COMPETENCY STANDARDS

SCADA OPERATION LEVEL II

INFORMATION AND COMMUNICATIONS TECHNOLOGY (ICT) SECTOR

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

TABLE OF CONTENTS

ELECTRICAL AND ELECTRONICS SECTOR

SCADA OPERATION
LEVEL II

COMPETENCY STANDARDS
SCADA OPERATION LEVEL II

Section 1 SCADA OPERATION LEVEL II

The SCADA Operation Level II consists of competencies that must be possessed to enable a person to develop a SCADA application and to use SCADA systems in operation.

The units of competency comprising this qualification include the following:

Unit Code	BASIC COMPETENCIES
400311210	Participate in workplace communication
400311211	Work in a team environment
400311212	Solve/address general workplace problems
400311213	Develop career and life decisions
400311214	Contribute to workplace innovation
400311215	Present relevant information
400311216	Practice occupational safety and health policies and procedures
400311217	Exercise efficient and effective sustainable practices in the workplace
400311218	Practice entrepreneurial skills in the workplace

Unit Code	COMMON COMPETENCIES
CS-ELC311205	Use hand tools
CS-ELC311201	Perform mensuration and calculation
CS-ELC311202	Prepare and interpret technical drawing
CS-ELC311204	Apply quality standards
CS-ELC311203	Perform computer operations
CS-ELC311206	Terminate and connect electrical wiring and electronic circuits
CS-ELC311209	Test electronic components

Unit Code	CORE COMPETENCIES
CS-ELC311201	Observe SCADA operation safety practices
CS-ELC311202	Use SCADA systems in operation

A person who has achieved this Qualification is competent to be:

- SCADA systems operator

SECTION 2: COMPETENCY STANDARDS

This section gives the details of the contents of the basic, common, and core units of competency required for SCADA Operation Level II**.**

BASIC COMPETENCIES

UNIT OF COMPETENCY : PARTICIPATE IN WORKPLACE COMMUNICATION

UNIT CODE : 400311210

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to gather, interpret and convey information in response to workplace requirements.

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Obtain and convey workplace information	1.1 Specific and relevant information is accessed from ***appropriate sources*** 1.2 Effective questioning, active listening and speaking skills are used to gather and convey information 1.3 Appropriate ***medium*** is used to transfer information and ideas 1.4 Appropriate non- verbal communication is used 1.5 Appropriate lines of communication with supervisors and colleagues are identified and followed 1.6 Defined workplace procedures for the location and ***storage*** of information are used 1.7 Personal interaction is carried out clearly and concisely	1.1 Effective communication 1.2 Different modes of communication 1.3 Medium of communication in the workplace 1.4 Organizational policies 1.5 Communication procedures and systems 1.6 Lines of communication 1.7 Technology relevant to the enterprise and the individual's work responsibilities 1.8 Workplace etiquette	1.1 Following simple spoken language 1.2 Performing routine workplace duties following simple written notices 1.3 Participating in workplace meetings and discussions 1.4 Preparing work-related documents 1.5 Estimating, calculating and recording routine workplace measures 1.6 Relating/ Interacting with people of various levels in the workplace 1.7 Gathering and providing basic information in response to workplace requirements 1.8 Basic business writing skills 1.9 Interpersonal skills in the workplace 1.10 Active-listening skills
2. Perform duties following workplace instructions	2.1 Written notices and instructions are read and interpreted in accordance with organizational guidelines 2.2 Routine written instruction are followed	2.1 Effective verbal and non-verbal communication 2.2 Different modes of communication 2.3 Medium of communication in the workplace	2.1 Following simple spoken instructions 2.2 Performing routine workplace duties following simple written notices 2.3 Participating in workplace meetings and discussions

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	based on established procedures 2.3 Feedback is given to workplace supervisor-based instructions/ information received 2.4 ***Workplace interactions*** are conducted in a courteous manner 2.5 Where necessary, clarifications about routine workplace procedures and matters concerning conditions of employment are sought and asked from appropriate sources 2.6 Meeting's outcomes are interpreted and implemented	2.4 Organizational/ Workplace policies 2.5 Communication procedures and systems 2.6 Lines of communication 2.7 Technology relevant to the enterprise and the individual's work responsibilities 2.8 Effective questioning techniques (clarifying and probing) 2.9 Workplace etiquette	2.4 Completing work-related documents 2.5 Estimating, calculating and recording routine workplace measures 2.6 Relating/ Responding to people of various levels in the workplace 2.7 Gathering and providing information in response to workplace requirements 2.8 Basic questioning/ querying 2.9 Skills in reading for information 2.10 Skills in locating
3. Complete relevant work-related documents	3.1 Range of ***forms*** relating to conditions of employment are completed accurately and legibly 3.2 Workplace data is recorded on standard workplace forms and documents 3.3 Errors in recording information on forms/ documents are identified and properly acted upon 3.4 Reporting requirements to supervisor are completed according to organizational guidelines	3.1 Effective verbal and non-verbal communication 3.2 Different modes of communication 3.3 Workplace forms and documents 3.4 Organizational/ Workplace policies 3.5 Communication procedures and systems 3.6 Technology relevant to the enterprise and the individual's work responsibilities	3.1 Completing work-related documents 3.2 Applying operations of addition, subtraction, division, and multiplication 3.3 Gathering and providing information in response to workplace requirements 3.4 Effective record keeping skills

RANGE OF VARIABLES

VARIABLE	RANGE
1. Appropriate sources	May include: 1.1. Team members 1.2. Suppliers 1.3. Trade personnel 1.4. Local government 1.5. Industry bodies
2. Medium	May include: 2.1. Memorandum 2.2. Circular 2.3. Notice 2.4. Information discussion 2.5. Follow-up or verbal instructions 2.6. Face to face communication
3. Storage	May include: 3.1. Manual filing system 3.2. Computer-based filing system
4. Workplace interactions	May include: 4.1. Face to face 4.2. Telephone 4.3. Electronic and two-way radio 4.4. Written including electronic, memos, instruction, and forms, 4.5. Non-verbal including gestures, signals, signs, and diagrams
5. Forms	May include: 5.1. HR/Personnel forms, telephone message forms, safety reports

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1. Prepared written communication following standard format of the organization 1.2. Accessed information using workplace communication equipment/systems 1.3. Made use of relevant terms as an aid to transfer information effectively 1.4. Conveyed information effectively adopting the formal or informal communication
2. Resource Implications	The following resources should be provided: 2.1. Fax machine 2.2. Telephone 2.3. Notebook / Writing materials 2.4. Computer with internet connection
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1. Demonstration with oral questioning 3.2. Interview 3.3. Written test 3.4. Third-party report
4. Context for Assessment	4.1. Competency may be assessed individually in the actual workplace or through accredited institution

UNIT OF COMPETENCY: WORK IN TEAM ENVIRONMENT

UNIT CODE : 400311211

UNIT DESCRIPTOR : This unit covers the skills, knowledge and attitudes to identify one's roles and responsibilities as a member of a team.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Describe team role and scope	1.1. The ***role and objective of the team*** is identified from available ***sources of information*** 1.2. Team parameters, reporting relationships and responsibilities are identified from team discussions and appropriate external sources	1.1 Group structure 1.2 Group development 1.3 Sources of information	1.1 Communicating with others, appropriately consistent with the culture of the workplace 1.2 Developing ways in improving work structure and performing respective roles in the group or organization
2. Identify one's role and responsibility within team	1.1. Individual role and responsibilities within the team environment are identified 1.2. Roles and objectives of the team is identified from available ***source of information*** 1.3. Team parameters, reporting relationships and responsibilities are identified based on team discussions and appropriate external sources	2.1. Team roles and objectives 2.2. Team structure and parameters 2.3. Team development 2.4. Sources of information	2.1. Communicating with others, appropriately consistent with the culture of the workplace 2.2. Developing ways in improving work structure and performing respective roles in the group or organization
3. Work as a team member	2.5. Effective and appropriate forms of communications are used, and interactions undertaken with team members based on company practices 2.6. Effective and appropriate contributions is made to complement team activities and objectives based on ***workplace context*** 2.7. Protocols in reporting are observed based on standard company practices 2.8. Contribute to the development of team work plans based on an understanding of team's role and objectives	3.1. Communication process 3.2. Workplace communication protocol 3.3. Team planning and decision making 3.4. Team thinking 3.5. Team roles 3.6. Process of team development 3.7. Workplace context	3.1. Communicating with others, appropriately consistent with the culture of the workplace 3.2. Interacting effectively with others 3.3. Deciding as an individual and as a group using group think strategies and techniques 3.4. Contributing to Resolution of issues and concerns

RANGE OF VARIABLES

VARIABLE	RANGE
1. Role and objective of team	May include but not limited to: 1.1. Work activities in a team environment with enterprise or specific sector 1.2. Limited discretion, initiative and judgement maybe demonstrated on the job, either individually or in a team environment
2. Sources of information	May include but not limited to: 2.1. Standard operating and/or other workplace procedures 2.2. Job procedures 2.3. Machine/equipment manufacturer's specifications and instructions 2.4. Organizational or external personnel 2.5. Client/supplier instructions 2.6. Quality standards 2.7. OHS and environmental standards
3. Workplace context	May include but not limited to: 3.1. Work procedures and practices 3.2. Conditions of work environments 3.3. Legislation and industrial agreements 3.4. Standard work practice including the storage, safe handling, and disposal of chemicals 3.5. Safety, environmental, housekeeping and quality guidelines

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1. Worked in a team to complete workplace activity 1.2. Worked effectively with others 1.3. Conveyed information in written or oral form 1.4. Selected and used appropriate workplace language 1.5. Followed designated work plan for the job
2. Resource Implications	The following resources should 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 tasks
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1. Role play involving the participation of individual member to the attainment of organizational goal 3.3. Case studies and scenarios as a basis for discussion of issues and strategies in teamwork 3.4 Socio-drama and socio-metric methods 3.5 Sensitivity techniques 3.6 Written Test
4. Context for Assessment	4.1. Competency may be assessed in workplace or in a simulated workplace setting 4.2. Assessment shall be observed while task is being undertaken whether individually or in group

UNIT OF COMPETENCY: SOLVE/ADDRESS GENERAL WORKPLACE PROBLEMS

UNIT CODE : 400311212

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to apply problem-solving techniques to determine the origin of problems and plan for their resolution. It also includes addressing procedural problems through documentation, and referral.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify routine problems	1.1 Routine ***problems or procedural problem*** areas are identified 1.2 Problems to be investigated are defined and determined 1.3 Current conditions of the problem are identified and documented	1.1 Current industry hardware and software products and services 1.2 Industry maintenance, service and helpdesk practices, processes, and procedures 1.3 Industry standard diagnostic tools 1.4 Malfunctions and resolutions	1.1 Identifying current industry hardware and software products and services 1.2 Identifying current industry maintenance, services and helpdesk practices, processes, and procedures. 1.3 Identifying current industry standard diagnostic tools 1.4 Describing common malfunctions and resolutions. 1.5 Determining the root cause of a routine malfunction
2. Look for solutions to routine problems	2.1 Potential solutions to problem are identified 2.2 Recommendations about possible solutions are developed, ***documented***, ranked, and presented to ***appropriate person*** for decision	2.1 Current industry hardware and software products and services 2.2 Industry service and helpdesk practices, processes, and procedures 2.3 Operating systems 2.4 Industry standard diagnostic tools 2.5 Malfunctions and resolutions. 2.6 Root cause analysis	2.1 Identifying current industry hardware and software products and services 2.2 Identifying services and helpdesk practices, processes, and procedures. 2.3 Identifying operating system 2.4 Identifying current industry standard diagnostic tools 2.5 Describing common malfunctions and resolutions. 2.6 Determining the root cause of a routine malfunction

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Recommend solutions to problems	3.1 Implementation of solutions are ***planned*** 3.2 Evaluation of implemented solutions are planned 3.3 Recommended solutions are documented and submit to appropriate person for confirmation	3.1 Standard procedures 3.2 Documentation produce	3.1 Producing documentation that recommends solutions to problems 3.2 Following established procedures

RANGE OF VARIABLES

VARIABLE	RANGE
1. Problems/Procedural Problem	May include but not limited to: 1.1 Routine/non – routine processes and quality problems 1.2 Equipment selection, availability, and failure 1.3 Teamwork and work allocation problem 1.4 Safety and emergency situations and incidents 1.5 Work-related problems outside of own work area
2. Appropriate person	May include but not limited to: 2.1 Supervisor or manager 2.2 Peers/work colleagues 2.3 Other members of the organization
3. Document	May include but not limited to: 3.1 Electronic mail 3.2 Briefing notes 3.3 Written report 3.4 Evaluation report
4. Plan	May include but not limited to: 4.1 Priority requirements 4.2 Co-ordination and feedback requirements 4.3 Safety requirements 4.4 Risk assessment 4.5 Environmental requirements

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 Determined the root cause of a routine problem 1.2 Identified solutions to procedural problems. 1.3 Produced documentation that recommends solutions to problems. 1.4 Followed established procedures. 1.5 Referred unresolved problems to support persons.
2. Resource Implications	1.1. Assessment will require access to a workplace over an extended period, or a suitable method of gathering evidence of operating ability over a range of situations.
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1 Case Formulation 3.2 Life Narrative Inquiry 3.3 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.
4. Context for Assessment	4.1 Competency may be assessed individually in the actual workplace or simulation environment in TESDA accredited institutions.

UNIT OF COMPETENCY : DEVELOP CAREER AND LIFE DECISIONS

UNIT CODE : 400311213

UNIT DESCRIPTOR : This unit covers the knowledge, skills, and attitudes in managing one's emotions, developing reflective practice, and boosting self-confidence and developing self-regulation.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Manage one's emotion	1.1 **Self-management strategies** are identified 1.2 Skills to work independently and to show initiative, to be conscientious, and persevering in the face of setbacks and frustrations are developed 1.3 Techniques for effectively handling negative emotions and **unpleasant situation i**n the workplace are examined	1.1 Self-management strategies that assist in regulating behavior and achieving personal and learning goals (e.g. Nine self-management strategies according to Robert Kelley) 1.2 Enablers and barriers in achieving personal and career goals 1.3 Techniques in handling negative emotions and unpleasant situation in the workplace such as frustration, anger, worry, anxiety, etc.	1.1 Managing properly one's emotions and recognizing situations that cannot be changed and accept them and remain professional 1.2 Developing self-discipline, working independently and showing initiative to achieve personal and career goals 1.3 Showing confidence, and resilience in the face of setbacks and frustrations and other negative emotions and unpleasant situations in the workplace
2. Develop reflective practice	2.1 Personal strengths and achievements, based on self-assessment strategies and teacher feedback are contemplated 2.2 Progress when seeking and responding to feedback from teachers to assist them in consolidating strengths, addressing weaknesses and fulfilling their potential are monitored 2.3 Outcomes of personal and academic challenges by reflecting on previous problem solving and decision-making strategies and feedback from peers and teachers are predicted	2.1 Basic SWOT analysis 2.2 Strategies to improve one's attitude in the workplace 2.3 Gibbs' Reflective Cycle/Model (Description, Feelings, Evaluation, Analysis, Conclusion, and Action plan)	2.1 Using the basic SWOT analysis as self-assessment strategy 2.2 Developing reflective practice through realization of limitations, likes/ dislikes; through showing of self-confidence 2.3 Demonstrating self-acceptance and being able to accept challenges

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Boost self-confidence and develop self-regulation	3.1 Efforts for continuous self-improvement are demonstrated 3.2 Counter-productive tendencies at work are eliminated 3.3 Positive outlook in life is maintained.	3.1 Four components of self-regulation based on Self-Regulation Theory (SRT) 3.2 Personality development concepts 3.3 Self-help concepts (e. g., 7 Habits by Stephen Covey, transactional analysis, psycho-spiritual concepts)	3.1 Performing effective communication skills – reading, writing, conversing skills 3.2 Showing affective skills – flexibility, adaptability, etc. 3.3 Self-assessment for determining one's strengths and weaknesses

RANGE OF VARIABLES

VARIABLE	RANGE
1. Self-management strategies	May include but not limited to: 1.1 Seeking assistance in the form of job coaching or mentoring 1.2 Continuing dialogue to tackle workplace grievances 1.3 Collective negotiation/bargaining for better working conditions 1.4 Share your goals to improve with a trusted co-worker or supervisor 1.5 Make a negativity log of every instance when you catch yourself complaining to others 1.6 Make lists and schedules for necessary activities
2. Unpleasant situation	May include but not limited to: 2.1 Job burn-out 2.2 Drug dependence 2.3 Sulking

EVIDENCE GUIDE

1 Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 Express emotions appropriately 1.2 Work independently and show initiative 1.3 Consistently demonstrate self-confidence and self-discipline
2 Resource Implications	The following resources should be provided: 2.1 Access to workplace and resource s 2.2 Case studies
3 Methods of Assessment	Competency in this unit may be assessed through: 3.1 Demonstration or simulation with oral questioning 3.2 Case problems involving work improvement and sustainability issues 3.3 Third-party report
4 Context for Assessment	4.1 Competency assessment may occur in workplace or any appropriately simulated environment

UNIT OF COMPETENCY : **CONTRIBUTE TO WORKPLACE INNOVATION**

UNIT CODE : **400311214**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to make a pro-active and positive contribution to workplace innovation.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify opportunities to do things better.	1.1 ***Opportunities for improvement*** are identified proactively in own area of work. 1.2 ***Information*** are gathered and reviewed which may be relevant to ideas and which might assist in gaining support for idea.	1.1 Roles of individuals in suggesting and making improvements. 1.2 Positive impacts and challenges in innovation. 1.3 Types of changes and responsibility. 1.4 Seven habits of highly effective people.	1.1 Identifying opportunities to improve and to do things better. Involvement. 1.2 Identifying the positive impacts and the challenges of change and innovation. 1.3 Identifying examples of the types of changes that are within and outside own scope of responsibility
2. Discuss and develop ideas with others	2.1 ***People who could provide input*** to ideas for improvements are identified. 2.2 Ways of approaching people to begin sharing ideas are selected. 2.3 Meeting is set with relevant people. 2.4 Ideas for follow up are review and selected based on feedback. 2.5 ***Critical inquiry method*** is used to discuss and develop ideas with others.	2.1 Roles of individuals in suggesting and making improvements. 2.2 Positive impacts and challenges in innovation. 2.3 Types of changes and responsibility. 2.4 Seven habits of highly effective people.	2.1 Identifying opportunities to improve and to do things better. Involvement. 2.2 Identifying the positive impacts and the challenges of change and innovation. 2.3 Providing examples of the types of changes that are within and outside own scope of responsibility 2.4 Communicating ideas for change through small group discussions and meetings.
3. Integrate ideas for change in the workplace.	3.1 Critical inquiry method is used to integrate different ideas for change of key people. 3.2 Summarizing, analyzing, and generalizing skills are used to extract salient points in the pool of ideas. 3.3 ***Reporting skills*** are likewise used to communicate results.	3.1 Roles of individuals in suggesting and making improvements. 3.2 Positive impacts and challenges in innovation. 3.3 Types of changes and responsibility. 3.4 Seven habits of highly effective people.	3.1 Identifying opportunities to improve and to do things better. Involvement. 3.2 Identifying the positive impacts and the challenges of change and innovation. 3.3 Providing examples of the types of changes that are within and

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	3.4 ***Current Issues and concerns*** on the systems, processes and procedures, as well as the need for simple innovative practices are identified.	3.5 Basic research skills.	outside own scope of responsibility. 3.4 Communicating ideas for change through small group discussions and meetings. 3.5 Demonstrating skills in analysis and interpretation of data.

RANGE OF VARIABLES

VARIABLE	RANGE	
1. Opportunities for improvement	May include: 1.1 Systems. 1.2 Processes. 1.3 Procedures. 1.4 Protocols. 1.5 Codes. 1.6 Practices.	
2. Information	May include: 2.1 Workplace communication problems. 2.2 Performance evaluation results. 2.3 Team dynamics issues and concerns. 2.4 Challenges on return of investment 2.5 New tools, processes, and procedures. 2.6 New people in the organization.	
3. People who could provide input	May include: 3.1 Leaders 3.2 Managers 3.3 Specialists 3.4 Associates 3.5 Researchers 3.6 Supervisors	3.7 Staff 3.8 Consultants (external) 3.9 People outside the organization in the same field or similar expertise/industry. 3.10 Clients
4. Critical inquiry method	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 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.	
5. Reporting skills	May include: 5.1 Data management. 5.2 Coding. 5.3 Data analysis and interpretation. 5.4 Coherent writing. 5.5 Speaking.	

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 Identified opportunities to do things better. 1.2 Discussed and developed ideas with others on how to contribute to workplace innovation. 1.3 Integrated ideas for change in the workplace. 1.4 Analyzed and reported rooms for innovation and learning in the workplace.
2. Resource Implications	The following resources should be provided: 2.1 Pens, papers and writing implements. 2.2 Cartolina. 2.3 Manila papers.
3. Methods 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 for Assessment	4.1 Competency may be assessed individually in the actual workplace or simulation environment in TESDA accredited institutions.

UNIT OF COMPETENCY : PRESENT RELEVANT INFORMATION

UNIT CODE : 400311215

UNIT DESCRIPTOR : This unit of covers the knowledge, skills and attitudes required to present data/information appropriately.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Gather data/ information	1.1 Evidence, facts, and information are collected 1.2 Evaluation, terms of reference and conditions are reviewed to determine whether data/information falls within project scope	1.1 Organizational protocols 1.2 Confidentiality 1.3 Accuracy 1.4 Business mathematics and statistics 1.5 Data analysis techniques/procedures 1.6 Reporting requirements to a range of audiences 1.7 Legislation, policy and procedures relating to the conduct of evaluations 1.8 Organizational values, ethics and codes of conduct	1.1 Describing organizational protocols relating to client liaison 1.2 Protecting confidentiality 1.3 Describing accuracy 1.4 Computing business mathematics and statistics 1.5 Describing data analysis techniques/ procedures 1.6 Reporting requirements to a range of audiences 1.7 Stating legislation, policy and procedures relating to the conduct of evaluations 1.8 Stating organizational values, ethics and codes of conduct
2. Assess gathered data/ information	2.1 Validity of data/ information is assessed 2.2 Analysis techniques are applied to assess data/ information. 2.3 Trends and anomalies are identified 2.4 ***Data analysis techniques*** and procedures are documented 2.5 Recommendations are made on areas of possible improvement.	2.1 Business mathematics and statistics 2.2 Data analysis techniques/ procedures 2.3 Reporting requirements to a range of audiences 2.4 Legislation, policy, and procedures relating to the conduct of evaluations 2.5 Organizational values, ethics, and codes of conduct	2.1 Computing business mathematics and statistics 2.2 Describing data analysis techniques/ procedures 2.3 Reporting requirements to a range of audiences 2.4 Stating legislation, policy and procedures relating to the conduct of evaluations 2.5 Stating organizational values, ethics, and codes of conduct

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Record and present information	3.1 Studied data/information are recorded. 3.2 Recommendations are analyzed for action to ensure they are compatible with the project's scope and terms of reference. 3.3 Interim and final reports are analyzed, and outcomes are compared to the criteria established at the outset. 3.4 Findings are presented to stakeholders.	3.1 Data analysis techniques/ procedures 3.2 Reporting requirements to a range of audiences 3.3 Legislation, policy, and procedures relating to the conduct of evaluations 3.4 Organizational values, ethics, and codes of conduct	3.1 Describing data analysis techniques/ procedures 3.2 Reporting requirements to a range of audiences 3.3 Stating legislation, policy and procedures relating to the conduct of evaluations 3.4 Stating organizational values, ethics, and codes of conduct practices

RANGE OF VARIABLES

VARIABLE	RANGE
1. Data analysis techniques	May include but not limited to: 1.1. Domain analysis 1.2. Content analysis 1.3. Comparison technique

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Determine data / information 1.2 Studied and applied gathered data/information 1.3 Recorded and studied data/information These aspects may be best assessed using a range of scenarios what ifs as a stimulus with a walk-through forming part of the response. These assessment activities should include a range of problems, including new, unusual, and improbable situations that may have happened.
2. Resource Implications	**Specific resources for assessment** 2.1. Evidence of competent performance should be obtained by observing an individual in an information management role within the workplace or operational or simulated environment.
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1. Written Test 3.2. Interview 3.3. Portfolio 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.
4. Context for Assessment	4.1. In all workplace, it may be appropriate to assess this unit concurrently with relevant teamwork or operation units.

UNIT OF COMPETENCY : PRACTICE OCCUPATIONAL SAFETY AND HEALTH POLICIES AND PROCEDURES

UNIT CODE : 400311216

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to identify OSH compliance requirements, prepare OSH requirements for compliance, and perform tasks in accordance with relevant OSH policies and procedures

ELEMENTS	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify OSH compliance requirements	1.1. Relevant ***OSH requirements, regulations, policies, and procedures*** are identified in accordance with workplace policies and procedures 1.2. OSH activity non-conformities are conveyed to ***appropriate personnel*** 1.3. ***OSH preventive and control requirements*** are identified in accordance with OSH work policies and procedures	1.1. OSH preventive and control requirements 1.2. Hierarchy of Controls 1.3. Hazard Prevention and Control 1.4. General OSH principles 1.5. Work standards and procedures 1.6. Safe handling procedures of tools, equipment, and materials 1.7. Standard emergency plan and procedures in the workplace	1.1. Communication skills 1.2. Interpersonal skills 1.3. Critical thinking skills 1.4. Observation skills
2. Prepare OSH requirements for compliance	2.1. OSH work activity material, tools and equipment requirements are identified in accordance with workplace policies and procedures 2.2. Required OSH materials, tools and equipment are acquired in accordance with workplace policies and procedures 2.3. Required OSH materials, tools and equipment are arranged/ placed in accordance with OSH work standards	2.1. Resources necessary to execute hierarchy of controls 2.2. General OSH principles 2.3. Work standards and procedures 2.4. Safe handling procedures of tools, equipment and materials 2.5. Different OSH control measures	2.1. Communication skills 2.2. Estimation skills 2.3. Interpersonal skills 2.4. Critical thinking skills 2.5. Observation skills 2.6. Material, tool and equipment identification skills
3. Perform tasks in accordance with relevant OSH policies and procedures	3.1. Relevant OSH work procedures are identified in accordance with workplace policies and procedures 3.2. Work Activities are executed in accordance with OSH work standards 3.3. ***Non-compliance work activities*** are reported to *appropriate personnel*	3.1. OSH work standards 3.2. Industry related work activities 3.3. General OSH principles 3.4. OSH Violations 3.5. Non-compliance work activities	3.1. Communication skills 3.2. Interpersonal skills 3.3. Troubleshooting skills 3.4. Critical thinking skills 3.5. Observation skills

RANGE OF VARIABLES

VARIABLE	RANGE
1. OSH Requirements, Regulations, Policies and Procedures	May include: 1.1 Clean Air Act 1.2 Building code 1.3 National Electrical and Fire Safety Codes 1.4 Waste management statutes and rules 1.5 Permit to Operate 1.6 Philippine Occupational Safety and Health Standards 1.7 Department Order No. 13 (Construction Safety and Health) 1.8 ECC regulations
2. Appropriate Personnel	May include: 2.1 Manager 2.2 Safety Officer 2.3 EHS Offices 2.4 Supervisors 2.5 Team Leaders 2.6 Administrators 2.7 Stakeholders 2.8 Government Official 2.9 Key Personnel 2.10 Specialists 2.11 Himself
3. OSH Preventive and Control Requirements	May include: 3.1 Resources needed for removing hazard effectively 3.2 Resources needed for substitution or replacement 3.3 Resources needed to establishing engineering controls 3.4 Resources needed for enforcing administrative controls 3.5 Personal Protective equipment
4. Non-OSH-Compliance Work Activities	May include non-compliance or observance of the following safety measures: 4.1 Violations that may lead to serious physical harm or death 4.2 Fall Protection 4.3 Hazard Communication 4.4 Respiratory Protection 4.5 Power Industrial Trucks 4.6 Lockout/Tag-out 4.7 Working at heights (use of ladder, scaffolding) 4.8 Electrical Wiring Methods 4.9 Machine Guarding 4.10 Electrical General Requirements 4.11 Asbestos work requirements 4.12 Excavations work requirements

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1. Convey OSH work non-conformities to appropriate personnel 1.2. Identify OSH preventive and control requirements in accordance with OSH work policies and procedures 1.3. Identify OSH work activity material, tools and equipment requirements in accordance with workplace policies and procedures 1.4. Arrange/Place required OSH materials, tools and equipment in accordance with OSH work standards 1.5. Execute work activities in accordance with OSH work standards 1.6. Report OSH activity non-compliance work activities to appropriate personnel
2. Resource Implications	The following resources should be provided: 2.1 Facilities, materials tools, and equipment necessary for the activity
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1 Observation/Demonstration with oral questioning 3.2 Third party report
4. Context for Assessment	4.1 Competency may be assessed in the workplace or in a simulated work place setting

UNIT OF COMPETENCY	**:**	**EXERCISE EFFICIENT AND EFFECTIVE SUSTAINABLE PRACTICES IN THE WORKPLACE**
UNIT CODE	**:**	**400311217**
UNIT DESCRIPTOR	**:**	This unit covers knowledge, skills and attitude to identify the efficiency and effectiveness of resource utilization, determine causes of inefficiency and/or ineffectiveness of resource utilization and Convey inefficient and ineffective environmental practices

ELEMENTS	**PERFORMANCE CRITERIA** ***Italicized terms*** are elaborated in the Range of Variables	**REQUIRED KNOWLEDGE**	**REQUIRED SKILLS**
1. Identify the efficiency and effectiveness of resource utilization	1.1. Required resource utilization in the workplace is measured using appropriate techniques 1.2. Data are recorded in accordance with workplace protocol 1.3. Recorded data are compared to determine the efficiency and effectiveness of resource utilization according to established ***environmental work procedures***	1.1. Importance of Environmental Literacy 1.2. Environmental Work Procedures 1.3. Waste Minimization 1.4. Efficient Energy Consumptions	1.1 Recording Skills 1.2 Writing Skills 1.3 Innovation Skills
2. Determine causes of inefficiency and/or ineffectiveness of resource utilization	2.1. Potential causes of inefficiency and/or ineffectiveness are listed 2.2. Causes of inefficiency and/or ineffectiveness are identified through deductive reasoning 2.3. Identified causes of inefficiency and/or ineffectiveness are validated thru established environmental procedures	2.1. Causes of environmental inefficiencies and ineffectiveness	2.1. Deductive Reasoning Skills 2.2. Critical thinking 2.3. Problem Solving 2.4. Observation Skills
3. Convey inefficient and ineffective environmental practices	3.1. Efficiency and effectiveness of resource utilization are reported to ***appropriate personnel*** 3.2. Concerns related resource utilization are discussed with appropriate personnel 3.3. Feedback on information/ concerns raised are clarified with appropriate personnel	3.1. Appropriate Personnel to address the environmental hazards 3.2. Environmental corrective actions	3.1. Written and Oral Communication Skills 3.2. Critical thinking 3.3. Problem Solving 3.4. Observation Skills 3.5. Practice Environmental Awareness

RANGE OF VARIABLES

VARIABLE	RANGE	
1. Environmental Work Procedures	May include: 1.1. Utilization of Energy, Water, Fuel Procedures 1.2. Waster Segregation Procedures 1.3. Waste Disposal and Reuse Procedures 1.4. Waste Collection Procedures 1.5. Usage of Hazardous Materials Procedures 1.6. Chemical Application Procedures 1.7. Labeling Procedures	
2. Appropriate Personnel	May include: 2.1. Manager 2.2. Safety Officer 2.3. EHS Offices 2.4. Supervisors 2.5. Team Leaders	2.6. Administrators 2.7. Stakeholders 2.8. Government Official 2.9. Key Personnel 2.10. Specialists 2.11. Himself

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1. Measured required resource utilization in the workplace using appropriate techniques 1.2. Recorded data in accordance with workplace protocol 1.3. Identified causes of inefficiency and/or ineffectiveness through deductive reasoning 1.4. Validate the identified causes of inefficiency and/or ineffectiveness thru established environmental procedures 1.5. Report efficiency and effectives of resource utilization to appropriate personnel 1.6. Clarify feedback on information/concerns raised with appropriate personnel
2. Resource Implications	The following resources should be provided: 2.1 Workplace 2.2 Tools, materials, and equipment relevant to the tasks 2.3 PPE 2.4 Manuals and references
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1 Demonstration 3.2 Oral questioning 3.3 Written examination
4. Context for Assessment	4.1 Competency assessment may occur in workplace or any appropriately simulated environment 4.2 Assessment shall be observed while task are being undertaken whether individually or in-group

UNIT OF COMPETENCY : PRACTICE ENTREPRENEURIAL SKILLS IN THE WORKPLACE

UNIT CODE : 400311218

UNIT DESCRIPTOR : This unit covers the outcomes required to apply entrepreneurial workplace best practices and implement cost-effective operations.

ELEMENTS	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Apply entrepreneurial workplace best practices	1.1. ***Good practices*** relating to workplace operations are observed and selected following workplace policy. 1.2. Quality procedures and practices are complied with according to workplace requirements. 1.3. Cost-conscious habits in ***resource utilization*** are applied based on industry standards.	1.1. Workplace best practices, policies, and criteria 1.2. Resource utilization 1.3. Ways in fostering entrepreneurial attitudes: 1.3.1. Patience 1.3.2. Honesty 1.3.3. Quality-consciousness 1.3.4. Safety-consciousness 1.3.5. Resourcefulness	1.1. Communication skills 1.2. Complying with quality procedures
2. Communicate entrepreneurial workplace best practices	1.3. Observed good practices relating to workplace operations are communicated to **appropriate person**. 1.4. Observed quality procedures and practices are communicated to appropriate person 1.5. Cost-conscious habits in resource utilization are communicated based on industry standards.	2.1. Workplace best practices, policies, and criteria 2.2. Resource utilization 2.3. Ways in fostering entrepreneurial attitudes: 2.3.1. Patience 2.3.2. Honesty 2.3.3. Quality-consciousness 2.3.4. Safety-consciousness 2.3.5. Resourcefulness	2.1. Communication skills 2.2. Complying with quality procedures 2.3. Following workplace communication protocol
3. Implement cost-effective operations	2.4. Preservation and optimization of workplace resources is implemented in accordance with enterprise policy 2.5. Judicious use of workplace tools, equipment and materials are observed according to manual and work requirements. 2.6. Constructive contributions to office operations are made according to enterprise requirements.	3.1. Optimization of workplace resources 3.2. 5S procedures and concepts 3.3. Criteria for cost-effectiveness 3.4. Workplace productivity 3.5. Impact of entrepreneurial mindset to workplace productivity	3.1. Implementing preservation and optimizing workplace resources 3.2. Observing judicious use of workplace tools, equipment, and materials 3.3. Making constructive contributions to office operations

	2.7. Ability to work within one's allotted time and finances is sustained.	3.6. Ways in fostering entrepreneurial attitudes: 3.6.1. Quality-consciousness 3.6.2. Safety-consciousness	3.4. Sustaining ability to work within allotted time and finances

RANGE OF VARIABLES

VARIABLE	RANGE
1.Good practices	May include: 1.1 Economy in use of resources 1.2 Documentation of quality practices
2.Resources utilization	May include: 2.1 Consumption/ use of consumables 2.2 Use/Maintenance of assigned equipment and furniture 2.3 Optimum use of allotted /available time

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1. Demonstrated ability to identify and sustain cost-effective activities in the workplace 1.2. Demonstrated ability to practice entrepreneurial knowledge, skills, and attitudes in the workplace.
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 2.3.1 Enterprise procedures manuals 2.3.2 Company quality policy
3. Methods of Assessment	Competency in this unit should be assessed through: 3.1. Interview 3.2. Third-party report
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 : CS-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 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 or 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 protective equipment*** (PPE) are used 3.3. Malfunctions, unplanned or unusual events are reported to the supervisor	3.1. Safety requirements in using electronics hand tools and test equipment 3.2. Electronics hand tools for adjusting, dismantling, assembling, finishing, and cutting. 3.3. Processes, Operations, Systems o Proper usage and care of hand tools o Types and uses of test equipment 3.4. Common faults in the use of hand tool	3.1. Reading skills required to interpret work instruction and numerical skills 3.2. Using PPE properly 3.3. Problem solving in emergency situation
4. Maintain hand tools	4.1. Tools are handled without damage according to procedures. 4.2. Routine ***maintenance*** of tools is 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, Systems o Maintenance of tools o 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	1.1. Hand tools for adjusting, dismantling, assembling, finishing, cutting. Tool set includes the following but not limited to: screw drivers, pliers, punches, wrenches, files
2. Personal Protective Equipment (PPE)	2.1. Gloves 2.2. Protective eyewear 2.3. Apron/overall
3. Maintenance	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	3.1. Tools may include the following but not limited to: 3.1.1. screw drivers 3.1.2. pliers 3.1.3. punches 3.1.4. wrenches, files
4. Context of Assessment	4.1. Assessment may be conducted in the workplace or in a simulated environment

UNIT TITLE : PERFORM MENSURATION AND CALCULATION
UNIT CODE : CS-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, classified and interpreted to the appropriate regular ***geometric shape*** 1.2. Measuring tools are selected in line with job requirements 1.3. Correct specifications are obtained from relevant source 1.4. Appropriate ***measuring instrument*** is selected to achieve required outcome 1.5. Alternative measuring tools are used without sacrificing cost and quality of work	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. Accurate ***measurements and calculations*** are obtained for job 2.2. Calculation needed to complete work tasks are performed using the four basic process of addition (+), subtraction (-), multiplication (x), and division (/) 2.3. Calculation involving fractions, percentages and mixed numbers are used to complete workplace tasks. 2.4. Numerical computation is self-checked and corrected for accuracy 2.5. Instruments are read to the limit of accuracy of the tool. 2.6. Systems of measurement identified and converted according to job requirements/ISO 2.7. Work pieces are measured according to job requirements	2.1. Calculation & measurement 2.2. Four fundamental operation 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
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 operation of mathematics 3.4. Formula for volume, area, perimeter and other geometric figures	3.1. Handling and maintaining measuring instruments

RANGE OF VARIABLES

VARIABLE	RANGE	
1. Geometric Shape	Including but I not limited to: 1.1 Round 1.2 Square 1.3 Rectangular 1.4 Triangle 1.5 Sphere 1.6 Conical	
2. Measuring instruments	Including but not limited to: 2.1 Micrometer (In-out, depth) 2.2 Vernier caliper (out, inside) 2.3 Dial gauge with mag, std. 2.4 Straight edge 2.5 Thickness gauge 2.6 Torque gauge 2.7 Small hole gauge 2.8 Telescopic gauge	2.9 Try-square 2.10 Protractor 2.11 Combination gauge 2.12 Steel rule 2.13 Voltmeter 2.14 Ammeter 2.15 Mega-ohmmeter 2.16 KWH meter 2.17 Gauges 2.18 Thermometers
3. Measurements and calculations	3.1 Linear 3.2 Volume 3.3 Area 3.4 Wattage 3.5 Voltage 3.6 Resistance 3.7 Amperage 3.8 Frequency 3.9 Impedance 3.10 Conductance 3.11 Capacitance	3.12 Displacement 3.13 Inside diameter 3.14 Circumference 3.15 Length 3.16 Thickness 3.17 Outside diameter 3.18 Taper 3.19 Out of roundness 3.20 Oil clearance 3.21 End play/thrust clearance

EVIDENCE GUIDE

1. Critical aspect of competency	Assessment must show 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. Resource implication	2.1. Place of assessment 2.2. Measuring instruments 2.3. Straight edge 2.4. Torque gauge 2.5. Try square 2.6. Protractor 2.7. Combination gauge 2.8. Steel rule
3. Method of assessment	Competency should be assessed through: 3.1 Actual demonstration 3.2 Direct observation 3.3 Written test/questioning related to required knowledge
4. Context of Assessment	Assessment may be conducted in the workplace or in a simulated environment

UNIT TITLE : PREPARE AND INTERPRET TECHNICAL DRAWING
UNIT CODE : CS-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*** 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 o Linear measurement o Dimension o Unit conversion 2.2. Blueprint Reading and Plan Specification o Architectural, electrical, electronics, mechanical plan, symbols and abbreviations o Drawing standard symbols 2.3. Trade Theory o Basic technical drawing o Types technical plans o Various types of drawings o Notes and specifications	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
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 are selected and used in accordance with job requirements.	3.1. Drawing conventions 3.2. Dimensioning Conventions 3.3. Mathematics o Four fundamental operations o Percentage o Fraction o Algebra o 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

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
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 a nd maintaining paper drawings 4.3. Storing drawing in digital forms o Scanner o 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	Technical drawings include the following but not limited to: 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	Dimensions may include but not limited to: 2.1. Length 2.2. Width 2.3. Height 2.4. Diameter 2.5. Angles
3. Symbols	May include but not limited to: 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/Equipment	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 work environment

UNIT TITLE : APPLY QUALITY STANDARDS
UNIT CODE : CS-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
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. 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/components	1.1. Materials may include but not limited to: 1.1.1. wires 1.1.2. cables, soldering lead 1.1.3. electrical tape 1.2. Components may include but not limited to: 1.2.1. ICs 1.2.2. Diodes
2. Faults	Faults may include but not limited to: 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	3.1. Organization work procedures 3.2. Manufacturer's instruction manual 3.3. Customer requirements 3.4. Forms
4. Quality standards	4.1. Quality standards may relate but not limited to the following: 4.1.1. materials 4.1.2. component parts 4.1.3. final product 4.1.4. production processes
5. Customer	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 requires evidence 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	Competency in this unit must be assessed through: 3.1 Observation 3.2 Oral Questioning 3.3 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 work environment.

UNIT TITLE : PERFORM COMPUTER OPERATIONS
UNIT CODE : CS-ELC311203

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 Bold*** 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 according to job specifications 1.2. Appropriate ***hardware*** 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 1.4. Client -specific guidelines and procedures are followed. 1.5. Required data security guidelines are applied in accordance with existing procedures.	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 standard operating procedures 2.3. Inputted data are stored in ***storage media*** according to requirements 2.4. Work is performed within ***ergonomic guidelines***	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
3. Access information using computer	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	3.1. 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

ELEMENT	PERFORMANCE CRITERIA ***Italicized Bold*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	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		
4. 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 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	4.1. Computer application in printing, scanning and sending facsimile 4.2. Types and function of computer peripheral devices	4.1. Computer data processing 4.2. Printing of data 4.3. Transferring files and data
5. Maintain computer equipment and systems	5.1. Systems for cleaning, minor ***maintenance*** and replacement of consumables are implemented 5.2. Procedures for ensuring security of data, including regular back-ups and virus checks are implemented in accordance with standard operating procedures 5.3. Basic file maintenance procedures are implemented in line with the standard operating procedures	5.1. Computer equipment/ system basic maintenance procedures 5.2. Viruses 5.3. OH & S principles and responsibilities 5.4. Calculating computer capacity 5.5. System Software 5.6. Basic file maintenance procedures	5.1. Removing computer viruses from infected machines 5.2. Making backup files

RANGE OF VARIABLES

VARIABLE	RANGE
1. Hardware and peripheral devices	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	Software includes the following but not limited to: 2.1. Word processing packages 2.2. Data base packages 2.3. Internet 2.4. Spreadsheets
3. OH & S guidelines	3.1. OHS guidelines 3.2. Enterprise procedures
4. Storage media	Storage media include the following but not limited to: 4.1. diskettes 4.2. CDs 4.3. zip disks 4.4. hard disk drives, local and remote
5. Ergonomic guidelines	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	Icons include the following but not limited to: 6.1. directories/folders 6.2. files 6.3. network devices 6.4. recycle bin
7. Maintenance	7.1. Creating more space in the hard disk 7.2. Reviewing programs 7.3. Deleting unwanted files 7.4. Backing up files 7.5. Checking hard drive for errors 7.6. Using up to date anti-virus programs 7.7. Cleaning dust from internal and external surfaces

EVIDENCE GUIDE

1. Critical aspect of competency	Assessment requires evidence that the candidate: 1.1. Planned and prepared for task to be undertaken 1.2. Inputted data into computer 1.3. Accessed information using computer 1.4. Produced/outputted data using computer system 1.5. Maintained computer equipment and systems
2. Method of assessment	Competency in this unit must be assessed through: 2.1. Observation 2.2. Questioning 2.3. Practical demonstration
3. Resource implication	3.1. Computer hardware with peripherals 3.2. Appropriate software
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 : **CS-ELC311206**

UNIT DESCRIPTOR : This unit covers the knowledge, skills, 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
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 according to job specifications 2.5. ***Accessories*** used are adjusted, if necessary 2.6. Confirm termination/ connection 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. Use of diagnostic equipment 3.3. Surface mount soldering techniques 3.4. Tests for wiring and connections 3.5. Wiring support techniques and alternatives	3.1. Soldering techniques 3.2. Printed circuit board repair and techniques 3.3. Electronic assembly functional and quality testing 3.4. Undertaking testing of wiring and connections for conformance to specification 3.5. Using language and literacy skills to complete short reports and required 3.6. Adjusting and fixing wiring supports

RANGE OF VARIABLES

VARIABLE	RANGE
1. Materials	1.1 Materials included the following but not limited to: 1.1.1 Soldering lead 1.1.2 Cables 1.1.3 Wires
2. Tools and equipment	2.1 Tools for measuring, cutting, drilling, assembling/disassembling. Tool set includes the following but not limited to: 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	3.1 goggles 3.2 gloves 3.3 apron/overall
4. Methods	4.1 Clamping 4.2 Pin connection 4.3 Soldered joints 4.4 Plugs
5. Accessories	5.1 Accessories may include the following but not limited to: 5.1.1 brackets 5.1.2 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	Competency in this unit must be assessed through: 2.1. Observation 2.2. Oral Questioning 2.3. Practical demonstration
3. Resource implication	Tools for measuring, cutting, drilling, assembling/ disassembling, connection. Tool set includes the following but not limited to: 3.1 screw drivers 3.2 pliers 3.3 cutters
4. Context of Assessment	4.1. Assessment may be conducted in the workplace or in a simulated environment

UNIT OF COMPETENCY: **TEST ELECTRONIC COMPONENTS**

UNIT CODE : **CS-ELC311209**

DESCRIPTON : This unit covers the knowledge, skills and attitudes required to test electronic components. It includes competencies in determining the criteria for testing electronics components, planning an approach for component testing, testing the components and evaluating the testing process.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Determine criteria for testing electronics components	1.1 Work instructions are obtained and clarified based on job order or client requirements 1.2 ***Responsible person*** is consulted for effective and proper work coordination 1.3 Data sheets/Application notes are obtained and interpreted based on manufacturer's specifications 1.4 ***Testing criteria*** are defined to ensure that components meet technical and quality requirements 1.5 Document and communicate testing criteria to relevant personnel	1.1 Mensuration/ Mathematics o Conversion of Units o Applied Mathematics 1.2 Safety o Work Safety requirements and economy of materials with durability 1.3 Systems and Processes o Principles of electrical / electronic circuits o Identifying sources of electricity o Identifying conductors and insulators o Supplying different voltage using variable power supply o Measuring resistance using VOM o Testing resistors o Measuring current and voltage using VOM 1.4 Testing Criteria o Controls o Effectiveness o Efficiency o Bug detection o Functionality, including flow o Interoperability o Performance o Reliability o Operating parameters	1.1 Work efficiently & systematically 1.2 Communication skills 1.3 Use and maintenance of tools and equipment 1.4 Skills in testing electronic components 1.5 Work safety practices and time management 1.6 Problem solving skills 1.7 Reading skills
2. Plan an approach for component testing	2.1 Various ***testing methods*** are Identified based on ***types of electronic components*** 2.2 Characteristics and appropriateness of testing methods to be used during	2.1 Safety o Work Safety requirements and economy of materials with durability o Knowledge in 5S application and	2.1 Skills in testing electronic components 2.2 Work safety practices and time management 2.3 Planning skills

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	development and on completion is determined 2.3 Testing methods are considered/selected in relation to appropriate ***testing strategy*** 2.4 Plan for testing components is developed at specified points during development and on completion 2.5 Required ***test & measuring instruments*** and ***tools*** are prepared and checked in accordance with established procedures 2.6 ***Records system*** is established to document testing results, including problems and faults	observation of required timeframe 2.2 Materials, tools and equipment uses and specifications o Proper care and use of tools 2.3 Types of electronic components o Passive components o Active components o Dynamic components o Hybrid components 2.4 Testing methods o Automated o Debugging o Inspection o Platform testing o Prototyping 2.5 Systems and Processes o Describing resistance and identify resistors o Describing alternating current circuits o Describing capacitance and identifying capacitors o Describing inductance and identifying inductors o Describing the characteristic of transformers o Describing and identifying semiconductor diode o Describing and identifying bipolar transistor o Describing and analyzing digital gate	2.4 Problem solving skills 2.5 Reading skills 2.6 Checking test & measuring instruments and tools 2.7 Documentation skills
3. Test components	3.1 Testing methods are applied to ensure that products meet creative, production and technical requirements 3.2 Problems and faults detected by testing are recorded and remedial steps taken in records system is documented 3.3 Problems and faults detected during testing are resolved in accordance	3.1 Safety o Work Safety requirements and economy of materials with durability 3.2 Materials, tools and equipment uses and specifications o Proper care and use of tools 3.3 Systems and Processes o Principles of electrical/ electronic circuits	3.1 Skills in testing electronic components 3.2 Troubleshooting skills 3.3 Problem solving skills 3.4 Documentation skills 3.5 Work efficiently & systematically

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	with agreed project or industry practice 3.4 Evaluate final products against the previously determined criteria 3.5 Testing process is documented and summarized evaluation report is submitted to relevant personnel	○ Supplying different voltage using variable power supply ○ Measuring resistance using VOM ○ Testing resistors ○ Measuring current and voltage using VOM ○ Observing waveform using oscilloscope ○ Generating waveform in various frequency using function generator ○ Measuring frequency using oscilloscope ○ Measuring capacitance using VOM ○ Testing capacitors ○ Testing inductors ○ Testing semiconductor diode ○ Testing bipolar transistor ○ Testing logic gates	3.6 Product analysis and evaluation skills 3.7 Communication skills 3.8 Reading skills
4. Evaluate the testing process	4.1 Testing methods that were successful and those that led to difficulties are identified based on industry standards 4.2 Testing process and records system are evaluated based on standard procedures 4.3 Test results/findings are documented for subsequent components testing.	4.1 Evaluation of testing process and records system 4.2 Systems and Processes ○ Analyzing simple circuit using ohms and power law ○ Analyzing series/parallel circuits using ohms and power law ○ Analyzing series/parallel capacitances ○ Analyzing series parallel inductors ○ Analyzing rectifier circuits ○ Analyzing amplifier circuit ○ Analyzing multi-vibrator circuit ○ Analyzing logic networks ○ Analyzing sequence circuits	4.1 Work efficiently & systematically 4.2 Skills in testing electronic components 4.3 Product analysis and evaluation skills 4.4 Documentation skills 4.5 Communication skills 4.6 Reading skills

RANGE OF VARIABLES

VARIABLE	RANGE
1. Responsible person	Relevant personnel may include: 1.1. Immediate supervisor 1.2. Manager
2. Testing criteria	Testing criteria may include: 2.1. controls 2.2. effectiveness 2.3. efficiency 2.4. bug detection 2.5. functionality, including flow 2.6. interoperability 2.7. performance 2.8. reliability 2.9. operating parameters
3. Testing methods	Testing methods may include: 3.1. automated 3.2. debugging 3.3. inspection 3.4. platform testing 3.5. prototyping
4. Types of electronic components	4.1. Passive components 4.2. Active components 4.3. Dynamic components 4.4. Hybrid components
5. Testing strategy	Testing strategy may be determined by: 5.1. Passive testing 5.2. Dynamic testing 5.3. In-circuit testing
6. Test and measuring instruments	Test and measuring instruments may include: 6.1. Variable DC power supply 6.2. Digital VOM 6.3. analog VOM 6.4. dual trace triggered oscilloscope 6.5. function generator
7. Tools	Tools may include: 7.1. set of pliers 7.2. set of screw drivers 7.3. set of wrenches 7.4. Hand drills, 7.5. Hack saw 7.6. set of files 7.7. tin snip 7.8. Hammer

VARIABLE	RANGE
8. Records system	Records system may include: 8.1. metadata that includes: 8.1.1. description of fault 8.1.2. identification of code 8.1.3. user responses 8.1.4. written or verbal comments 8.1.5. quantitative data 8.1.6. remedial action taken 8.1.7. retest result 8.1.8. date 8.1.9. tester's details 8.2. questionnaire 8.3. survey

EVIDENCE GUIDE

1 Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Determined criteria for testing electronics components 1.2 Planned an approach for component testing 1.3 Tested components 1.4 Evaluated the testing process
2 Method of assessment	Competency may be assessed through two or more of the following methods: 2.1 Direct observation of application to tasks and questions related to required knowledge 2.2 Demonstration with oral questioning 2.3 Third party report 2.4 Written test 2.5 Portfolio
3 Resource implications	The following resources must be provided: 3.1 Tools and equipment (see range of variables) 3.2 Working area/bench 3.3 Electronic components 3.4 Testing instruments and equipment 3.5 Assessment rating sheet 3.6 Reporting forms
4 Context of assessment	4.1 Assessment maybe conducted in the workplace or in a simulated workplace setting

CORE COMPETENCIES

UNIT TITLE : OBSERVE SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA) OPERATION SAFETY PRACTICES

UNIT CODE : CS-ICT311201

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitude required to observe safety practices in SCADA operation. This includes competencies in identifying different hazards and risk in operating industrial equipment and in demonstrating safety consideration while remotely operating industrial equipment and observing safety measure during plant maintenance.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify different hazards and risk in operating industrial equipment	1.1. Occupational health and safety standards are familiarized with in line with work requirements 1.2. ***Hazards*** in industrial equipment are identified based on OSH standards 1.3. Activity report on identified hazards and risk is prepared and completed according to company requirements	1.1. Occupational health and safety standards 1.2. Hazards and risk in industrial equipment	1.1. Computer operation skills 1.2. Communication skills 1.3. Interpreting work instructions 1.4. Interpersonal skills 1.5. Data verification skills 1.6. Identifying potential hazards and risk
2. Demonstrate safety consideration in operating industrial equipment remotely	2.1. ***Safety practices*** are observed consistently while operating industrial equipment 2.2. Safety procedures are performed during equipment operation 2.3. Activity report equipment operation is prepared and completed according to company requirements	2.1. Occupational health and safety standards 2.2. Hazards and risk in industrial equipment safety concerns 2.3. Safety operation protocols 2.4. Safety parameters	2.1. Computer operation skills 2.2. Communication skills 2.3. Interpreting work instructions 2.4. Data verification skills 2.5. Applying safety procedures
3. Observe safety measure during plant maintenance.	3.1. Safety parameters are checked based on maintenance procedures 3.2. Safety procedures are performed during equipment maintenance 3.3. Activity report on plant maintenance is prepared and completed according to company requirements	3.1. Occupational health and safety standards 3.2. Hazards and risk in industrial equipment safety concerns 3.3. Safety plant maintenance protocols 3.4. Safety parameters	3.1. Computer operation skills 3.2. Communication skills 3.3. Interpreting work instructions 3.4. Data verification skills 3.5. Applying safety procedures

RANGE OF VARIABLES

VARIABLE	RANGE
1 Hazards	May include but not limited to: 1.1 moving parts (e.g., risk of injuries from entanglement, friction, abrasion, cutting, severing, shearing, stabbing, puncturing, impact, crushing, drawing-in or trapping, etc.) 1.2 energy (e.g., electrical, electromagnetic, magnetic, etc.) 1.3 heat or cold. 1.4 noise. 1.5 vibration.
2 Safety practices	May include: 2.1 Use the machine properly and in accordance with the manufacturer's instructions; 2.2 Wear the appropriate protective clothing and equipment required for a machine, such as: 2.2.1. safety glasses; 2.2.2. hearing protection; and 2.2.3. safety shoes 2.3 Never walk away from a machine until all its parts have stopped moving. 2.4 Always refer any questions or concerns about machine safety or working with safeguards to your supervisor

EVIDENCE GUIDE

1. Critical Aspect of Competency	Assessment requires evidence that the candidate: 1.1. Identified different hazards and risk in operating industrial equipment 1.1.1. Identified hazards in industrial equipment based on OSH standards 1.2. Demonstrated safety consideration in operating industrial equipment remotely. 1.2.1. Observed safety practices consistently while operating industrial equipment 1.2.2. Performed safety procedures during equipment operation 1.3. Observed safety measure during plant maintenance 1.3.1. Checked safety parameters based on maintenance procedures 1.3.2. Performed safety procedures during equipment maintenance
2. Resource Implication	The following resources should be provided: 2.1. Appropriate supplies and materials 2.2. Applicable equipment 2.3. Appropriate software 2.4. Workplace or assessment area

3. Method of Assessment	Competency in this unit may be assessed through: 3.1. Demonstration with oral questioning 3.2. Written Exam 3.3. Portfolio with interview
4. Context of Assessment	4.1. Competency may be assessed in the actual workplace or at the designated TESDA Accredited Assessment Center.

UNIT TITLE : USE SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA) SYSTEMS IN OPERATION

UNIT CODE : CS-ICT311202

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitude required to use SCADA systems in operation. This includes competencies in accessing and control various system application, responding to alarm systems and making required changes in accordance with procedures.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Access and control various system application	1.1. ***Industrial field devices*** are identified relevant to assigned field stations and functions 1.2. Correct level of access is used and all relevant screens and information are set up based on organization requirements 1.3. Information is inputted and outputted correctly according to program and organization requirements	1.1. Reading and interpreting electronic and hard copy SCADA operating instructions and documents, including where used: 1.1.1. work instructions 1.1.2. standard operating procedures 1.1.3. temporary instructions 1.1.4. other provided operating instructions 1.2. Security and access control requirements of the SCADA system 1.3. Identification of modules, screens, and other components of SCADA system 1.4. Inputting and outputting data in SCADA system 1.5. Searching and retrieving data in SCADA system 1.6. Accessing SCADA system nominated assistance	1.1. Computer operation skills 1.2. Communication skills 1.3. Interpreting work instructions 1.4. Interpersonal skills 1.5. Identifying modules 1.6. Using web browsers 1.7. Searching and retrieving data 1.8. Accurately inputting and outputting data 1.7. Searching and retrieving data
2. Respond to alarm systems	2.1. ***Data and information*** are obtained from SCADA 2.2. Data and information are interpreted based on job requirements 2.3. Relevant historical data and information are sought and used based on job requirements 2.4. Manufacturer manuals or specifications are used to expand knowledge of SCADA system	2.1. Reading and interpreting electronic and hard copy SCADA operating instructions and documents, including where used: 2.1.1. work instructions 2.1.2. standard operating procedures 2.1.3. temporary instructions 2.1.4. other provided operating instructions	2.1. Computer operation skills 2.2. Communication skills 2.3. Interpreting work instructions 2.4. Interpersonal skills 2.5. Identifying modules 2.6. Using web browsers 2.7. Searching and retrieving data

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	2.5. Required actions are determined and prioritized based on job requirements	2.2. Security and access control requirements of the SCADA system 2.3. Identification of modules, screens and other components of SCADA system 2.4. Inputting and outputting data in SCADA system 2.5. Searching and retrieving data in SCADA system 2.6. Accessing SCADA system nominated assistance	2.8. Accurately inputting and outputting data 2.9. Searching and retrieving data
3. Make required changes/ adjustments to the process	3.1. Production/process is adjusted in response to SCADA information 3.2. Adjustments and variations to specifications/schedules are recorded and reported to appropriate personnel in accordance with procedures. 3.3. Feedback and information on adjustments are sought to further improve ***procedures***	3.1. Reading and interpreting electronic and hard copy SCADA operating instructions and documents, including where used: 3.1.1. work instructions 3.1.2. standard operating procedures 3.1.3. temporary instructions 3.1.4. other provided operating instructions 3.2. Security and access control requirements of the SCADA system 3.3. Identification of modules, screens and other components of SCADA system 3.4. Inputting and outputting data in SCADA system 3.5. Searching and retrieving data in SCADA system 3.6. Accessing SCADA system nominated assistance	3.1. Computer operation skills 3.2. Communication skills 3.3. Interpreting work instructions 3.4. Interpersonal skills 3.5. Identifying modules 3.6. Using web browsers 3.7. Searching and retrieving data 3.8. Accurately inputting and outputting data 3.9. Searching and retrieving data

RANGE OF VARIABLES

VARIABLE	RANGE
1. Industrial field devices	May include: 1.1. Programmable Logic Controllers (PLC) 1.2. Remote Terminal Units (RTU) 1.3. Human–machine interface (HMI) 1.4. Intelligent Electronic Device (IED)
2. Data and information	May include: 2.1. process 2.2. supply 2.3. product chain
3. Procedures	May include: 3.1. process 3.2. work instructions 3.3. standard operating procedures (SOPs) 3.4. safe work method statements 3.5. formulas/recipes 3.6. batch sheets 3.7. temporary instructions 3.8. any similar instructions provided for the smooth running of the plant.

EVIDENCE GUIDE

1. Critical Aspect of Competency	Assessment requires evidence that the candidate: 1.1. Accessed and controlled various system application 1.1.1. Identified industrial field devices relevant to assigned field stations and functions 1.1.2. Used correct level of access and set up all relevant screens and information 1.1.3. Inputted and outputted information correctly according to program and organization requirements 1.2. Responded to alarm systems 1.2.1. Obtained data and information from SCADA 1.2.2. Interpreted data and information as required by own job 1.2.3. Sought and used relevant historical data and information based on job requirements 1.3. Made required changes/adjustments to the process 1.3.1. Adjusted production/process in response to SCADA information
2. Resource Implication	The following resources should be provided: 2.1. Appropriate supplies and materials 2.2. Applicable equipment 2.3. Appropriate software 2.4. Workplace or assessment area
3. Method of Assessment	Competency in this unit may be assessed through: 3.1. Demonstration with oral questioning 3.2. Written Exam 3.3. Portfolio with interview
4. Context of Assessment	4.1. Competency may be assessed in the actual workplace or at the designated TESDA Accredited Assessment Center.

SECTION 3 TRAINEE ENTRY REQUIREMENTS, TRAINER'S QUALIFICATIONS, LIST OF TOOLS, MATERIALS AND EQUIPMENT; AND TRAINING FACILITIES

3.1 TRAINEE ENTRY REQUIREMENTS

The trainees who wish to enter the course should possess the following requirements:

- At least knowledgeable in common manufacturing operations
- At least knowledgeable in Industrial Automation software concepts preferably in Human Machine Interface (HMI)
- Familiar in Microsoft Excel
- Can communicate orally and in writing
- Can perform basic mathematical computations
- Can recognize abstract and 3-dimensional figures
- Must have completed basic education or holder of Alternative Learning Systems (ALS) certificate of completion with grade 10 equivalent
- Physically able to operate/manipulate a computer input device

This list does not include specific institutional requirements such as educational attainment, appropriate work experience, specific clearances and others that may be required from the trainees by the school or training center delivering the TVET program.

3.2 TRAINERS QUALIFICATIONS

- Must be a holder of Trainer's Methodology Certificate (TMC) **OR** must be a SCADA certified training provider
- Must have at least 2 years related industry experience on SCADA programming and operation or at least 3 years teaching experience, and at least 36 hours of relevant training of SCADA programming and operation within the last five (5) years
- Must be able to communicate, both orally and in writing
- Must be physically and mentally fit

3.3 LIST OF TOOLS, EQUIPMENT AND MATERIALS

Recommended list of tools, equipment and materials for the conduct of training in SCADA Programming Level III:

TOOLS		
Qty.	**Unit**	**Description/Specification**
10	unit	SCADA Software license*
1	lot	Presentation Materials
10	unit	Chair
10	unit	Table
1	lot	References

* *Can be either educational, license or open-source software*

EQUIPMENT		
Qty.	**Unit**	**Description/Specification**
10	unit	Laptop/Computer (8 GB RAM min; Win 8.1/10 Professional/Enterprise or better)
1	unit	Digital light projector
1	unit	Printer (A4 size)
1	unit	Copier machine (A4 size)

MATERIALS		
Qty.	**Unit**	**Description/Specification**
10	ream	Bond paper (A4)
3	unit	Printer ink (black/colored)

Due to the fast-changing nature of technology, the experts may recommend to TVET providers other similar up-to-date tools, equipment and materials with equivalent functions as alternatives and to be provided and used by their trainees, whichever is appropriate and applicable. This also applies in consideration of community practices and their availability in the local market.

3.4 TRAINING FACILITIES

The space requirements for the teaching/learning and circulation areas are as follows:

TEACHING/LEARNING AREAS	SIZE IN METERS	AREA IN SQ. METERS	QTY	TOTAL AREA IN SQ. METERS
Computer/ Laboratory/ Lecture Area	5 x 10	50	1	50
Learning Resource Area	3 x 5	15	1	15
Wash & Toilet Area	2 x 2	4	2	8
Admin and Staff Room	4 X 5	20	1	20
Total				93
Facilities / Equipment / Circulation (*Area requirement is equivalent to 30% of the total teaching/learning areas*)				19
Total Area				**112**

Note: Subject to conformity of the health and safety protocols

Appropriate consideration should be given in providing and allocating workspace, communications facilities, and the usual workplace amenities to ensure a proper learning environment. Where applicable, training shall be held or conducted in learning facilities in accordance with generally accepted industry standards and practice.

GLOSSARY OF TERMS

GENERAL

1) **Certification -** is the process of verifying and validating the competencies of a person through assessment

2) **Certificate of Competency (COC)** – is a certification issued to individuals who pass the assessment for a single unit or cluster of units of competency

3) **Common Competencies** - are the skills and knowledge needed by all people working in a particular industry

4) **Competency** - is the possession and application of knowledge, skills and attitudes to perform work activities to the standard expected in the workplace

5) **Competency Assessment -** is the process of collecting evidence and making judgments on whether competency has been achieved

6) **Competency Standard (CS)** - is the industry-determined specification of competencies required for effective work performance

7) **Context of Assessment** - refers to the place where assessment is to be conducted or carried out

8) **Core Competencies -** are the specific skills and knowledge needed in a particular area of work - industry sector/occupation/job role

9) **Critical aspects of competency -** refers to the evidence that is essential for successful performance of the unit of competency

10) **Elective Competencies -** are the additional skills and knowledge required by the individual or enterprise for work

11) **Elements** - are the building blocks of a unit of competency. They describe in outcome terms the functions that a person performs in the workplace.

12) **Evidence Guide** - is a component of the unit of competency that defines or identifies the evidences required to determine the competence of the individual. It provides information on critical aspects of competency, underpinning knowledge, underpinning skills, resource implications, assessment method and context of assessment

13) **Level -** refers to the category of skills and knowledge required to do a job

14) **Method of Assessment** - refers to the ways of collecting evidence and when, evidence should be collected

15) **National Certificate (NC)** – is a certification issued to individuals who achieve all the required units of competency for a national qualification defined under the Training Regulations. NCs are aligned to specific levels within the PTQF

16) **Performance Criteria** - are evaluative statements that specify what is to be assessed and the required level of performance

17) **Qualification** - is a cluster of units of competencies that meets job roles and is significant in the workplace. It is also a certification awarded to a person on successful completion of a course in recognition of having demonstrated competencies in an industry sector

18) **Range of Variables** - describes the circumstances or context in which the work is to be performed

19) **Recognition of Prior Learning (RPL)** – is the acknowledgement of an individual's skills, knowledge and attitudes gained from life and work experiences outside registered training programs

19) **Resource Implication -** refer to the resources needed for the successful performance of the work activity described in the unit of competency. It includes work environment and conditions, materials, tools and equipment

20) **Basic Competencies -** are the skills and knowledge that everyone needs for work

21) **Required Knowledge -** refers to the competency that involves in applying knowledge to perform work activities. It includes specific knowledge that is essential to the performance of the competency

22) **Required Skills** - refers to the list of the skills needed to achieve the elements and performance criteria in the unit of competency. It includes generic and industry specific skills

23) **Unit of Competency** – is a component of the competency standards stating a specific key function or role in a particular job or occupation; it is the smallest component of achievement that can be assessed and certified under the PTQF

SPECIFIC

1) **Alarm** - is a notification or message that informs the operator of what's happening at the plant. These events can range from routine maintenance alerts all the way up to plant emergencies.

2) **Alarm management -** is a system for prioritizing, grouping and classifying alerts and event notifications used in supervisory control and data acquisition (SCADA). Alarm management functions similarly in other applications such as IT and medical care.

3) **HMI** - Human machine interfaces (HMIs) are used as an operator control panel to PLCs, RTUs, and in some cases directly to IEDs. HMIs replace manually activated switches, dials, and other controls with graphical representations of the control process and digital controls to influence that process.

4) **P&ID** - a piping and instrumentation diagram, or P&ID, shows the piping and related components of a physical process flow. It is most commonly used in the engineering field.

5) **PLC** - stands for programmable logic controller. A programmable logic controller is installed to monitor sensors. In this manner, a PLC stands for data collection, receiving critical information about the flow and input within the system.

6) **SCADA** – Supervisory Control and Data Acquisition; It is a control system architecture comprising computers, networked data communications and graphical user interfaces for high-level supervision of machines and processes.

7) **SCADA script** - is an advanced feature of a basic system. It is required mainly if the user need to customize the integration for some uncommon scenario, or anything other unique behavior which ordinary settings could not achieve. For example, some operation which requires mathematics calculation.

8) **SCADA security** - is the practice of protecting supervisory control and data acquisition (SCADA) networks, a common framework of control systems used in industrial operations.

9) **SCADA software** - is a system of software and hardware elements that allows industrial organizations to control industrial processes locally or at remote locations and to monitor, gather, and process real-time data.

10) **SCADA system alarms** - notify the operator of power supply issues (activation of the SCADA UPS and backup power supply) and network issues such as loss of IP connection. The most common SCADA alarm is "Device Down," which occurs when a device stops communicating on the network.

11) **Situational Awareness Library -** a Library of Symbols that includes symbols designed to help operators extract useful information with minimal effort

12) **Tags** - are the placeholder of information in SCADA servers; they are similar to OPC items, except that internal tags (results of calculations made by SCADA scripts for example), as well as external tags (information from PLCs or OPC servers) can be used. The sole purpose of a tag is to organize and structure your data. These tags are defined within the controller's program, and they are the foundation of the control system's smarts.

13) **Trends** (or charts, graphs) - are essentially important for an industrial automation system. They record real time data from field, retrieve historical data, and present them in graphical ways. SCADA serves as the backbone to an automated system, and it takes care of trends.

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