	1.1. Reading skills required to interpret work instruction 1.2. Checking materials for conformance to specifications 1.3. Checking existing and new installation site for correct location and specification

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Terminate/ connect electrical wiring/ electronic circuits	2.1. Safety procedures in using tools are observed at all times and appropriate ***personal protective equipment*** are used 2.2. Work is undertaken safely in accordance with the workplace and standard procedures 2.3. Appropriate range of ***methods*** in termination/ connection are used according to specifications, manufacturer's requirements and safety 2.4. Correct sequence of operation is followed 2.5. ***Accessories*** used are adjusted, if necessary 2.6. Confirmed termination/connection is undertaken successfully in accordance with job specification	2.1. Wiring techniques 2.2. OH & S principles 2.3. Use of lead-free soldering technology 2.4. Surface mount soldering techniques 2.5. Specifications and methods for terminating different materials	2.1. Communication skills 2.2. Marking, tagging and labeling requirements for cables, wires, conductors and connections 2.3. Soldering techniques 2.4. Adjusting and fixing wiring supports

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Test termination/ connections of electrical wiring/ electronics circuits	3.1. Testing of all completed termination/ connections of electric wiring/electronic circuits is conducted for compliance with specifications and regulations using appropriate procedures and equipment 3.2. Wiring and circuits are checked using specified testing procedures 3.3. Unplanned events or conditions are responded to in accordance with established procedures	3.1. AC and DC power supplies 3.2. Uses of diagnostic equipment 3.3. Tests for wiring and connections 3.4. Wiring support techniques and alternatives	3.1. Printed circuit board repair and techniques 3.2. Electronic assembly functional and quality testing 3.3. Testing of wiring and connections for conformance to specification

RANGE OF VARIABLES

VARIABLE	RANGE
1. Materials	May include: 1.1. Soldering lead 1.2. Cables 1.3. Wires
2. Tools and equipment	May include: 2.1. Tool set: 2.1.1. Pliers 2.1.2. Cutters 2.1.3. Screw drivers 2.2. Equipment: 2.2.1. Soldering gun 2.2.2. Multi-tester
3. Personal protective equipment	May include: 3.1. goggles 3.2. gloves 3.3. apron/overall
4. Methods	May include: 4.1. Clamping 4.2. Pin connection 4.3. Soldered joints 4.4. Plugs
5. Accessories	May include: 5.1. Brackets 5.2. Clamps

EVIDENCE GUIDE

1. Critical aspect of competency	Assessment requires evidence that the candidate: 1.1. Undertook work safely and according to workplace and standard procedures 1.2. Used appropriate termination/ connection methods 1.3. Followed correct sequence in termination / connection process 1.4. Conducted testing of terminated connected electrical wiring/electronic circuits using appropriate procedures and standards
2. Method of assessment	The assessor may select two (2) of the following assessment methods to objectively assess the candidate: 2.1. Observation 2.2. Oral Questioning 2.3. Practical demonstration
3. Resource implication	3.1. Tools for measuring, cutting, drilling, assembling/disassembling, connecting. Tool set includes the following but not limited to: 3.1.1. screw drivers 3.1.2. pliers 3.1.3. cutters
4. Context of Assessment	4.1. Assessment may be conducted in the workplace or in a simulated work environment

UNIT OF COMPETENCY : **MAINTAIN TOOLS AND EQUIPMENT**

UNIT CODE : **ELC311212**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes on checking condition, performing preventive maintenance and storing of tools and equipment based on the required performance standards.

ELEMENTS	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Check condition of tools and equipment	1.1. ***Materials,*** tools and equipment are identified according to classification and job requirements 1.2. Non-functional tools and equipment are segregated and labeled according to classification 1.3. Safety of tools and equipment are observed in accordance with manufacturer's instructions 1.4. Condition of ***personal protective equipment (PPE)*** are checked in accordance with manufacturer's instructions	1.1. Safety Practices 1.1.1. Use of PPE 1.1.2. Handling of tools and equipment 1.1.3. Good housekeeping 1.2. Materials, Tools and Equipment 1.2.1. Types and uses of lubricant 1.2.2. Types and uses of cleaning material 1.2.3. Types and uses of plumbing tools 1.2.4. Types and uses of plumbing equipment 1.3. Operational conditions of electrical tools and equipment 1.4. Electrical tools and equipment defects	1.1. Maintaining tools and equipment 1.2. Handling of tools and equipment 1.3. Identifying tools and equipment defects

ELEMENTS	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Perform basic preventive maintenance	2.1. Appropriate lubricants are identified according to types of equipment 2.2. ***Tools and equipment*** are lubricated according to preventive maintenance schedule or manufacturer's specifications 2.3. Measuring instruments are checked and calibrated in accordance with manufacturer's instructions 2.4. Tools are cleaned and lubricated according to standard procedures 2.5. Defective instruments, equipment and accessories are inspected and replaced according to manufacturer's specifications 2.6. Tools are inspected, repaired and replaced after use 2.7. Work place is	2.1. Safety Practices 2.1.1. Use of PPE 2.1.2. Handling of tools and equipment 2.1.3. Good housekeeping 2.2. Materials, Tools and Equipment 2.2.1. Types and uses of lubricants 2.2.2. Types and uses of cleaning materials 2.3. Preventive Maintenance 2.3.1. Methods and techniques 2.3.2. Procedures	2.1. Handling of tools and equipment 2.2. Performing preventive maintenance

ELEMENTS	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	cleaned and kept in safe state in line with OHSA regulations		
3. Store tools and equipment	3.1. Inventory of tools, instruments and equipment are conducted and recorded as per company practices 3.2. Tools and equipment are stored safely in appropriate locations in accordance with manufacturer's specifications or company procedures	3.1. Safety Practices 3.1.1. Use of PPE 3.1.2. Handling of tools and equipment 3.1.3. Storing procedures and techniques 3.2. Storage conditions/ locations	3.1. Storing tools and equipment 3.2. Handling of tools and equipment

RANGE OF VARIABLES

VARIABLES	RANGE
1. Materials	May include: 1.1. Lubricants 1.2. Cleaning materials 1.3. Rust remover 1.4. Rugs 1.5. Spare parts
2. Tools and equipment	May include: 2.1. Tools: Electrical and Mechanical Tools 2.2. Heavy Equipment (Crane, Excavator, Manlift)
3. Personal Protective Equipment (PPE)	May include: 3.1. Climbing Harness 3.2. Goggles 3.3. Hard Hat 3.4. Working Gloves 3.5. Ear muff/ Ear Plugs 3.6. Reflectorized vest 3.7. Working Trousers 3.8. Safety Shoes

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires that the candidate: 1.1. Selected and used appropriate processes, tools and equipment to carry out task 1.2. Identified functional and non-functional tools and equipment 1.3. Checked, lubricated and calibrated tools, equipment and instruments according to manufacturer's specifications 1.4. Replaced defective tools, equipment and their accessories 1.5. Observed and applied safe handling of tools and equipment and safety work practices 1.6. Prepared and submitted inventory report, where applicable 1.7. Maintained workplace in accordance with OHSA regulations 1.8. Stored tools and equipment safely in appropriate locations and in accordance with company practices
2. Resource implications	The following resources should be provided: 2.1. Workplace 2.2. Maintenance schedule 2.3. Maintenance materials, tools and equipment relevant to the proposed activity/task
3. Methods of assessment	Competency should be assessed through: 3.1. Direct observation 3.2. Written test/questioning relevant to Underpinning knowledge
4. Context of assessment	4.1. Competency assessment may occur in workplace or any appropriate simulated environment 4.2. Competency assessment must be undertaken in accordance with the endorsed TESDA assessment guidelines

UNIT TITLE : **COMPLY WITH ENVIRONMENTAL PROTECTION PROCEDURES**

UNIT CODE : **UTL311206**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to implement and monitor environmental protection policies and procedures including accessing relevant information concerning environmental protection regulations and procedures, and implementing and monitoring procedures concerning environmental hazards, related control procedures, environmental training arrangements, and required records and documentation

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Access information concerning environmental protection regulations and procedures	1.1. Relevant provisions of environmental legislation and codes of practice are accurately followed 1.2. Information on workplace environmental policies, procedures and programs is stored in a readily accessible location and manner 1.3. ***Information*** is accurately and clearly explained to the work team and updated according to change in workplace policy 1.4. Information about the outcomes of environmental risk identification and control procedures is	1.1. Relevant environmental protection regulations & codes of practice 1.2. Environmental risks associated with workplace operations and related precautions to control the risk 1.3. Environmental protection standards required in the workplace	1.1. Workplace reporting and recording processes and procedures 1.2. Communication skills 1.3. Accessing information and data 1.4. Ability to recognize potential environmental risks and ways of minimizing them

	provided to the appropriate personnel		
2. Implement and monitor procedures concerning environmental hazards	2.1. Existing and potential ***environmental hazards*** in the workplace are identified and reported 2.2. Identified hazards are assessed in relation to relevant environmental protection policies 2.3. ***Workplace procedures for dealing with hazardous events*** are implemented wherever necessary to ensure that prompt control action is taken 2.4. ***Personal protective equipment (PPE)*** are obtained and used in accordance with job requirements 2.5. Hazardous events are investigated to identify causes, and control measures are implemented to prevent recurrence and minimize risks of such events	2.1. Relevant environmental protection regulations & codes of practice 2.2. Workplace procedures and guidelines for implementing and monitoring procedures concerning environmental hazards 2.3. Workplace environmental hazards and related hazard control measures 2.4. Equipment and resources required when implementing and monitoring environmental protection procedures 2.5. Organizational structure and site layout	2.1. Workplace reporting and recording processes and procedures 2.2. Communication skills 2.3. Problem solving skills 2.4. Ability to: recognize potential environmental hazards and ways of minimizing them counsel, advise and inform others on environmental protection matters identify and correctly use equipment and vehicles in accordance with environmental protection regulations and guidelines

3. Implement and monitor environmental control procedures	3.1. Existing environmental protection measures are implemented, monitored and reviewed 3.2. Work procedures to protect ***environment*** are implemented and adherence to them by the work group is monitored 3.3. Required improvements to existing control measures are identified, including required resources for implementation, and reported to appropriate personnel	3.1. Relevant environmental protection regulations & codes of practice 3.2. Workplace procedures and guidelines for implementing and monitoring environmental control procedures 3.3. Equipment and resources required when implementing and monitoring environmental control procedures 3.4. Organizational structure and site layout	3.1. Workplace reporting and recording processes and procedures 3.2. Communication skills 3.3. Accessing Information and data 3.4. Problem solving skills 3.5. Ability to: 3.5.1. counsel, advise and inform others on environmental control procedures 3.5.2. identify and correctly use equipment and vehicles in accordance with environmental control procedures, regulations and guidelines

RANGE OF VARIABLES

VARIABLE	RANGE
1. Information	May include: 1.1. Workplace procedures and practices related to environmental protection, including all financial, operating and customer service policies and procedures 1.2. OHS and environmental protection regulations 1.3. Workplace housekeeping procedures and policie 1.4. Code of practice for environmental protection 1.5. Material safety data sheets 1.6. Policies and procedures for entry and work in confined spaces 1.7. Manufacturer's instructions concerning the use and servicing of equipment 1.8. Emergency procedures 1.9. Regulations and policies concerning noise, waste disposal/reprocessing, handling of dangerous goods/hazardous substances and other environmental protection issues 1.10. Standards and certification requirements 1.11. Quality assurance procedures
2. Appropriate personnel	May include: 2.1. Workplace personnel including supervisors and management 2.2. Site visitors 2.3. Contractors 2.4. Official representatives
3. Environmental hazards	May include: 3.1. Oils and lubricants 3.2. Exhaust fumes 3.3. Gas 3.4. Smoke 3.5. Chemicals and detergents 3.6. Rubbish 3.7. Noise 3.8. Wastes

4. Workplace procedures for dealing with hazardous events	May include: 4.1. Inspection and housekeeping 4.2. Maintenance including plant and equipment 4.3. Purchasing 4.4. Evacuation 4.5. Hazardous substance containment 4.6. Operational instruction 4.7. Environmental information including incident and management practices 4.8. Specific hazardous materials policies and procedures 4.9. Risk assessment and control 4.10. First aid
5. Personal protective equipment (PPE)	May include: 5.1. Gloves 5.2. Safety headwear and footwear 5.3. Safety glasses 5.4. Two-way radios 5.5. High visibility clothing
6. Environment	May include: 6.1. Indoor 6.2. Outdoor 6.3. Marine 6.4. Atmospheric

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires that the candidate: 1.1. Identified and monitored environmental hazards in the workplace 1.2. Implemented effective procedures for dealing with hazardous events 1.3. Monitored workplace adherence to environmental practices 1.4. Communicated effectively with the team members
2. Resource implications	The following resources should be provided: 2.1. Environmental protection regulations and guidelines 2.2. OHS regulations and hazard prevention policies and procedures 2.3. Workplace environmental protection policies, procedures and instructions 2.4. Equipment/vehicle manufacturer's operating and servicing instructions
3. Methods of assessment	Competency should be assessed through: 3.1. Direct observation 3.2. Oral or written questioning 3.3. Questions/interview 3.4. Assessment of underpinning knowledge and practical skills may be combined
4. Context of assessment	4.1. Competency assessment must be undertaken in accordance with the endorsed TESDA assessment guidelines 4.2. Assessment may be conducted in the workplace or a simulated environment

UNIT TITLE : **PERFORM COMPUTER OPERATIONS**

UNIT CODE : **UTL311207**

UNIT DESCRIPTOR : This unit covers the knowledge, skills, (and) attitudes and values needed to perform computer operations which include inputting, accessing, producing and transferring data using the appropriate hardware and software

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Plan and prepare for task to be undertaken	1.1. Requirements of task are determined 1.2. Appropriate ***hardware peripheral devices*** and ***software*** are selected according to task assigned and required outcome 1.3. Task is planned to ensure ***OH&S guidelines*** and procedures are followed	1.1. Main types of computers and basic features of different operating systems 1.2. Main parts of a computer 1.3. Information on hardware and software 1.4. Data security guidelines	1.1. Reading and comprehension skills required to interpret work instruction and to interpret basic user manuals. 1.2. Communication skills to identify lines of communication, request advice, follow instructions and receive feedback. 1.3. Interpreting user manuals and security guidelines
2. Input data into computer	2.1. Data are entered into the computer using appropriate program/application in accordance with company procedures 2.2. Accuracy of information is checked and information is saved in accordance with	2.1. Basic ergonomics of keyboard and computer user 2.2. Storage devices and basic categories of memory 2.3. Relevant types of software	2.1. Technology skills to use equipment safely including keyboard skills. 2.2. Entering data

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	standard operating procedures 2.3. Inputted data are stored in ***storage media*** according to requirements 2.4. Work is performed within ***ergonomic guidelines***		
3. Access information using computer/ smartphone	3.1. Correct program/application is selected based on job requirements 3.2. Program/application containing the information required is accessed according to company procedures 3.3. ***Desktop icons*** are correctly selected, opened and closed for navigation purposes 3.4. Keyboard techniques are carried out in line with OH&S requirements for safe use of keyboards	3.1. General security, privacy legislation and copyright 3.2. Productivity Application 3.3. Business Application	3.1. Accessing Information 3.2. Searching and browsing files and data
3.1. Produce / output data using computer system	4.1. Entered data are processed using appropriate software commands 4.2. Data printed out as required using computer hardware/peripheral devices in	4.1. Computer application in printing, scanning and sending facsimile 4.2. Types and function of computer peripheral	4.1. Computer data processing 4.2. Printing of data 4.3. Transferring files and data

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	accordance with standard operating procedures 4.3. Files, data are transferred between compatible systems using computer software, hardware/ peripheral devices in accordance with standard operating procedures	devices	

RANGE OF VARIABLES

VARIABLE	RANGE
1. Hardware peripheral devices	May include: 1.1. Personal computers 1.2. Networked systems 1.3. Communication equipment 1.4. Printers 1.5. Scanners 1.6. Keyboard 1.7. Mouse
2. Software	May include: 2.1. Word processing packages 2.2. Data base packages 2.3. Internet 2.4. Spreadsheets
3. OH & S guidelines	May include: 3.1. OHS guidelines 3.2. Enterprise procedures
4. Storage media	May include: 4.1 CDs 4.2 zip disks 4.3 hard disk drives, local and remote 4.4 cloud storage
5. Ergonomic guidelines	May include: 5.1. Types of equipment used 5.2. Appropriate furniture 5.3. Seating posture 5.4. Lifting posture 5.5. Visual display unit screen brightness
6. Desktop icons	May include: 6.1. Directories/folders 6.2. Files 6.3. Network devices 6.4. Recycle bin

EVIDENCE GUIDE

1. Critical aspect of competency	Assessment requires evidence that the candidate: 1.1. Selected and used hardware components correctly and according to the task requirement 1.2. Identified and explain the functions of both hardware and software used, their general features and capabilities 1.3. Produced accurate and complete data in accordance with the requirements 1.4. Used appropriate devices and procedures to transfer files/data accurately 1.5. Maintained computer system
2. Resource implication	2.1. Computer hardware with peripherals 2.2. Appropriate software
3. Method of assessment	The assessor may select two of the following assessment methods to objectively assess the candidate: 3.1. Observation 3.2. Questioning 3.3. Practical demonstration
4. Context of Assessment	4.1. Assessment may be conducted in the workplace or in a simulated work environment

UNIT OF COMPETENCY : OBSERVE PROCEDURES, SPECIFICATIONS AND MANUALS OF INSTRUCTIONS

UNIT CODE : UTL311201

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes on identifying, interpreting, applying services to specifications and manuals and storing manuals.

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify and access specification/ manuals	1.1 Appropriate manuals are identified and accessed as per job requirements 1.2 Version and date of manual are checked to ensure that correct specification and procedures are identified	1.1 Types of manuals used in distribution lines 1.2 Identification of symbols used in the manuals	1.1 Reading and comprehension skills 1.2 Identifying and interpreting manuals and specifications 1.3 Accessing information and data
2. Interpret manuals	2.1 Relevant sections, chapters of specifications/ manuals are located in relation to the work to be conducted 2.2 Information and procedure in the manual are interpreted in accordance with industry practices	2.1 Types of manuals used in distribution lines 2.2 Types of symbols used in manuals 2.3 Identification of units of measurements 2.4 Unit conversion	2.1 Reading and comprehension skills 2.2 Identifying and interpreting manuals and specifications 2.3 Accessing information and data 2.4 Applying conversion of units of measurements
3. Apply information in manual	3.1 Manual is interpreted according to job requirements 3.2 Work steps are correctly identified in accordance with manufacturer's specification 3.3 Manual data are applied according to the given task 3.4 All correct	3.1 Types of manuals used in distribution lines 3.2 Types and application of symbols used in the manuals 3.3 Unit conversion	3.1 Reading and comprehensi on skills 3.2 Applying information from manuals

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	sequencing and adjustments are interpreted in accordance with information contained on the manual or specifications		
4. Store manuals	4.1 ***Manual or specification*** is stored appropriately to prevent damage, ready access and updating of information when required in accordance with company requirements	4.1 Types of manuals used in distribution lines 4.2 Manual storing and maintaining procedures	4.1 Reading and comprehension skills 4.2 Storing and maintaining manuals

RANGE OF VARIABLES

VARIABLE	RANGE
1. Manual or Specification	May include: 1.1 Manufacturer's Specification Manual 1.2 Repair Manual 1.3 Maintenance Procedure Manual 1.4 Periodic Maintenance Manual

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires that the candidate: 1.1 Identified and accessed specification/manuals as per job requirements 1.2 Interpreted manuals in accordance with industry practices 1.3 Applied information in manuals according to the given task 1.4 Stored manuals in accordance with company requirements
2. Resource implications	The following resources should be provided: 2.1 All manuals/catalogues relative to the sector
3. Methods of assessment	Competency in this unit may be assessed through: 3.1 Direct observation 3.2 Questions/interview Assessment of underpinning knowledge and practical skills may be combined
4. Context of assessment	4.1 Competency assessment must be undertaken in accordance with the endorsed TESDA assessment guidelines 4.2 Assessment may be conducted in the workplace or a simulated environment

UNIT OF COMPETENCY : PERFORM BASIC ELECTRICAL WORKS

UNIT CODE : HVC724201

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes in preparing materials, tools and equipment, testing electrical components and basic repairing in electricity based on the required performance standards.

ELEMENT	PERFORMANCE CRITERIA ***Bold & Italicized*** fonts are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Prepare electrical tools, test instruments and materials	1.1. ***Work plan*** is interpreted to determine job requirements 1.2. Electrical tools, instruments and ***materials*** are identified and prepared according to job requirements 1.3. ***Electrical tools and instruments*** are checked for conditions and calibrated as required	1.1. Uses of tools and testing instruments 1.2. Calibration of testing instruments 1.3. Safe handling and proper care of tools and testing instruments	1.1. Interpretation skills 1.2. Handling of tools and materials 1.3. Calibration skills 1.4. Communication skills (oral and written)
2. Test power supply and electrical components	2.1. Instruments are tested in accordance with PEC 2.2. Power supply and electrical components are checked in accordance with manufacturer's specifications/PEC 2.3. Defects of power supply and electrical components are identified and recorded 2.4. Safe working habits is observed	2.1. Functions and uses of testing instruments 2.2. Basic electricity 2.3. Electrical safety and hazards 2.4. Testing procedures	2.1. Usage of testing instruments 2.2. Basic troubleshooting skills 2.3. Practice safety skills

ELEMENT	PERFORMANCE CRITERIA ***Bold & Italicized*** fonts are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Perform basic electrical repair	3.1. ***Work instructions*** are followed to ensure safety work 3.2. Loose connections are tightened in accordance with PEC 3.3. Defective electrical components are replaced and tested in accordance with PEC 3.4. Work place is cleaned and in safe state in line with OHSA regulations	3.1. Types of electrical parts and fixtures 3.2. Testing procedures 3.3. Electrical safety and hazards 3.4. Applied occupational health & safety (OH & S) 3.5. Electrical joints and splices	3.1. Basic electrical servicing and troubleshooting skills 3.2. Wire splicing skills 3.3. Practice safety skills

RANGE OF VARIABLES

VARIABLE	RANGE
1. Work plan	May include: 1.1. Job requirements 1.2. Schedule of work
2. Materials	May include: 2.1. Solid, stranded wire 2.2. Service plug/outlet 2.3. HVAC/R electrical components 2.4. Soldering lead 2.5. Terminal clips 2.6. Moulding 2.7. Fuses 2.8. PVC/Mold flux 2.9. Electrical tape
3. Electrical tools and instruments	May include: 3.1. Clamp ammeter 3.2. Multi tester 3.3. Insulation tester 3.4. PPE 3.5. Soldering gun/iron 3.6. Wire stripper 3.7. Measuring tool 3.8. Markers 3.9. Crimping tools 3.10. Screw drivers 3.11. Electrician pliers 3.12. Electric drill 3.13. Long nose
4. Work instructions	May include: 4.1. Work plan 4.2. Schematic diagrams 4.3. Installation instruction

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires that the candidate: 1.1. Interpreted work plan to determine job requirements 1.2. Selected and used appropriate processes, tools and equipment to carry out task 1.3. Identified electrical tools and instruments are tested in accordance with PEC 1.4. Replaced defective tools and instruments 1.5. Checked power supply and electrical components in accordance with PEC 1.6. Cleaned work place and left in safe state in line with OHSA regulations 1.7. Completed electrical wiring in HVAC/R units based in manufacturer's specifications and PEC 1.8. Communicated effectively to ensure safety works
2. Resource Implications	The following resources should be provided: 2.1. Work place 2.2. Work plan 2.3. Materials, tools and equipment relevant to the proposed activity/task
3. Methods of Assessment	Competency should be assessed through: 3.1. Direct observation 3.2. Written test/questioning relevant to required knowledge
4. Context of Assessment	4.1. Competency assessment may occur in workplace or any appropriate simulated environment 4.2. Assessment shall be observed while task is being undertaken whether individually or in group

CORE COMPETENCIES

UNIT OF COMPETENCY : **PERFORM ROUTINE WIND TURBINE MAINTENANCE**

UNIT CODE : **AB-UTL0102800313301**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to perform routine wind turbine maintenance, like inspecting components and lubricating parts.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Review maintenance plans	1.1 ***Required documents*** are reviewed to determine the tasks and equipment parts needed. 1.2 Appropriate ***tools and equipment*** are identified based on company policies and procedures Appropriate ***personal protective equipment (PPE)*** identified based on company policies and procedures	1.1 Company Maintenance Plan 1.2 Existing company maintenance manuals/service manuals. 1.3 Types of electrical, mechanical drawings and diagrams 1.4 Company PPE Policy 1.5 Types and uses of PPEs 1.6 Types of Tools and Equipment 1.7 Equipment and Tools Calibration Procedure 1.8 Basic Parts and Function of Wind Turbine	1.1 Describing maintenance plan 1.2 Familiarization of existing company maintenance manuals/service manuals 1.3 Reading and interpreting various types of electrical, mechanical drawings, diagrams, plans and manuals 1.4 Describing types and uses of PPE 1.5 Identifying and describing tools and equipment 1.6 Calibrating Equipment and Tools 1.7 Familiarizing the basic parts and functions of the wind turbine
2. Prepare work order	2.1 ***Work order form*** properly filled-out and approved	2.1 Work Order Form 2.2 Appropriate	2.1 Filling-out of Work Order Form

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	based on company policies and manual 2.2 Appropriate tools and equipment are prepared based on work order 2.3. Required ***logistics*** are listed based on company policies and procedures	Tools and Equipment Selection 2.3 Logistic Requirements 2.3.1. Meals 2.3.2. Vehicle/ Logistical requisition policy 2.4. Heavy equipment requisition policy	2.2 Selecting of Appropriate Tools and Equipment Needed 2.3 Identifying logistics requirements 2.4 Filling of request forms
3. Secure approved permit to work	3.1 ***Risk and hazards*** are identified based on ***company policies and procedures*** 3.2 Permit to work form properly filled-out and approved based on company policies and procedures 3.3 Appropriate PPE identified based on company policies procedures	3.1 Company PTW policy 3.2 Job risk/hazard 3.3 Job Hazard Analysis Form 3.4 Permit to Work Form 3.5 PPE Identification Procedure	3.1 Understanding Company PTW policy 3.2 Identifying and analyzing job risk/hazards 3.3 Filling-out of Job Hazard Analysis Form 3.4 Accomplishing Permit to Work Form 3.5 Identifying of Appropriate PPE
4. Conduct toolbox meeting	4.1. Safety orientation conducted based on ***OSH standard*** 4.2. PPEs are inspected based on approved PTW 4.3. Checklist of toolbox are verified based on approved ***permit to work (PTW)*** 4.4. Step by step ***toolbox meeting*** procedures are	4.1. Orientation of OSH Standard 4.2. PPE Functionality 4.3. Checklist of Tools 4.4 Specific descriptive procedure in performing the work required in the approved PTW	4.1. Identifying OSH Standards 4.2. Checking of PPE functionality 4.3. Verifying of tools based on checklist 4.4. Describing the specific procedure in performing the work required in the approved

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	discussed based on company policies and procedures		PTW
5. Perform preventive maintenance	5.1 Work area is checked for ***additional work environment hazards*** based on company job hazards analysis Work area is cleaned up based on company policies and procedures 5.2 Preventive Maintenance Schedule (PMS) is safely conducted based on approved Permit to Work (PTW) 5.3 Completion of work is checked based on the approved permit to work	5.1 Work environment hazards 5.2 Inspection Checklist 5.3 OSH requirements, regulation, policies and procedures 5.4 Preventive Maintenance Schedule (PMS) 5.5 5S 5.6 Work Completion	5.1 Identifying Work Environment Hazards 5.2 Utilizing safety walkthrough inspection checklist 5.3 Following procedures of specified PMS activity 5.4 Implementing 5S 5.5 Verifying of work completion
6. Prepare preventive maintenance reports	6.1 Accomplishment Report Form is prepared and accomplished based on company policies and procedures 6.2 Accomplishment report is submitted for checking/ review based on company policies and procedures 6.3 Reviewed Accomplishment	6.1. Accomplishment Report Process 6.2. Communication Process Flow	6.1 Preparing accomplishment report form 6.2 Describing the work and activities conducted. 6.3 Enumerating findings and overall remarks. 6.4 Validating the submitted report. 6.5 Submitting the report within the designated time

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	report is submitted for approval based on company policies and procedures 6.4 Approved Accomplishment report is submitted to the documents controller for uploading based on company policies and procedures		frame for uploading 6.6 Tracking communication process 6.7 Job Communication Skills
7. Surrender/ Close out Permit to Work (PTW)	7.1 Permit to work is surrendered for checking based on company policies and procedures 7.2 Permit to work is turn over and recorded as completed based on company policies and procedures 7.3 Permit to work is submitted to the document controller for uploading based on company policies and procedures	7.1. Permit to work Surrender/ closed out process 7.2. Time frame of permit to work submission	7.1 Submitting surrendered PTW following the required time frame 7.2 Turning over and recording completed PTW for uploading

RANGE OF VARIABLES

VARIABLE	RANGE
1. Required documents	May include: 1.1 Maintenance plan 1.2 Maintenance manual 1.3 Service Manual 1.4 Electrical, mechanical drawings and diagram 1.5 Company PPE Policy 1.6 Permit to Work (PTW) Form 1.7 Accomplishment Report Form
2. Tools and Equipment	May include: <u>2.1 Electrical</u> 2.1.1. Electric Portable Drill 2.1.2. VOM/Megger 2.1.3. Clamp on meter 2.1.4. Pipe cutter 2.1.5. Ball hammer 2.1.6. Combination pliers 2.1.7. Set of screwdrivers 2.1.8. Wire stripper 2.1.9. Electrician knife 2.1.10. Headlamp/flashlight 2.1.11. Inspection Mirror 2.1.12. 2-way radio 2.1.13. Electrical Tester 2.1.14. Box Wrenches <u>2.2 Mechanical</u> 2.2.1. Tensioner pump 2.2.2. Pressure gauge 2.2.3. Hydraulic torque wrenches 2.2.4. Bolt tensioners 2.2.5. Hydraulic pumps 2.2.6. Flange Alignment tools 2.2.7. Nut splitter 2.2.8. Orbital sanders 2.2.9. Circular Saws 2.2.10. Impact wrenches 2.2.11. Infrared level 2.2.12. Hydraulic Tester 2.2.13. Hydraulic Torque 2.2.14. Hydraulic Tension

VARIABLE	RANGE
3. Personal Protective Equipment (PPE)	May include: 3.1. Hard hat 3.2. Googles 3.3. Working Gloves 3.4. Reflectorized vest 3.5. Working trousers 3.6. Safety shoes 3.7. Fall arrest device (rope and rail) 3.8. Twin lanyard with absorber 3.9. Working position lanyard 3.10. Full body harness 3.11. Climbing gloves
4. Work Order Form	May include: 4.1. List of works/tasks to be initiated 4.2. Names of workers involve 4.3. List of tools and equipment needed 4.4. Specific location of activity 4.5. Duration of activity
5. Logistics	May include: 5.1 Vehicles 5.2 Meals 5.3 Cleaning Materials 5.1.1. Cloth 5.1.2. Cleaning chemical 5.1.3. Degreaser 5.1.4. Battery cleaner
6. Risk and Hazards	May include: 6.1. Physical Hazard 6.2. Ergonomic Hazard 6.3. Chemical Hazard 6.4. Biological Hazard 6.5. Safety Hazard 6.6. Workload Hazard 6.7. Falling from heights 6.8. Falling from same level 6.9. Electrocution 6.10. Suffocation 6.11. Contact with moving parts 6.12. Contact with sharp objects 6.13. Falling objects 6.14. Tripping hazards 6.15. Falling on uneven surfaces

VARIABLE	RANGE
7. Company Policies and Procedures	May include: 7.1. Emergency Response Plan 7.2. Permit to Work Policy 7.3. Electrical Safety Procedure 7.4. Lock out Tag out Procedure 7.5. Heat Stress Policy 7.6. Stop Work Authority Policy 7.7. OHS Standards 7.8. PPE Policy 7.9. Policy and Procedure in Housekeeping 7.10. Preventive Maintenance Policy and Procedure 7.11. Inter-department communication protocol
8. OSH Standards	May include: 8.1. OSH Manual 8.2. Provision of worker's training 8.3. Formulation of safety and health program 8.4. Use of approved or certified devices and equipment 8.5. Provision of PPE 8.6. Compliance to other OSH standards 8.7. Tools and Equipment Safety Inspection
9. Permit To Work (PTW)	May include: 9.1. Permit to work policy 9.1.1. Permit application 9.1.2. Permit approval 9.1.3. Permit issuance 9.2. Work planning 9.3. Site check, toolbox meeting 9.4. Discussion of emergency procedures
10. Toolbox meeting	May include: 10.1. Instruction, discussion and proper briefing on the planned work 10.2. The assessment of past work 10.3. The possibility or actual occurrence of accidents at the site 10.4. Tips and suggestions on how to prevent possible accidents and other related matters
11. Additional work environment hazards	May include: 11.1. Abrupt change in weather condition/temperature 11.2. Presence of birds of prey 11.3. Occurrence of lightning strike

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Reviewed maintenance plans 1.2 Prepared work order 1.3 Secured approved permit to work 1.4 Conducted toolbox meeting 1.5 Performed preventive maintenance 1.6 Prepared preventive maintenance reports 1.7 Surrendered/Closed out Permit to Work (PTW)
2. Resource implication	The following resources must be provided: 2.1. Work place 2.2. Work plan 2.3. Materials, tools and equipment relevant to the proposed activity/task
3. Method of assessment	Competency in this unit must be assessed using at least two (2) of the following methods: 3.1. Direct observation 3.2. Written test/questions relevant to underpinning knowledge
4. Context of assessment	4.1. Competency assessment may occur in workplace or any appropriate simulated environment 4.2. Assessment shall be observed while task is being undertaken whether individually or in group

UNIT OF COMPETENCY : **INSPECT WIND TURBINE TOWERS**

UNIT CODE : **AB-UTL0102800313302**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to inspect wind turbine towers to make sure they're in proper working condition.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Review maintenance plans	1.1. ***Required documents*** are reviewed to determine the tasks and equipment parts needed. 1.2. Appropriate ***tools and equipment*** are identified based on company policies and procedures 1.3. Appropriate ***personal protective equipment (PPE)*** identified based on company policies and procedures	1.1. Company Maintenance Plan 1.2. Existing company maintenance manuals/service manuals. 1.3. Types of electrical, mechanical drawings and diagrams 1.4. Company PPE Policy 1.5. Types and uses of PPEs 1.6. Types of Tools and Equipment 1.7. Equipment and Tools Calibration Procedure 1.8. Basic Parts and Function of Wind Turbine	1.1. Describing maintenance plan 1.2. Familiarization of existing company maintenance manuals/service manuals 1.3. Reading and interpreting various types of electrical, mechanical drawings, diagrams, plans and manuals 1.4. Describing types and uses of PPE 1.5. Identifying and describing tools and equipment 1.6. Calibrating Equipment and Tools 1.7. Familiarizing the basic parts and functions of the wind turbine
2. Prepare work order	2.1. ***Work order form*** properly filled-out and approved based on company policies and manual 2.2. Appropriate tools and equipment are	2.1. Work Order Form 2.2. Appropriate Tools and Equipment Selection 2.3. Logistic Requirements 2.3.1. Meals 2.3.2. Vehicle/	2.1. Filling-out of Work Order Form 2.2. Selecting of Appropriate Tools and Equipment Needed 2.3. Identifying logistics requirements

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	prepared based on work order 2.3. Required ***logistics*** are listed based on company policies and procedures	Logistical requisition policy 2.3.3. Heavy equipment requisition policy	2.4. Filling of request forms
3. Secure approved permit to work	3.1. ***Risk and hazards*** are identified based on ***company policies and procedures*** 3.2. Permit to work form properly filled-out and approved based on company policies and procedures 3.3. Appropriate PPE identified based on company policies procedures	3.1. Company PTW policy 3.2. Job risk/hazards 3.3. Job Hazard Analysis Form 3.4. Permit to Work Form 3.5. PPE Identification Procedure 3.6. Basic Drone Operation	3.1. Understanding Company PTW policy 3.2. Identifying and analyzing job risk/hazards 3.3. Filling-out of Job Hazard Analysis Form 3.4. Accomplishing Permit to Work Form 3.5. Identifying of Appropriate PPE 3.6. Operating Drone
4. Conduct toolbox meeting	4.1. Safety orientation conducted based on ***OSH standard*** 4.2. Checklist of tools and equipment are verified based on approved PTW 4.3. PPEs are inspected based on approved PTW 4.4. Step by step procedures are discussed based on company policies and	4.1. Orientation of OSH Standard 4.2. PPE Functionality 4.3. Checklist of Tools and Equipment 4.4. Specific descriptive procedure in performing the work required in the approved PTW	4.1. Identifying OSH Standards 4.2. Checking of PPE functionality 4.3. Verifying of tools and equipment based on checklist 4.4. Describing the specific procedure in performing the work required in the approved PTW

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	procedures		
5. Inspect wind turbine tower	5.1. Inspection checklist prepared and secured 5.2. Condition of wind turbine tower is checked safely based on inspection checklist 5.3. Condition of wind turbine generator is checked safely based on inspection checklist 5.4. Relevant OSH requirements, regulations, policies and procedures are observed 5.5. Procedure in inspecting wind turbine is followed based on company policies and procedures	5.1. Work environment hazards 5.2. Inspection Checklist 5.3. OSH requirements, regulation, policies and procedures 5.4. Procedure in inspecting wind turbine tower 5.5. Work Completion	5.1. Identifying Work Environment Hazards 5.2. Utilizing safety walkthrough inspection checklist 5.3. Following procedures of specified inspection activity 5.4. Verifying of work completion
6. Prepare inspection reports	6.1. Inspection report is prepared and accomplished based on company policies and procedures 6.2. Inspection report is submitted for checking/ review based on company policies and procedures 6.3. Reviewed Inspection report is submitted for	6.1. Inspection Report Process 6.2. Communication Process Flow	6.1. Preparing inspection report 6.2. Describing the work and activities conducted. 6.3. Enumerating findings and overall remarks. 6.4. Validating the submitted report. 6.5. Submitting the report within the designated time frame for uploading

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	approval based on company policies and procedures 6.4. Approved Inspection report is submitted to the documents controller for uploading based on company policies and procedures		6.6. Tracking communication process 6.7. Job Communication Skills
7. Surrender/ Close out Permit to Work (PTW)	7.1. ***permit to work (PTW)*** is surrendered for checking based on company policies and procedures 7.2. Permit to work is turn over and recorded as completed based on company policies and procedures 7.3. Permit to work is submitted to the document controller for uploading based on company policies and procedures	7.1. Permit to work Surrender/ closed out process 7.2. Time frame of permit to work submission	7.1. Submitting surrendered PTW following the required time frame 7.2. Turning over and recording completed PTW for uploading

RANGE OF VARIABLES

VARIABLE	RANGE
1. Required documents	May include: 1.1. Maintenance plan 1.2. Maintenance manual 1.3. Service Manual 1.4. Electrical, mechanical drawings and diagram 1.5. Company PPE Policy 1.6. PTW Form 1.7. Accomplishment Report Form 1.8. Drone Pilot license/certification 1.9. Drone user's/operator's manual 1.10. Aerial working platform lifting plan
2. Tools and Equipment	May include: <u>2.1 Electrical</u> 2.1.1. Electric Portable Drill 2.1.2. VOM/Megger 2.1.3. Clamp on meter 2.1.4. Pipe cutter 2.1.5. Ball hammer 2.1.6. Combination pliers 2.1.7. Set of screwdrivers 2.1.8. Wire stripper 2.1.9. Electrician knife 2.1.10. Headlamp/flashlight 2.1.11. Inspection Mirror 2.1.12. 2-way radio <u>2.2 Mechanical</u> 2.2.1. Tensioner pump 2.2.2. Pressure gauge 2.2.3. Hydraulic torque wrenches 2.2.4. Bolt tensioners 2.2.5. Hydraulic pumps 2.2.6. Flange Alignment tools 2.2.7. Nut splitter 2.2.8. Orbital sanders 2.2.9. Circular Saws 2.2.10. Impact wrenches 2.2.11. Infrared level <u>2.3 Other Tools and Equipment</u> 2.3.1. Binoculars 2.3.2. Drone 2.3.3. Manlift/Aerial Working Platform 2.3.4. Telescope 2.3.5. DSLR camera

VARIABLE	RANGE
3. Personal Protective Equipment (PPE)	May include: 3.1. Hard hat 3.2. Googles 3.3. Working Gloves 3.4. Reflectorized vest 3.5. Working trousers 3.6. Safety shoes 3.7. Fall arrest device (rope and rail) 3.8. Twin lanyard with absorber 3.9. Working position lanyard 3.10. Full body harness 3.11. Climbing gloves
4. Work Order Form	May include: 4.1. List of works/tasks to be initiated 4.2. Names of workers involve 4.3. List of tools and equipment needed 4.4. Specific location of activity 4.5. Duration of activity
5. Logistics	May include: 5.1. Vehicles 5.2. Meals 5.3. Portalets
6. Risk and Hazards	May include: 6.1. Physical Hazard 6.2. Ergonomic Hazard 6.3. Chemical Hazard 6.4. Biological Hazard 6.5. Safety Hazard 6.6. Workload Hazard 6.7. Falling from heights 6.8. Falling from same level 6.9. Electrocution 6.10. Suffocation 6.11. Contact with moving parts 6.12. Contact with sharp objects 6.13. Falling objects 6.14. Tripping hazards 6.15. Falling on uneven surfaces
7. Company Policies and Procedures	May include: 7.1. Emergency Response Plan 7.2. Permit to Work Policy 7.3. Drone Flight Plan Procedure 7.4. Heat Stress Policy 7.5. Stop Work Authority Policy

VARIABLE	RANGE
	7.6. OHS Standards 7.7. PPE Policy 7.8. Working at height procedure 7.9. Inter-department communication protocol
8. OSH Standards	May include: 8.1. OSH Manual 8.2. Provision of worker's training 8.3. Formulation of safety and health program 8.4. Use of approved or certified devices and equipment 8.5. Provision of PPE 8.6. Compliance to other OSH standards 8.7. Tools and Equipment Safety Inspection
9. Permit to Work (PTW)	May include: 9.1. Permit to work policy 9.1.1. Permit application 9.1.2. Permit approval 9.1.3. Permit issuance 9.2. Work planning 9.3. Site check, toolbox meeting 9.4. Discussion of emergency procedures

EVIDENCE GUIDE:

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1. Reviewed maintenance plans 1.2. Prepared work order 1.3. Secured approved permit to work 1.4. Conducted toolbox meeting 1.5. Inspected wind turbine tower 1.6. Prepared preventive maintenance reports 1.7. Surrendered/Closed out Permit to Work (PTW)
2. Resource implication	The following resources must be provided: 2.1. Work place 2.2. Work plan 2.3. Materials, tools and equipment relevant to the proposed activity/task
3. Method of assessment	Competency in this unit must be assessed using at least two (2) of the following methods: 3.1. Direct observation 3.2. Written test/questions relevant to underpinning knowledge
4. Context of assessment	4.1. Competency assessment may occur in workplace or any appropriate simulated environment 4.2. Assessment shall be observed while task is being undertaken whether individually or in group

UNIT OF COMPETENCY : **CLIMB WIND TURBINE TOWERS TO REPAIR/REPLACE PARTS**

UNIT CODE : **AB-UTL0102800313303**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to climb wind turbine towers to repir equipment/replace wind turbine parts. (Level 1 WTG Technician- Minor repairs; Level 2 WTG Technician- troubleshooting; Level 3 WTG Technician- Major repairs).

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Review maintenance plans	1.1. Turbine alarm indicating fault is received based on company procedure 1.2. ***Required documents*** are reviewed to determine the tasks and equipment parts needed. 1.3. Appropriate ***tools and equipment*** are identified based on company policies and procedures 1.4. Appropriate ***personal protective equipment (PPE)*** identified based on company policies and procedures	1.1. Company Maintenance Plan 1.2. Existing company maintenance manuals/servic e manuals. 1.3. Types of electrical, mechanical drawings and diagrams 1.4. Company PPE Policy 1.5. Types and uses of PPEs 1.6. Types of Tools and Equipment 1.7. Equipment and Tools Calibration Procedure 1.8. Basic Parts and Function of Wind Turbine	1.1. Describing maintenance plan 1.2. Familiarization of existing company maintenance manuals/service manuals 1.3. Reading and interpreting various types of electrical, mechanical drawings, diagrams, plans and manuals 1.4. Describing types and uses of PPE 1.5. Identifying and describing tools and equipment 1.6. Calibrating Equipment and Tools 1.7. Familiarizing the basic parts and functions of the wind turbine
2. Prepare work order	2.1 ***Work order form*** properly filled-out and approved based on	2.1. Work Order Form 2.2. Appropriate Tools and	2.1. Filling-out of Work Order Form 2.2. Selecting of Appropriate Tools

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	company policies and manual 2.2 Appropriate tools and equipment are prepared based on work order 2.3 Required ***logistics*** are listed based on company policies and procedures	Equipment Selection 2.3. Logistic Requirements 2.3.1. Meals 2.3.2. Vehicle/ Logistical requisition policy 2.3.3. Heavy equipment requisition policy	and Equipment Needed 2.3. Identifying logistics requirements 2.4. Filling of request forms
3. Secure approved permit to work	3.1. ***Risk and hazards*** are identified based on company policies and procedures 3.2. Permit to work form properly filled-out and approved based on company policies and procedures 3.3. Appropriate PPE identified based on ***company policies procedures***	3.1. Company PTW policy 3.2. Job risk/hazards 3.3. Job Hazard Analysis Form 3.4. Permit to Work Form 3.5. PPE Identification Procedure	3.1. Understanding Company PTW policy 3.2. Identifying and analyzing job risk/hazards 3.3. Filling-out of Job Hazard Analysis Form 3.4. Accomplishing Permit to Work Form 3.5. Identifying of Appropriate PPE
4. Conduct kick-off meeting	4.1. Safety orientation conducted based on ***OSH standard*** 4.2. Checklist of tools and equipment are verified based on approved PTW 4.3. PPEs are inspected based on approved	4.1 Orientation of OSH Standard 4.2 PPE Functionality 4.3 Checklist of Tools and Equipment 4.5. Specific descriptive procedure in performing the work required in the approved PTW	4.1 Identifying OSH Standards 4.2 Checking of PPE functionality 4.3 Verifying of tools based on checklist 4.4 Describing the specific procedure in performing the work required in the approved PTW

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	PTW 4.1 Operator of Heavy Equipment fully certified (NC Holder) based on company policies and procedures 4.2 Heavy equipment is certified as safe to operate based on company policies and procedures 4.3 Step by step ***kick-off meeting*** procedures are discussed based on company policies and procedures		
5. Troubleshoot Wind Turbine Parts	5.1 Possible parts that caused the alarm are verified based on company policies and procedure 5.2 Repair kits/replacement parts are prepared 5.3 Parts identified for repair are repaired/replaced based on troubleshooting done 5.4 Procedure in inspecting wind turbine is followed based on company policies and procedures	5.1 Work environment hazards 5.2 Inspection Checklist 5.3 OSH requirements, regulation, policies and procedures 5.4 Procedure in inspecting turbine tower 5.5 5S 5.6 Work Completion	5.1 Identifying Work Environment Hazards 5.2 Utilizing safety walkthrough inspection checklist 5.3 Following procedures of specified inspection activity 5.4 Implementing 5S 5.5 Utilizing tools and equipment 5.6 Testing of repaired/replaced parts 5.7 Verifying of work completion

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	5.5 ***Relevant OSH requirements,*** regulations, policies and procedures are observed		
6. Prepare technical inspection report	6.1. Technical Inspection Report is prepared and accomplished based on company policies and procedures 6.2. Technical Inspection Report is submitted for checking/ review based on company policies and procedures 6.3. Reviewed Technical Inspection Report is submitted for approval based on company policies and procedures 6.4. Approved Technical Inspection Report is submitted to the documents controller for uploading based on company policies and procedures	6.1. Technical Inspection Report Process 6.2. Communication Process Flow	6.1. Preparing Technical Inspection Report 6.2. Describing the work and activities conducted. 6.3. Enumerating findings and overall remarks. 6.4. Validating the submitted report. 6.5. Submitting the report within the designated time frame for uploading 6.6. Tracking communication process 6.7. Job Communication Skills

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
7. Surrender/ Close out Permit to Work (PTW)	7.1. ***Permit To work (PTW)*** is surrendered for checking based on company policies and procedures 7.2. Permit to work is turn over and recorded as completed based on company policies and procedures 7.3. Permit to work is submitted to the document controller for uploading based on company policies and procedures	7.1. Permit to work Surrender/ closed out process 7.2. Time frame of permit to work submission	7.1. Submitting surrendered PTW following the required time frame 7.2. Turning over and recording completed PTW for uploading

RANGE OF VARIABLES

VARIABLE	RANGE
1. Required documents	May include: 1.1. Maintenance plan 1.2. Maintenance manual 1.3. Service Manual 1.4. Electrical, mechanical drawings and diagram 1.5. Company PPE Policy 1.6. Permit To Work (PTW) Form 1.7. Accomplishment Report Form 1.8. Preventive Maintenance Schedule (PMS) 1.9. Emergency Response Plan 1.10. Heavy Equipment Certification 1.11. Operator's Certification 1.12. Aerial working platform lifting plan
2. Tools and Equipment	May include: <u>2..1 Electrical</u> 2.1.1. Electric Portable Drill 2.1.2. VOM/Megger 2.1.3. Clamp on meter 2.1.4. Pipe cutter 2.1.5. Ball hammer 2.1.6. Combination pliers 2.1.7. Set of screwdrivers 2.1.8. Wire stripper 2.1.9. Electrician knife 2.1.10. Headlamp/flashlight 2.1.11. Inspection Mirror 2.1.12. 2-way radio 2.1.13. Electrical tester <u>2.2 Mechanical</u> 2.2.1. Mechanical Climb Assisted Device 2.2.2. Tensioner pump 2.2.3. Pressure gauge 2.2.4. Hydraulic torque wrenches 2.2.5. Bolt tensioners 2.2.6. Hydraulic pumps 2.2.7. Flange Alignment tools 2.2.8. Nut splitter 2.2.9. Orbital sanders 2.2.10. Circular Saws 2.2.11. Impact wrenches 2.2.12. Infrared level

VARIABLE	RANGE
	2.2.13. Hydraulic tester 2.2.14. Hydraulic torque 2.2.15. Hydraulic tension 2.2.16. Box wrenches 2.3 Equipment 2.3.1. Crane 2.3.2. Excavator 2.3.3. Manlift/Aerial Working Platform
3. Personal Protective Equipment (PPE)	May include: 3.1. Hard hat 3.2. Googles 3.3. Working Gloves 3.4. Reflectorized vest 3.5. Working trousers 3.6. Safety shoes 3.7. Fall arrest device (rope and rail) 3.8. Twin lanyard with absorber 3.9. Working position lanyard 3.10. Full body harness 3.11. Climbing gloves
4. Work Order Form	May include: 4.1. List of works/tasks to be initiated 4.2. Names of workers involve 4.3. List of tools and equipment needed 4.4. Specific location of activity 4.5. Duration of activity
5. Logistics	May include: 5.1. Vehicles 5.2. Meals 5.3. Cleaning Materials 5.4. Cloth 5.5. Cleaning chemical 5.6. Degreaser 5.7. Battery cleaner
6. Risk and Hazards	6.1. Physical Hazard 6.2. Ergonomic Hazard 6.3. Chemical Hazard 6.4. Biological Hazard 6.5. Safety Hazard 6.6. Workload Hazard 6.7. Falling from heights 6.8. Falling from same level

VARIABLE	RANGE
	6.1. Electrocution 6.2. Suffocation 6.3. Contact with moving parts 6.4. Contact with sharp objects 6.5. Falling objects 6.6. Tripping hazards 6.7. Falling on uneven surfaces
7. Company Policies and Procedures	May include: 7.1. Emergency Response Plan 7.2. Permit to Work Policy 7.3. Electrical Safety Procedure 7.4. Lock out Tag out Procedure 7.5. Heat Stress Policy 7.6. Stop Work Authority Policy 7.7. OHS Standards 7.8. PPE Policy 7.9. Policy and Procedure in Housekeeping 7.10. Preventive Maintenance Policy and Procedure 7.11. Working at height procedure 7.12. Inter-department communication protocol
8. OSH Standard	May include: 8.1. OSH Manual 8.2. Provision of worker's training 8.3. Formulation of safety and health program 8.4. Use of approved or certified devices and equipment 8.5. Provision of PPE 8.6. Compliance to other OSH standards 8.7. Tools and Equipment Safety Inspection
9. Kick-off meeting	May include: 9.1. Instruction, discussion and proper briefing on the planned work 9.2. The assessment of past work 9.3. The possibility or actual occurrence of accidents at the site 9.4. Tips and suggestions on how to prevent possible accidents and other related matters
10. Relevant OSH Requirements	May include: 10..1. OSH Manual 10..2. Provision of worker's training 10..3. Formulation of safety and health program 10..4. Use of approved or certified devices and equipment 10..5. Provision of PPE

VARIABLE	RANGE
	10..6. Compliance to other OSH standards 10..7. Tools and Equipment Safety Inspection
11. Permit to Work	May include: 11.1. Permit to work policy 11.1.1. Permit application 11.1.2. Permit approval 11.1.3. Permit issuance 11.2. Work planning 11.3. Site check, toolbox meeting 11.4. Discussion of emergency procedures

EVIDENCE GUIDE:

1. Critical aspect of competency	Assessment requires evidence that the candidate: 1.1. Reviewed maintenance plans 1.2. Prepared work order 1.3. Secured approved permit to work 1.4. Conducted kick-off meeting 1.5. Repaired/Troubleshoot wind turbine parts 1.6. Prepared technical inspection report 1.7. Surrendered/Closed out permit to work (PTW)
2. 2. Resource implication	The following resources must be provided: 2.1. Work place 2.2. Work plan 2.3. Materials, tools and equipment relevant to the proposed activity/task
3. Method of assessment	Competency in this unit must be assessed using at least two (2) of the following methods: 3.1. Direct observation 3.2. Written test/questions relevant to underpinning knowledge 3.4.
4. Context of assessment	4.1. Competency assessment may occur in workplace or any appropriate simulated environment 4.2. Assessment shall be observed while task are being undertaken whether individually or in group

UNIT OF COMPETENCY : **TROUBLESHOOT AND TEST WIND TURBINE SYSTEMS**

UNIT CODE : **AB-UTL0102800313304**

UNIT DESCRIPTOR : This unit covers the knowledge of turbine systems, electrical drawings and hydraulics schematics drawings, skills and attitudes required to climb wind turbine towers to repair equipment/replace wind turbine parts.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Review maintenance plans	1.1. Turbine alarm indicating fault is received baked on company procedure 1.2. ***Required documents*** are reviewed to determine the tasks and equipment parts needed. 1.3. Appropriate ***tools and equipment*** are identified based on company policies and procedures 1.4. Appropriate ***personal protective equipment*** (***PPE)*** identified based on company policies and procedures	1.1 Company Maintenance Plan 1.2 Existing company maintenance manuals/service manuals. 1.3 Types of electrical, mechanical drawings and diagrams 1.4 Company PPE Policy 1.5 Types and uses of PPEs 1.6 Types of Tools and Equipment 1.7 Equipment and Tools Calibration Procedure 1.8 Basic Parts and Function of Wind Turbine	1.1. Describing maintenance plan 1.2. Familiarization of existing company maintenance manuals/service manuals 1.3. Reading and interpreting various types of electrical, mechanical drawings, diagrams, plans and manuals 1.4. Describing types and uses of PPE 1.5. Identifying and describing tools and equipment 1.6. Calibrating Equipment and Tools 1.7. Familiarizing the basic parts and functions of

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
			the wind turbine
2. Prepare work order	2.1. ***Work order form*** properly filled-out and approved based on company policies and manual 2.2. Appropriate tools and equipment are prepared based on work order 2.3. Required ***logistics*** are listed based on company policies and procedures	2.1. Work Order Form 2.2. Appropriate Tools and Equipment Selection 2.3. Logistic Requirements 2.1.1. Meals 2.1.2. Vehicle/ Logistical requisition policy 2.1.3. Heavy equipment requisition policy	2.1. Filling-out of Work Order Form 2.2. Selecting of Appropriate Tools and Equipment Needed 2.3. Identifying logistics requirements 2.4. Filling of request forms
3. Secure approved permit to work	3.1. ***Risk and hazards*** are identified based on company policies and procedures 3.2. Permit to work form properly filled-out and approved based on company policies and procedures 3.3. Appropriate PPE identified based on ***company policies procedures***	3.1 Company PTW policy 3.2 Job risk/hazards 3.3 Job Hazard Analysis Form 3.4 Permit to Work Form 3.5 PPE Identification Procedure	3.1 Understanding Company PTW policy 3.2 Identifying and analyzing job risk/hazards 3.3 Filling-out of Job Hazard Analysis Form 3.4 Accomplishing Permit to Work Form 3.6. Identifying of Appropriate PPE
4. Conduct toolbox meeting	4.1. Safety orientation conducted based on ***OSH standard*** 4.2. Checklist of tools and	4.1. Orientation of OSH Standard 4.2. PPE Functionality 4.3. Checklist of Tools and Equipment	4.1. Identifying OSH Standards 4.2. Checking of PPE functionality and appropriateness 4.3. Verifying of tools based on

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	equipment are verified based on approved ***Permit to Work (PTW)*** 4.3. PPEs are inspected based on approved PTW 4.4. Step by step ***toolbox meeting*** procedures are discussed based on company policies and procedures	4.4. Procedure in responding emergency situation 4.5. Procedure in chemical handling 4.6. Specific descriptive procedure in performing the work required in the approved PTW	checklist 4.4. Responding to emergency situations 4.5. Noting Verbal Details 4.6. Describing the specific procedure in performing the work required in the approved PTW
5. Assess Wind Turbine Systems	5.1. ***Moving and stationary parts*** are checked and tested based on the company policies and procedures 5.2. ***Electrical component system*** is checked and tested based on company policies and procedures 5.3. ***Mechanical component system*** is checked and tested based on company policies and procedures 5.4. ***Chemical Substances*** are checked on their required levels based on	5.1. Work environment hazards 5.2. Inspection Checklist 5.3. OSH requirements, regulation, policies and procedures 5.4. Procedure in inspecting turbine tower 5.5. 5S 5.6. Procedure in checking and testing system component 5.7. Oil Spill Policy 5.8. Work Completion	5.1. Identifying Work Environment Hazards 5.2. Utilizing safety walkthrough inspection checklist 5.3. Following procedures of specified inspection activity 5.4. Implementing 5S 5.5. Utilizing tools and equipment 5.6. Checking and testing mechanical component system 5.7. Checking and testing chemical substances 5.8. Assessing and testing electrical systems and components 5.9. Assessing and testing fire

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	company policies and procedures 5.5. ***Fire suppression system*** is checked and tested based on company policies and procedures 5.6. ***Relevant OSH requirements***, regulations, policies and procedures are observed		suppression systems 5.10. Assessing and testing moving and stationary parts 5.11. Oil Spill handling and disposing 5.12. Verifying of work completion
6. Prepare inspection report	6.1 Inspection Report is prepared and accomplished based on company policies and procedures 6.2 Inspection Report is submitted for checking/ review based on company policies and procedures 6.3 Reviewed Inspection Report is submitted for approval based on company policies and procedures 6.5. Approved Inspection Report is submitted to the	6.1. Inspection Report Process 6.2. Communication Process Flow	6.1 Preparing Inspection Report 6.2 Describing the work and activities conducted. 6.3 Enumerating findings and overall remarks. 6.4 Validating the submitted report. 6.5 Submitting the report within the designated time frame for uploading 6.6 Tracking communication process 6.7 Job Communication Skills

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	documents controller for uploading based on company policies and procedures		
7. Surrender/ Close out Permit to Work (PTW)	7.1 Permit to work is surrendered for checking based on company policies and procedures 7.2 Permit to work is turn over and recorded as completed based on company policies and procedures 7.3 Permit to work is submitted to the document controller for uploading based on company policies and procedures	7.1. Permit to work Surrender/ closed out process 7.2. Time frame of permit to work submission	7.1 Submitting surrendered PTW following the required time frame 7.2 Turning over and recording completed PTW for uploading

RANGE OF VARIABLES

VARIABLE	RANGE
1. Required documents	May include: 1.1. Maintenance plan 1.2. Maintenance manual 1.3. Service Manual 1.4. Electrical, mechanical drawings and diagram 1.5. Company PPE Policy 1.6. Permit To Work (PTW) Form 1.7. Heavy Equipment Certification 1.8. Operator's Certification 1.9. Aerial working platform lifting plan 1.10. Accomplishment Report Form
2. Tools and Equipment	May include: <u>2.1 Electrical</u> 2.1.1. Electric Portable Drill 2.1.2. VOM/Megger 2.1.3. Clamp on meter 2.1.4. Pipe cutter 2.1.5. Ball hammer 2.1.6. Combination pliers 2.1.7. Set of screwdrivers 2.1.8. Wire stripper 2.1.9. Electrician knife 2.1.10. Headlamp/flashlight 2.1.11. Inspection Mirror 2.1.12. 2-way radio 2.1.13. Electrical Tester <u>2.2 Mechanical</u> 2.2.1. Climb Assist Device 2.2.2. Tensioner pump 2.2.3. Pressure gauge 2.2.4. Hydraulic torque wrenches 2.2.5. Bolt tensioners 2.2.6. Hydraulic pumps 2.2.7. Flange Alignment tools 2.2.8. Nut splitter 2.2.9. Orbital sanders 2.2.10. Circular Saws 2.2.11. Impact wrenches 2.2.12. Infrared level 2.2.13. Hydraulic tester 2.2.14. Hydraulic Torque 2.2.15. Hydraulic tension

VARIABLE	RANGE
	2.2.16. Box Wrenches 2.3. Equipment 2.3.1. Laptop Computer 2.3.2. Hydrometer
3. Personal Protective Equipment (PPE)	May include: 3.1. Hard hat 3.2. Googles 3.3. Working Gloves 3.4. Reflectorized vest 3.5. Working trousers 3.6. Safety shoes 3.7. Fall arrest device (rope and rail) 3.8. Twin lanyard with absorber 3.9. Working position lanyard 3.10. Full body harness 3.11. Climbing gloves
4. Work Order Form	May include: 4.1. List of works/tasks to be initiated 4.2. Names of workers involve 4.3. List of tools and equipment needed 4.4. Specific location of activity 4.5. Duration of activity
5. Logistics	May include: 5.1. Vehicles 5.2. Meals 5.3. Portalets
6. Risk and Hazards	May include: 6.1. Physical Hazard 6.2. Ergonomic Hazard 6.3. Chemical Hazard 6.4. Biological Hazard 6.5. Safety Hazard 6.6. Workload Hazard 6.7. Falling from heights 6.8. Falling from same level 6.9. Electrocution 6.10. Suffocation 6.11. Contact with moving parts 6.12. Contact with sharp objects 6.13. Falling objects 6.14. Tripping hazards 6.15. Falling on uneven surfaces

VARIABLE	RANGE
7. Company Policies and Procedures	May include: 7.1. Emergency Response Plan 7.2. Permit to Work Policy 7.3. Electrical Safety Procedure 7.4. Lock out Tag out Procedure 7.5. Heat Stress Policy 7.6. Stop Work Authority Policy 7.7. OHS Standards 7.8. PPE Policy 7.9. Policy and Procedure in Housekeeping 7.10. Preventive Maintenance Policy and Procedure 7.11. Working at height procedure 7.12. Inter-department communication protocol
8. OSH Standard	May include: 8.1. OSH Manual 8.2. Provision of worker's training 8.3. Formulation of safety and health program 8.4. Use of approved or certified devices and equipment 8.5. Provision of PPE 8.6. Compliance to other OSH standards 8.7. Tools and Equipment Safety Inspection
9. Permit to Work (PTW)	May include: 9.1. Permit to work policy 9.1.1. Permit application 9.1.2. Permit approval 9.1.3. Permit issuance 9.2. Work planning 9.3. Site check, toolbox meeting 9.4. Discussion of emergency procedures
10. Toolbox meeting	May include: 10.1. Instruction, discussion and proper briefing on the planned work 10.2. The assessment of past work 10.3. The possibility or actual occurrence of accidents at the site 10.4. Tips and suggestions on how to prevent possible accidents and other related matters
11. Moving and stationary parts	May include: 11.1. Blades 11.2. Tower 11.3. Service manlift 11.4. Canopy 11.5. Service hatch 11.6. Hub

VARIABLE	RANGE
	11.7. Bedplate 11.5. Service ladder
12. Electrical component system	May include: 12.1. Top controller 12.2. Generator power cable 12.3. Deacon light 11.8. Control panels
13. Mechanical component system	May include: 13.1. Blade bearing 13.2. Main Shaft 13.3. Main Bearing 13.4. Gearbox 13.5. Radiator/Cooling unit 13.6. Generator 13.7. Hydraulic pitch activator 13.8. Yaw Control 13.9. Shock absorbers 13.10. Main Disc brake 13.11. transmission 13.12. Fed generator 13.13. weather station 13.14. Hydraulic unit 13.15. Yaw gear 13.16. Yaw motor
14. Chemical substances	May include: 14.1. Hydraulic fluid 14.2. Gear oil 14.3. Coolant 14.4. Grease 14.5. Paints and Coatings 14.6. Solvents 14.7. Adhesive 13.17. Dry Chemical
15. Fire suppression system	May include: 16.1. Fire extinguisher 16.2. Smoke detector 16.3. Fire alarm 16.4. Control panel
16. Relevant OSH Requirements	May include: 16.1. OSH Manual 16.2. Provision of worker's training 16.3. Formulation of safety and health program 16.4. Use of approved or certified devices and equipment 16.5. Provision of PPE 16.6. Compliance to other OSH standards 16.7. Tools and Equipment Safety Inspection

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1. Reviewed maintenance plans 1.2. Prepared work order 1.3. Secured approved permit to work 1.4. Conducted toolbox meeting 1.5. Assessed wind turbine systems 1.6. Prepared inspection report 1.7. Surrendered/Closed out permit to work (PTW)
2. Resource implication	The following resources must be provided: 2.1. Work place 2.2. Work plan 2.3. Materials, tools and equipment relevant to the proposed activity/task
3. Method of assessment	Competency in this unit must be assessed using at least two (2) of the following methods: 3.1. Direct observation 3.2. Written test/questions relevant to underpinning knowledge
4. Context of assessment	4.1. Competency assessment may occur in workplace or any appropriate simulated environment 4.2. Assessment shall be observed while task is being undertaken whether individually or in group

UNIT OF COMPETENCY : **COLLECT DATA ON WIND TURBINE**

UNIT CODE : **AB-UTL0102800313305**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to collect data on wind turbines performance and condition monitoring, electrical and mechanical systems.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Review maintenance plans	1.1. ***Required documents*** are reviewed to determine the tasks and equipment parts needed. 1.2. Appropriate ***personal protective equipment (PPE)*** identified based on company policies and procedures 1.3. Appropriate ***tools and equipment*** are identified based on company policies and procedures	1.1. Preventive Maintenance Procedure 1.2. SCADA System 1.3. Company PPE Policy 1.4. Types of Tools and Equipment	1.1. Familiarizing existing maintenance manuals/service manuals 1.2. Utilizing SCADA System Software 1.3. Describing types and uses of PPE 1.4. Identifying appropriate tools and testing equipment
2. Collect Data	2.1. Data on Production is collected based on SCADA (Supervisory Control and Data Acquisition) System 2.2. ***Data on weather parameters*** is collected based on SCADA	2.1. Computer operation 2.2. SCADA System 2.3. Data Collection Procedure 2.4. Relevant OSH requirements, regulation, policies and procedures	2.1 Applying relevant OHS requirements, regulations policies and procedures 2.2 Operating a computer 2.3 Accessing SCADA System 2.4 Collecting data on production

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	Systems 2.3. **Relevant OSH requirements,** regulations, policies and procedures are observed		2.5. Collecting data on weather parameters
3. Submit Data	3.1. Collected data are forwarded to substation/ concerned department for analysis based on company policies and procedure 3.2. Feedback on analyzed data is recorded based on company procedure. 3.3. Collected data are filed according to company filing system	3.1. Data Collection Procedure 3.2. Computer operation 3.3. Relevant OSH requirements, regulations, policies and procedures are observed	3.1. Analyzing collected data on production and weather parameters. 3.2. Submitting recorded data. 3.3. Filing of collected data.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Required documents	May include: 1.1. Maintenance plan 1.2. Maintenance manual 1.3. Service Manual 1.4. Electrical, mechanical drawings and diagram 1.5. Company PPE Policy 1.11. Accomplishment Report Form
2. Personal Protective Equipment (PPE)	May include: 2.1 Hard hat 2.2 Googles 2.3 Working Gloves 2.4 Reflectorized vest 2.5 Working trousers 2.6 Safety shoes 2.7 Fall arrest device (rope and rail) 2.8 Twin lanyard with absorber 2.9 Working position lanyard 2.10 Full body harness 2.11 Climbing gloves
3. Tools and Equipment	May include: 3.1. Two-way radio 3.2. Laptop 3.3. External hard drive 3.4. USB cable 3.5. Data logger 3.6. Data collection application
4. Data on weather parameters	May include: 4.1. Temperature 4.2. Wind speed 4.3. Wind direction 4.4. Humidity
5. Relevant OSH Requirements	May include: 5.1. OSH Manual 5.2. Provision of worker's training 5.3. Formulation of safety and health program 5.4. Use of approved or certified devices and equipment 5.5. Provision of PPE 5.6. Compliance to other OSH standards 5.4. Tools and Equipment Safety Inspection

EVIDENCE GUIDE:

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1. Reviewed maintenance plans 1.2. Collected Data 1.3. Submitted Data
2. Resource implication	The following resources must be provided: 2.1. Work place 2.2. Work plan 2.3. Materials, tools and equipment relevant to the proposed activity/task
3. Method of assessment	Competency in this unit must be assessed using at least two (2) of the following methods: 3.1. Direct observation 3.2. Written test/questions relevant to underpinning knowledge
4. Context of assessment	4.1. Competency assessment may occur in workplace or any appropriate simulated environment 4.2. Assessment shall be observed while task is being undertaken whether individually or in group

Glossary of Terms

- **Anemometer** - a device used to measure the wind speed
- **Bearing** - a machine part that allows a hub to spin on a spindle
- **Biological Hazards** - Biological agent/entity that pose a threat to the health of humans
- **Blade pitch control system** - responsible for adjusting the angle of the rotor blade
- **Brake** - various systems used to stop the rotor from turning
- **Chemical Hazards** - hazard present in chemicals and materials that can cause acute or long-term adverse health effects
- **Control System** - monitors and regulates the whole operation of the wind turbine
- **Corrective Maintenance** - is the category of maintenance tasks that are performed to rectify and repair faulty systems and equipment
- **Cut out wind speed** - the wind speed at which a wind turbine ceases to generate electricity
- **Cut-in-wind speed** - the wind speed at which wind turbine begins to generate electricity
- **Electrical Safety Procedures** - Set of steps to be followed when working with electrical systems and components
- **Electrocution** - the injury on killing of someone by electric shocks
- **Emergency Response Plan** - Details how to act during an emergency
- **Ergonomic Hazards** - risks factors that cause wear and tear on the body and can cause injury
- **Gearbox** - the gearbox increases the rotational speed of the rotor to drive the generation of the required speed
- **Generator** - converts rotational kinetic energy to electrical energy (DC to AC)
- **Heat Stress Policy** - Policy allowing sufficient breaks in cool area to avoid heat strain and promote recovery
- **Hub** - the structure where the blades are attached
- **Inter** - department communication -protocol on the flow of information, data and messages among various departments, units, or teams
- **Inverter** - a device that converts direct current to alternating current
- **Lift** - an aerodynamic force that acts at right angles to the airstream flowing over an airfoil
- **Lightning protection -** system that protects the turbine from lightnings
- **Lockout/Tag-out** - set into motion to present unexpected start up or release of stored energy

- **Maintenance Manual** - is a document that contains all the necessary details on the upkeep of equipment and property
- **Maintenance Plan** - is an essential tool for project management inside an industrial plant or manufacturing operations
- **Manlift** - the component that hoists and lowers service personnel/crew and their equipment
- **Nacelle** - the structure that uses the generating components in a wind turbine (including generator and toolbox)
- **OHS Standards** - refers to a promotion and maintenance of the highest degree of physical, mental and social well-being of workers
- **Permit to work** - refers to management systems procedure to ensure that work is done safely and efficiently and designed to mitigate environmental, health, sustainability and safety risk in certain operations
- **Physical Hazards** - an agent factor on circumstance that can harm on contact
- **Policy and Procedures in Housekeeping** - A set of guidelines that specifies the plans for orderly storage and upkeep of materials from point of entry to exit
- **Power Cable** - conduit that carries electricity generated to the transformers
- **PPE Policy** - a set of guidelines that protects employees from exposure to workplace hazards
- **PPEs** - is equipment worn to minimize exposure to hazards that cause serious workplace injuries and illness
- **Preventive Maintenance Policy** - Policy that programs a proactive inspection, maintenance and correction of facility systems on equipment
- **Preventive Maintenance** - act of performing regularly scheduled maintenance activities to help prevent unexpected failure in the future
- **Radiator** - the component that cools the generator
- **Rotor Blades** - the component that captures the kinetic energy of the wind and convert it into rotational energy
- **Safety Hazard** - workplace risk which may cause spills or trips. Anything that can cause falls, such as working from heights, ladders, scaffolds or any elevated work area
- **SCADA** - (Supervisory Control and Data Acquisition) System used for controlling, monitoring and analyzing industrial devices and processes consisting of both hardware and software components
- **Safety** - Identify and eliminate all hazards for a zero accident and injury free workplace
- **Service Manual** - is a resource provided by a manufacturer explaining how to use, maintain, troubleshoot and repair a product
- **Set-in Order** - Arrange essential Items to promote efficient work flor

- **Shaft** - the rotating part in the center of a wind turbine that transforms power
- **Shine** - Clean the work area so it is neat and tidy
- **Slip Rings** - enables the transfer of electrical power between stationary and rotating parts
- **Sort** - Keep only necessary items in workplace
- **Spirit** - Willingness to collaborate as a team with maximum engagement at all levels
- **Standardize** - Set standards for a consistent organized workplace
- **Stop Work Authority** - Authority that is instituted which is instrumental in reducing workplace accidents. Work should be stopped anytime, unsafe conditions or behavior are observed
- **Suffocation** - the state or process of dying from being deprived of air or unable to breath
- **Sustain** - Maintain and review standards
- **Toolbox Meeting** - is a briefing of safety measures to supervisors, workers and safety team, held every before commencing a task or job
- **Tools and Equipment** - Tools are objects used to perform specific tasks while equipment encompasses a broader range of tools and machinery necessary for a particular purpose
- **Tower** - is the structure supporting the wind turbine made of tapered tubular sheet
- **Transformer** - a device that transfers electricity from one circuit to another modifying its characteristics
- **Wind Turbine** - is an equipment machine that converts wind energy into electrical energy
- **Wind Turbine Technician** - qualified personnel that services, repairs, maintains wind turbine equipment
- **Wind vane** - determines the direction of the wind
- **Work Order Form** - a document that assists both parties the requestor and person assigned in formally documenting what the job or tasks entails
- **Workload Hazard** - issues that could cause stress or strain such as workload violence or aggression
- **Yaw System** - adjust the orientation of the wind turbine

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