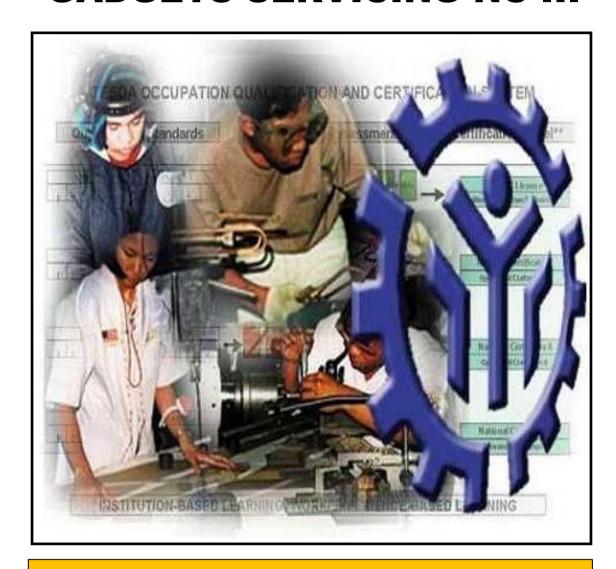# TRAINING REGULATIONS

MOBILE PHONES AND HANDHELD GADGETS SERVICING NC III

ELECTRICAL & ELECTRONICS SECTOR

TECHNICAL EDUCATION AND SKILLS DEVELOPMENT AUTHORITY
East Service Road, South Superhighway, Taguig City, Metro Manila

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

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

The Training Regulations (TR) serve as basis for the:

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

Each TR has four sections:

Section 1   **Definition of Qualification** – describes the qualification and defines the competencies that comprise the qualification.

Section 2   The **Competency Standards** format was revised to include the Required Knowledge and Required Skills per element. These fields explicitly state the required knowledge and skills for competent performance of a unit of competency in an informed and effective manner. These also emphasize the application of knowledge and skills to situations where understanding is converted into a workplace outcome.

Section 3   **Training Arrangements** - contain information and requirements which serve as bases for training providers in designing and delivering competency-based curriculum for the qualification. The revisions to section 3 entail identifying the Learning Activities leading to achievement of the identified Learning Outcome per unit of competency.

Section 4   **Assessment and Certification Arrangements** - describe the policies governing assessment and certification procedures for the qualification.

TABLE OF CONTENTS

ELECTRONICS SECTOR

MOBILE PHONES AND HANDHELD GADGETS SERVICING

NATIONAL CERTIFICATE LEVEL III

TRAINING REGULATIONS FOR
MOBILE PHONES AND HANDHELD GADGETS SERVICING NC III

Section 1   MOBILE PHONES AND HANDHELD GADGETS SERVICING NC III QUALIFICATIONS

The Mobile Phones and Handheld Gadgets Servicing NC III Qualification consist of competencies that must be possessed to enable a person to service mobile phones and handheld gadgets' hardware and software related troubles.

This qualification covers only the repair, service and maintenance of all types of mobile phones and handheld gadgets. It does not include the servicing of full-function laptops/notebooks, game consoles/gadgets like Xbox and PlayStation and handheld PABX devices.

This Qualification is packaged from the competency map of the Electrical and Electronics Industry (Service sector) as shown in Annex A.

The units of competency comprising this qualification include the following:

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

Code	COMMON COMPETENCIES
ELC311205	Use Hand Tools
ELC311201	Perform Mensuration and Calculation
ELC311202	Prepare and Interpret Technical Drawing
ELC311204	Apply Quality Standards
ELC311203	Perform Computer Operations
ELC311206	Terminate and Connect Electrical Wiring and Electronic Circuits
ELC311209	Test Electronic Components

Code	CORE COMPETENCIES
ELC742301	Prepare workplace for servicing mobile phone unit and handheld gadget
ELC742302	Diagnose and identity hardware and software related problems
ELC742303	Troubleshoot and repair mobile phone unit and handheld gadget
ELC742304	Perform functionality testing and documentation

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

- Mobile Phones and Handheld Gadgets Technician
- Mobile Phones and Handheld Gadgets Specialist
- Mobile Phones and Handheld Gadgets Service Supervisor
- Mobile Phones Technician

SECTION 2:   COMPETENCY STANDARDS

This section gives the details of the contents of the basic, common, and core units of competency required for Mobile Phones and Handheld Gadgets Servicing NC III.

BASIC COMPETENCIES

UNIT OF COMPETENCY :   LEAD WORKPLACE COMMUNICATION

UNIT CODE   :   400311319

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

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Communicate information about workplace processes	1.1 Relevant ***communication method*** is selected based on workplace procedures 1.2 Multiple operations involving several topics/areas are communicated following enterprise requirements 1.3 Questioning is applied to gain extra information 1.4 Relevant sources of information are identified in accordance with workplace/ client requirements 1.5 Information is selected and organized following enterprise procedures 1.6 Verbal and written reporting is undertaken when required 1.7 Communication and negotiation skills are applied and maintained in all relevant situations	1.1. Organization requirements for written and electronic communication methods 1.2. Effective verbal communication methods 1.3. Business writing 1.4. Workplace etiquette	1.1. Organizing information 1.2. Conveying intended meaning 1.3. Participating in a variety of workplace discussions 1.4. Complying with organization requirements for the use of written and electronic communication methods 1.5. Effective business writing 1.6. Effective clarifying and probing skills 1.7. Effective questioning techniques (clarifying and probing)
2. Lead workplace discussions	2.1 Response to workplace issues are sought following enterprise procedures 2.2 Response to workplace issues are provided immediately 2.3 Constructive contributions are made to ***workplace discussions*** on such issues as production, quality and safety	2.1 Organization requirements for written and electronic communication methods 2.2 Effective verbal communication methods 2.3 Workplace etiquette	2.1 Organizing information 2.2 Conveying intended meaning 2.3 Participating in variety of workplace discussions 2.4 Complying with organization requirements for

ELEMENT	PERFORMANCE CRITERIA Italicized terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	2.4 Goals/objectives and action plans undertaken in the workplace are communicated promptly		the use of written and electronic communication methods 2.5 Effective clarifying and probing skills
3. Identify and communicate issues arising in the workplace	3.1 Issues and problems are identified as they arise 3.2 Information regarding problems and issues are organized coherently to ensure clear and effective communication 3.3 Dialogue is initiated with appropriate personnel 3.4 Communication problems and issues are raised as they arise 3.5 Identify barriers in communication to be addressed appropriately	3.1 Organization requirements for written and electronic communication methods 3.2 Effective verbal communication methods 3.3 Workplace etiquette 3.4 Communication problems and issues 3.5 Barriers in communication	3.1 Organizing information 3.2 Conveying intended meaning 3.3 Participating in a variety of workplace discussions 3.4 Complying with organization requirements for the use of written and electronic communication methods 3.5 Effective clarifying and probing skills 3.6 Identifying issues 3.7 Negotiation and communication skills

RANGE OF VARIABLES

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

EVIDENCE GUIDE

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

UNIT OF COMPETENCY : **LEAD SMALL TEAMS**

UNIT CODE : **400311320**

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

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Provide team leadership	1.1. **Work requirements** are identified and presented to team members based on company policies and procedures 1.2. Reasons for instructions and requirements are communicated to team members based on company policies and procedures 1.3. **Team members' queries and concerns** are recognized, discussed and dealt with based on company practices	1.1 Facilitation of Team work 1.2 Company policies and procedures relating to work performance 1.3 Performance standards and expectations 1.4 Monitoring individual's and team's performance vis a vis client's and group's expectations	1.1 Communication skills required for leading teams 1.2 Group facilitation skills 1.3 Negotiating skills 1.4 Setting performance expectation
2. Assign responsibilities	2.1. Responsibilities are allocated having regard to the skills, knowledge and aptitude required to undertake the assigned task based on company policies. 2.2. Duties are allocated having regard to individual preference, domestic and personal considerations, whenever possible	2.1 Work plan and procedures 2.2 Work requirements and targets 2.2 Individual and group expectations and assignments 2.3 Ways to improve group leadership and membership	2.1 Communication skills 2.2 Management skills 2.3 Negotiating skills 2.4 Evaluation skills 2.5 Identifying team member's strengths and rooms for improvement
3. Set performance expectations for team members	3.1 Performance expectations are established based on client needs 3.2 Performance expectations are based on individual team members knowledge, skills and aptitude 3.3 Performance expectations are discussed and disseminated to individual team members	3.1 One's roles and responsibilities in the team 3.2 Feedback giving and receiving 3.3 Performance expectation	3.1 Communication skills 3.2 Accurate empathy 3.3 Congruence 3.4 Unconditional positive regard 3.5 Handling of Feedback

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TR – Mobile Phones & Handheld Gadgets Servicing NC III   (ELCMPS321)   Promulgated February 9, 2021   6

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
4. Supervised team performance	4.1 Performance is *monitored* based on defined performance criteria and/or assignment instructions 4.2 Team members are provided with *feedback*, positive support and advice on strategies to overcome any deficiencies based on company practices 4.3 *Performance issues* which cannot be rectified or addressed within the team are referenced to appropriate personnel according to employer policy 4.4 Team members are kept informed of any changes in the priority allocated to assignments or tasks which might impact on client/customer needs and satisfaction 4.5 Team operations are monitored to ensure that employer/client needs and requirements are met 4.6 Follow-up communication is provided on all issues affecting the team 4.7 All relevant documentation is completed in accordance with company procedures	4.1 Performance Coaching 4.2 Performance management 4.3 Performance Issues	4.1 Communication skills required for leading teams 4.2 Coaching skill

RANGE OF VARIABLES

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

EVIDENCE GUIDE

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

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

UNIT CODE : 400311321

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

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Examine specific workplace challenges	1.1. Variances are examined from normal operating **parameters;** and product quality. 1.2. Extent, cause and nature of the specific problem are defined through observation, investigation and ***analytical techniques***. 1.3. ***Problems*** are clearly stated and specified.	1.1. Competence includes a thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations. 1.2. Competence to include the ability to apply and explain, enough for the identification of fundamental causes of specific workplace challenges. 1.3. Relevant equipment and operational processes. 1.4. Enterprise goals, targets and measures. 1.5. Enterprise quality OHS and environmental requirement. 1.6. Enterprise information systems and data collation 1.7. Industry codes and standards.	1.1. Using range of analytical techniques (e.g., planning, attention, simultaneous and successive processing of information) in examining specific challenges in the workplace. 1.2. Identifying extent and causes of specific challenges in the workplace.
2. Analyze the causes of specific workplace challenges.	2.1. Possible causes of specific problems are identified based on experience and the use of problem solving tools / analytical techniques. 2.2. Possible cause statements are developed based on findings. 2.3. Fundamental causes are identified per results of investigation conducted.	2.1 Competence includes a thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations. 2.2 Competence to include the ability to apply and explain, sufficient for the identification of fundamental cause, determining the	2.1 Using range of analytical techniques (e.g., planning, attention, simultaneous and successive processing of information) in examining specific challenges in the workplace. 2.2 Identifying extent

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
		corrective action and provision of recommendations. 2.3 Relevant equipment and operational processes. 2.4 Enterprise goals, targets and measures. 2.5 Enterprise quality OSH and environmental requirement. 2.6 Enterprise information systems and data collation. 2.7 Industry codes and standards.	and causes of specific challenges in the workplace. 2.3 Providing clear-cut findings on the nature of each identified workplace challenges.
3. Formulate resolutions to specific workplace challenges	3.1. All possible options are considered for resolution of the problem. 3.2. Strengths and weaknesses of possible options are considered. 3.3. Corrective actions are determined to resolve the problem and possible future causes. 3.4. **Action *plans*** are developed identifying measurable objectives, resource needs and timelines in accordance with safety and operating procedures	3.1. Competence to include the ability to apply and explain, sufficient for the identification of fundamental cause, determining the corrective action and provision of recommendations 3.2. Relevant equipment and operational processes 3.3. Enterprise goals, targets and measures 3.4. Enterprise quality OSH and environmental requirement 3.5. Principles of decision making strategies and techniques 3.6. Enterprise information systems and data collation 3.7. Industry codes and standards	3.1. Using range of analytical techniques (e.g., planning, attention, simultaneous and successive processing of information) in examining specific challenges in the workplace. 3.2. Identifying extent and causes of specific challenges in the workplace. 3.3. Providing clear-cut findings on the nature of each identified workplace challenges. 3.4. Devising, communicating, implementing and evaluating strategies and techniques in addressing specific workplace challenges.

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
4. Implement action plans and communicate results	4.1. Action plans are implemented and evaluated. 4.2. Results of plan implementation and recommendations are prepared. 4.3. Recommendations are presented to appropriate personnel. 4.4. Recommendations are followed-up, if required.	4.1 Competence to include the ability to apply and explain, sufficient for the identification of fundamental cause, determining the corrective action and provision of recommendations 4.2. Relevant equipment and operational processes 4.3 Enterprise goals, targets and measures 4.4 Enterprise quality, OSH and environmental requirement 4.5 Principles of decision making strategies and techniques 4.6 Enterprise information systems and data collation 4.7 Industry codes and standards	4.1 Using range of analytical techniques (e.g., planning, attention, simultaneous and successive processing of information) in examining specific challenges in the workplace. 4.2 Identifying extent and causes of specific challenges in the workplace. 4.3 Providing clear-cut findings on the nature of each identified workplace challenges. 4.4 Devising, communicating, implementing and evaluating strategies and techniques in addressing specific workplace challenges.

RANGE OF VARIABLES

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

EVIDENCE GUIDE

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

UNIT CODE : **400311322**

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

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Develop an individual's cultural awareness and sensitivity	1.1. Individual differences with clients, customers and fellow workers are recognized and respected in accordance with enterprise policies and core values. 1.2. Differences are responded to in a sensitive and considerate manner 1.3. *Diversity* is accommodated using appropriate verbal and non-verbal communication.	1.1. Understanding cultural diversity in the workplace 1.2. Norms of behavior for interacting and dialogue with specific groups (e. g., Muslims and other non-Christians, non-Catholics, tribes/ethnic groups, foreigners) 1.3. Different methods of verbal and non-verbal communication in a multicultural setting	1.1. Applying cross-cultural communication skills (i.e. different business customs, beliefs, communication strategies) 1.2. Showing affective skills – establishing rapport and empathy, understanding, etc. 1.3. Demonstrating openness and flexibility in communication 1.4. Recognizing diverse groups in the workplace and community as defined by divergent culture, religion, traditions and practices
2. Work effectively in an environment that acknowledges and values cultural diversity	2.1 Knowledge, skills and experiences of others are recognized and documented in relation to team objectives. 2.2 Fellow workers are encouraged to utilize and share their specific qualities, skills or backgrounds with other team members and clients to enhance work outcomes. 2.3 Relations with customers and clients are maintained to show that diversity is valued by the business.	2.1 Value of diversity in the economy and society in terms of Workforce development 2.2 Importance of inclusiveness in a diverse environment 2.3 Shared vision and understanding of and commitment to team, departmental, and organizational goals and objectives 2.4 Strategies for customer service excellence	2.1 Demonstrating cross-cultural communication skills and active listening 2.2 Recognizing diverse groups in the workplace and community as defined by divergent culture, religion, traditions and practices 2.3 Demonstrating collaboration skills 2.4 Exhibiting customer service excellence

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

RANGE OF VARIABLES

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

EVIDENCE GUIDE

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

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

UNIT CODE : **400311323**

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

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Assess work procedures, processes and systems in terms of innovative practices	1.1. R*easons* for innovation are incorporated to work procedures. 1.2. ***Models of innovation*** are researched. 1.3. G*aps or barriers* to innovation in one's work area are analyzed. 1.4. Staff who can support and foster innovation in the work procedure are identified.	1.1 Seven habits of highly effective people. 1.2 Character strengths that foster innovation and learning (Christopher Peterson and Martin Seligman, 2004) 1.3 Five minds of the future concepts (Gardner, 2007). 1.4 Adaptation concepts in neuroscience (Merzenich, 2013). 1.5 Transtheoretical model of behavior change (Prochaska, DiClemente, & Norcross, 1992).	1.1 Demonstrating collaboration and networking skills. 1.2 Applying basic research and evaluation skills 1.3 Generating insights on how to improve organizational procedures, processes and systems through innovation.
2. Generate practical action plans for improving work procedures, processes	2.1 Ideas for innovative work procedure to foster innovation using individual and group techniques are conceptualized 2.2 Range of ideas with other team members and colleagues are evaluated and discussed 2.3 Work procedures and processes subject to change are selected based on ***workplace requirements*** (feasible and innovative). 2.4 Practical action plans are proposed to facilitate simple changes in the work procedures, processes and systems. 2.5 ***Critical inquiry*** is applied and used to	2.1 Seven habits of highly effective people. 2.2 Character strengths that foster innovation and learning (Christopher Peterson and Martin Seligman, 2004) 2.3 Five minds of the future concepts (Gardner, 2007). 2.4 Adaptation concepts in neuroscience (Merzenich, 2013). 2.5 Transtheoretical model of behavior change (Prochaska, DiClemente, & Norcross, 1992).	2.1 Assessing readiness for change on simple work procedures, processes and systems. 2.2 Generating insights on how to improve organizational procedures, processes and systems through innovation. 2.3 Facilitating action plans on how to apply innovative procedures in the organization.

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

TR – Mobile Phones & Handheld Gadgets Servicing NC III   (ELCMPS321)   Promulgated February 9, 2021   18

RANGE OF VARIABLES

VARIABLE	RANGE
1. Reasons	May include: 1.1. Strengths and weaknesses of the current systems, processes and procedures. 1.2. Opportunities and threats of the current systems, processes and procedures.
2. Models of innovation	May include: 2.1. Seven habits of highly effective people. 2.2. Five minds of the future concepts (Gardner, 2007). 2.3. Neuroplasticity and adaptation strategies.
3. Workplace requirements	May include: 3.1. Feasible 3.2. Innovative
4. Gaps or barriers	May include: 4.1. Machine 4.2. Manpower 4.3. Methods 4.4. Money
5. Critical Inquiry	May include: 5.1. Preparation. 5.2. Discussion. 5.3. Clarification of goals. 5.4. Negotiate towards a Win-Win outcome. 5.5. Agreement. 5.6. Implementation of a course of action. 5.7. Effective verbal communication. See our pages: Verbal Communication and Effective Speaking. 5.8. Listening. 5.9. Reducing misunderstandings is a key part of effective negotiation. 5.10. Rapport Building. 5.11. Problem Solving. 5.12. Decision Making. 5.13. Assertiveness. 5.14. Dealing with Difficult Situations.

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate:
	1.1 Established the reasons why innovative systems are required
	1.2 Established the goals of a new innovative system
	1.3 Analyzed current organizational systems to identify gaps and barriers to innovation.
	1.4 Assessed work procedures, processes and systems in terms of innovative practices.
	1.5 Generated practical action plans for improving work procedures, and processes.
	1.6 Reviewed the trial innovative work system and adjusted reflect evaluation feedback, knowledge management systems and future planning.
	1.7 Evaluated the effectiveness of the proposed action plans.
2. Resource 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: USE INFORMATION SYSTEMATICALLY

UNIT CODE   :   400311324

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

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Use technical information	1.1. *Information* are collated and organized into a suitable form for reference and use 1.2. Stored information are classified so that it can be quickly identified and retrieved when needed 1.3. Guidance are advised and offered to people who need to find and use information	1.1. Application in collating information 1.2. Procedures for inputting, maintaining and archiving information 1.3. Guidance to people who need to find and use information 1.4. Organize information 1.5. classify stored information for identification and retrieval 1.6. Operate the technical information system by using agreed procedures	1.1. Collating information 1.2. Operating appropriate and valid procedures for inputting, maintaining and archiving information 1.3. Advising and offering guidance to people who need to find and use information 1.4. Organizing information into a suitable form for reference and use 1.5. Classifying stored information for identification and retrieval 1.6. Operating the technical information system by using agreed procedures
2. Apply information technology (IT)	2.1. *Technical information* system is operated using agreed procedures 2.2. Appropriate and valid procedures are operated for inputting, maintaining and archiving information 2.3. *Software* required are utilized to execute the project activities 2.4. Information and data obtained are handled, edited, formatted and checked from a range of	2.1. Attributes and limitations of available software tools 2.2. Procedures and work instructions for the use of IT 2.3. Operational requirements for IT systems 2.4. Sources and flow paths of data 2.5. Security systems and measures that can be used 2.6. Extract data and	2.1. Identifying attributes and limitations of available software tools 2.2. Using procedures and work instructions for the use of IT 2.3. Describing operational requirements for IT systems 2.4. Identifying sources and flow paths of data

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	internal and external *sources* 2.5. Information are extracted, entered, and processed to produce the outputs required by *customers* 2.6. Own skills and understanding are shared to help others 2.7. Specified *security measures* are implemented to protect the confidentiality and integrity of project data held in IT systems	format reports 2.7. Methods of entering and processing information 2.8. WWW enabled applications	2.5. Determining security systems and measures that can be used 2.6. Extracting data and format reports 2.7. Describing methods of entering and processing information 2.8. Using WWW applications
3. Edit, format and check information	3.1 Basic editing techniques are used 3.2 Accuracy of documents are checked 3.3 Editing and formatting tools and techniques are used for more complex documents 3.4 Proof reading techniques is used to check that documents look professional	3.1 Basic file-handling techniques 3.2 Techniques in checking documents 3.3 Techniques in editing and formatting 3.4 Proof reading techniques	3.1 Using basic file-handling techniques is used for the software 3.2 Using different techniques in checking documents 3.3 Applying editing and formatting techniques 3.4 Applying proof reading techniques

RANGE OF VARIABLES

VARIABLE	RANGE
1. Information	May include: 1.1. Property 1.2. Organizational 1.3. Technical reference
2. Technical information	May include: 2.1. paper based 2.2. electronic
3. Software	May include: 3.1. spreadsheets 3.2. databases 3.3. word processing 3.4. presentation
4. Sources	May include: 4.1. other IT systems 4.2. manually created 4.3. within own organization 4.4. outside own organization 4.5. geographically remote
5. Customers	May include: 5.1. colleagues 5.2. company and project management 5.3. clients
6. Security measures	May include: 6.1. access rights to input; 6.2. passwords; 6.3. access rights to outputs; 6.4. data consistency and back-up; 6.5. recovery plans

EVIDENCE GUIDE

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

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

UNIT CODE : **400311325**

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

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Interpret Occupational Safety and Health practices	1.1 *OSH work practices issues* are identified relevant to work requirements 1.2 OSH work standards and procedures are determined based on applicability to nature of work 1.3 Gaps in work practices are identified related to relevant OSH work standards	1.1. OSH work practices issues 1.2. OSH work standards 1.3. General OSH principles and legislations 1.4. Company/ workplace policies/ guidelines 1.5. Standards and safety requirements of work process and procedures	1.1. Communication skills 1.2. Interpersonal skills 1.3. Critical thinking skills 1.4. Observation skills
2. Set OSH work targets	2.1 Relevant work information are gathered necessary to determine OSH work targets 2.2 *OSH Indicators* based on gathered information are agreed upon to measure effectiveness of workplace OSH policies and procedures 2.3 Agreed OSH indicators are endorsed for approval from appropriate personnel 2.4 *OSH work instructions* are received in accordance with workplace policies and procedures*	2.1. OSH work targets 2.2. OSH Indicators 2.3. OSH work instructions 2.4. Safety and health requirements of tasks 2.5. Workplace guidelines on providing feedback on OSH and security concerns 2.6. OSH regulations Hazard control procedures 2.7. OSH trainings relevant to work	2.1. Communication skills 2.2. Collaborating skills 2.3. Critical thinking skills 2.4. Observation skills
3. Evaluate effectiveness of Occupational Safety and Health work instructions	3.1 OSH Practices are observed based on workplace standards 3.2 Observed OSH practices are measured against approved *OSH metrics* 3.3 Findings regarding effectiveness are assessed and gaps identified are implemented based on OSH work standards	3.1. OSH Practices 3.2. OSH metrics 3.3. OSH Evaluation Techniques 3.4. OSH work standards	3.1. Critical thinking skills 3.2. Evaluating skills

RANGE OF VARIABLES

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

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1. Identify OSH work practices issues relevant to work requirements 1.2. Identify gaps in work practices related to relevant OSH work standards 1.3. Agree upon OSH Indicators based on gathered information to measure effectiveness of workplace OSH policies and procedures 1.4. Receive OSH work instructions in accordance with workplace policies and procedures 1.5. Compare Observed OSH practices with against approved OSH work instructions 1.6. Assess findings regarding effectiveness based on OSH work standards
2. Resource 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 3.3 Written exam
4. Context for Assessment	4.1 Competency may be assessed in the work place or in a simulated work place setting

UNIT OF COMPETENCY : **EVALUATE ENVIRONMENTAL WORK PRACTICES**
UNIT CODE : **400311326**
UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitude to interpret environmental Issues, establish targets to evaluate environmental practices and evaluate effectiveness of environmental practices

ELEMENTS	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Interpret environmental practices, policies and procedures	1.1 **Environmental work practices** issues are identified relevant to work requirements 1.2 Environmental Standards and Procedures nature of work are determined based on Applicability to nature of work 1.3 Gaps in work practices related to Environmental Standards and Procedures are identified	1.1 Environmental Issues 1.2 Environmental Work Procedures 1.3 Environmental Laws 1.4 Environmental Hazardous and Non-Hazardous Materials 1.5 Environmental required license, registration or certification	1.1. Analyzing Environmental Issues and Concerns 1.2. Critical thinking 1.3. Problem Solving 1.4. Observation Skills
2. Establish targets to evaluate environmental practices	2.1. Relevant information are gathered necessary to determine environmental work targets 2.2. **Environmental Indicators** based on gathered information are set to measure environmental work targets 2.3. Indicators are verified with appropriate personnel	2.1. Environmental Indicators 2.2. Relevant Environment Personnel or expert 2.3. Relevant Environmental Trainings and Seminars	2.1. Investigative Skills 2.2. Critical thinking 2.3. Problem Solving 2.4. Observation Skills
3. Evaluate effectiveness of environmental practices	3.1. Work environmental practices are recorded based on workplace standards 3.2. Recorded work environmental practices are compared against planned indicators 3.3. Findings regarding effectiveness are assessed and gaps identified are implemented based on environment work standards and procedures 3.4. Results of environmental assessment are conveyed to appropriate personnel	1.1. Environmental Practices 1.2. Environmental Standards and Procedures	3.1 Documentation and Record Keeping Skills 3.2 Critical thinking 3.3 Problem Solving 3.4 Observation Skills

RANGE OF VARIABLES

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

EVIDENCE GUIDE

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

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

UNIT CODE **:** **400311327**

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

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Develop and maintain micro-small-medium enterprise (MSMEs) skills in the organization	1.1 Appropriate **business strategies** are determined and set for the enterprise based on current and emerging business environment. 1.2 **Business operations** are monitored and controlled following established procedures. 1.3 Quality assurance measures are implemented consistently. 1.4 Good relations are maintained with staff/workers. 1.5 Policies and procedures on occupational safety and health and environmental concerns are constantly observed.	1.1 Business models and strategies 1.2 Types and categories of businesses 1.3 Business operation 1.4 Basic Bookkeeping 1.5 Business internal controls 1.6 Basic quality control and assurance concepts 1.7 Government and regulatory processes	1.1 Basic bookkeeping/ accounting skills 1.2 Communication skills 1.3 Building relations with customer and employees 1.4 Building competitive advantage of the enterprise
2. Establish and Maintain client-base/market	2.1 Good customer relations are maintained 2.2 New customers and markets are identified, explored and reached out to. 2.3 Promotions/Incentives are offered to loyal customers 2.4 Additional products and services are evaluated and tried where feasible. 2.5 **Promotional/advertising initiatives** are carried out where necessary and feasible.	2.1 Public relations concepts 2.2 Basic product promotion strategies 2.3 Basic market and feasibility studies 2.4 Basic business ethics	2.1 Building customer relations 2.2 Individual marketing skills 2.3 Using basic advertising (posters/ tarpaulins, flyers, social media, etc.)
3. Apply budgeting and financial management skills	3.1 Enterprise is built up and sustained through judicious control of cash flows. 3.2 Profitability of enterprise is ensured though appropriate **internal controls**. 3.3 Unnecessary or lower-priority expenses and purchases are avoided.	3.1 Cash flow management 3.1 Basic financial management 3.2 Basic financial accounting 3.3 Business internal controls	3.1 Setting business priorities and strategies 3.2 Interpreting basic financial statements 3.3 Preparing business plans

RANGE OF VARIABLES

VARIABLE	RANGE
1. Business strategies	May include: 1.1. Developing/Maintaining niche market 1.2. Use of organic/healthy ingredients 1.3. Environment-friendly and sustainable practices 1.4. Offering both affordable and high-quality products and services 1.5. Promotion and marketing strategies (e. g., on-line marketing)
2. Business operations	May include: 2.1 Purchasing 2.2 Accounting/Administrative work 2.3 Production/Operations/Sales
3. Internal controls	May include: 3.1 Accounting systems 3.2 Financial statements/reports 3.3 Cash management
4. Promotional/ Advertising initiatives	May include: 4.1 Use of tarpaulins, brochures, and/or flyers 4.2 Sales, discounts and easy payment terms 4.3 Use of social media/Internet 4.4 "Service with a smile" 4.5 Extra attention to regular customers

EVIDENCE GUIDE

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

COMMON COMPETENCIES

UNIT TITLE	**:**	**USE HAND TOOLS**	
UNIT CODE	**:**	**ELC724201**	
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 : **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
3. Maintain measuring instruments	3.1. Measuring instruments are not dropped to avoid damage 3.2. Measuring instruments are cleaned before and after using.	3.1. Types of measuring instruments and their uses 3.2. Safe handling procedures in using measuring	3.1. Handling and maintaining measuring instruments

ELEMENT	PERFORMANCE CRITERIA *Italicized Bold* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	3.3. Proper storage of instruments undertaken according to manufacturer's specifications and standard operating procedures.	instruments 3.3. Four fundamental operation of mathematics 3.4. Formula for volume, area, perimeter and other geometric figures	

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	The following resources should be provided: 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	:	**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 ○ Linear measurement ○ Dimension ○ Unit conversion 2.2. Blueprint Reading and Plan Specification ○ Architectural, electrical, electronics, mechanical plan, symbols and abbreviations ○ Drawing standard symbols 2.3. Trade Theory ○ Basic technical drawing ○ Types technical plans ○ Various types of drawings ○ 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 ○ Four fundamental operations ○ Percentage ○ Fraction ○ Algebra ○ 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 and 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	May include but not limited to: 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	The following resources should be provided: 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 : **ELC315202**

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

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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

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TR – Mobile Phones & Handheld Gadgets Servicing NC III   (ELCMPS321)   Promulgated February 9, 2021   44

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	The following resources should be provided: 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	:	**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* 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* 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. USB 4.2. hard disk drives, local and remote 4.3. cloud
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	The following resources should be provided: 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	:	ELC724202
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	The following resources should be provided:
	3.1 Tools for measuring, cutting, drilling, assembling/ disassembling, connection. Tool set includes the following but not limited to:
	o screw drivers
	o pliers
	o 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   **: ELC724205**

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 forms 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 development and on	2.1 Safety o Work Safety requirements and economy of materials with durability o Knowledge in 5S application and observation of required	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

	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
		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 with agreed project or
		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
		  o Supplying different
			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
			3.6 Product analysis and

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	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	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	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 should 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 : **PREPARE WORKPLACE FOR SERVICING MOBILE PHONE UNIT AND HANDHELD GADGET**

UNIT CODE : **ELC742301**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes needed in preparing workplace for servicing of mobile phone units and handheld gadgets. This includes competencies in organizing workplace, equipment/instrument, tools and materials for servicing, setting-up electro-static discharge (ESD) and other safety procedures, and reviewing customers related information.

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Organize workplace, equipment/ instrument, tools and materials for servicing	1.1. Workplace is set/ prepared in line with the service/repair center requirements * 1.2. Necessary ***equipment/ instrument, and tools*** used for servicing of mobile phone unit/ handheld gadget are prepared in line with job requirements * 1.3. ***Materials and consumables*** are prepared in line with job requirements * 1.4. Hard/Soft copies of ***service manuals*** and ***service information*** required are obtained prior to servicing activity. 1.5. Task is planned to ensure OH& S guidelines and procedures are followed* 1.6. Internet service requirements are checked for stability and readiness * 1.7. Laws, ordinances and regulations related to mobile devices servicing are familiarized in line with service/repair center's administrative and business guidelines and procedures.	1.1. Service center rules and requirements ○ Service Flowchart ○ Service Forms ○ Repair/Service Fees ○ Type of services to be rendered 1.2. Knowledge in Internet browsing, downloading and chatting/ online forums 1.3. Knowledge in technical aspects of mobile phone/ handheld gadget servicing 1.4. Safety ○ Work Safety requirements and economy of materials with durability ○ Knowledge in 5S application and observation of required procedure 1.5. Materials, tools & instruments for mobile phone unit and handheld gadget servicing ○ Identification of hand tools ○ Proper care and use of tools ○ Identification of test and measuring instruments 1.6. Laws and regulations ○ RA 9292, Sec.5 ○ NTC memorandum	1.1. Reading skills required to interpret work instructions 1.2. Communication skills 1.3. Computer operation skills 1.4. Internet browsing and forum chatting 1.5. Identifying tools, instruments and materials for servicing

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ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS

		Circulars (# 07-08-2004)
		  - Certification
		  - Permits
		  - TESDA Certification
		  ○ Local Ordinance
		    - Business permit
		  ○ DTI Regulations
		    - Warranty period
		    - Certification
		  ○ E-waste management
		    (DENR AO 2013-22)	

2. Set-up ESD and other safety procedures	2.1. Electro-static discharge (ESD) procedure is followed in accordance with current industry standards. *
	2.2. ***Personal protective equipment*** is prepared in accordance with ***Occupational Health and Safety practices*** *
	2.3. Faulty material or components related to work are identified and isolated
	2.4. Unsafe or faulty tools are identified and marked for repair according to safety procedure
		2.1. Electro-static discharge set-up
		2.2. Usage of Anti- Static package
		2.3. Usage of personal protective equipment
		2.4. Knowledge of occupational health and safety practices
		2.5. Proper identification of faulty tools, components or materials
		2.6. Safety
		  ○ Work Safety requirements and economy of materials with durability
		  ○ Knowledge in 5S application and observation of required procedure
			2.1. Reading skills required to interpret work instructions
			2.2. Communication skills
			2.3. Computer operation skills
			2.4. Internet browsing and forum chatting
			2.5. Identifying tools, instruments and materials for servicing
			2.6. Following safety requirements

3. Review customers related information	3.1. Work instructions are obtained and work preparation is carried out in accordance with job requirements 3.2. Job order forms are checked for customers concern and other related issues * 3.3. Customer related inquiries are resolved in accordance with job requirement 3.4. Relevant sources of information are identified in accordance with workplace/ client requirements	3.1. Rules of effective business communication in customer service 3.2. How to deal with customer satisfaction 3.3. Methods of communication 3.4. Relevant sources of information	3.1. Reading skills required to interpret work instructions 3.2. Communication skills 3.3. Computer operation skills 3.4. Internet browsing and forum chatting 3.5. Identifying tools, instruments and materials for servicing

RANGE OF VARIABLES

VARIABLE	RANGE

1. Tools and instruments	May include but not limited to:
	Tools:
	  1.1. Soldering iron
	  1.2. Desoldering tools
	  1.3. Tweezer
	  1.4. Precision screwdrivers (assorted)
	  1.5. Set of torx/star bit
	  1.6. Multi-testers (analog/digital)
	  1.7. Pliers (assorted)
	  1.8. Blade cutter
	Equipment/Instruments:
	  1.9. Rework station (Hot air) with soldering tool
	  1.10. Oscilloscope
	  1.11. Power Supply - variable
	  1.12. LCD refurbishing tools
	  1.13. ESD-free work bench with mirror
	  1.14. High-grade magnifying glass with lamp
	  1.15. Microscope
	  1.16. Desktop computer/ laptop
	  1.17. GSM Flasher tools
	  1.18. Thermal camera
	  1.19. Smoke absorber/fume extractor
	  1.20. Ultrasonic cleaner
	  1.21. CNC for mobile phone

2. Materials and consumables	May include but not limited to:
	  2.1. Soldering lead
	  2.2. Cleaning agent
	  2.3. Cleaning brush
	  2.4. Magnetic wires
	  2.5. Flux
	  2.6. Board for rework
	  2.7. SRT (plastic opener)
	  2.8. Reballing plate
	  2.9. Suction cap
	  2.10. USB cable
	  2.11. Card reader
	  2.12. UV lights/curing mask paste
	  2.13. Desoldering wick
	  2.14. Anti-static mat
	  2.15. Adhesive paste
	  2.16. Handheld gadgets OS software

3. Service manuals	May include but not limited to:
	  3.1. Service manual/schematic diagram/parts list
	  3.2. Operating instructions/User's/Owner's manual
	  3.3. Repair handbooks for mobile/cellular phones

VARIABLE	RANGE
4. Service Information	May include but not limited to: 4.1. Job Report Sheets 4.2. Job Order forms 4.3. Bill of materials 4.4. Customer index 4.5. Service flowchart 4.6. Stock and inventory record 4.7. Requisition slips (for acquisition of parts) 4.8. Supplier Index
5. Personal protective equipment	May include but not limited to: 5.1. Working clothes/Apron 5.2. Face/Dust Mask 5.3. Goggles 5.4. Anti-static mat 5.5. Anti-static gloves 5.6. anti-static wrist strap
6. OHS practices	May include but not limited to: 6.1. Use of proper tools and equipment 6.2. Observe workplace environment and safety 6.3. Adherence to safety requirements in handling the unit 6.4. Use of protective device/shields 6.5. Proper ESD practices

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate:

	1.1. Organize workplace, equipment/ instrument, tools and materials for servicing
	    1.1.1. Set/Prepared workplace in line with the service/repair center requirements
	    1.1.2. Used necessary equipment/ instrument, and tools for servicing of mobile phone/hand held gadget units are prepared in line with job requirements
	    1.1.3. Prepared materials and consumables are prepared in line with job requirements
	    1.1.4. Planned task to ensure OH& S guidelines and procedures are followed
	    1.1.5. Checked internet service requirements for stability and readiness
	1.2. Set-up ESD and other safety procedures
	    1.2.1. Followed electro-static discharge (ESD) procedure in accordance with current industry standards
	    1.2.2. Prepared personal protective equipment in accordance with Occupational Health and Safety practices
	1.3. Review customers related information
	    1.3.1. Checked job order forms for customers concern and other related issues

2. Resource Implications	The following resources should be provided: 2.1. Work area with sufficient lighting and ventilation system 2.2. Tools, equipment and test instruments 2.3. ESD free working area/bench 2.4. Mobile/cellular phone units and handheld gadgets 2.5. Service manuals/schematics 2.6. Desktop units / laptop and appropriate application software 2.7. Complete mobile/cellular phone spare parts and accessories
3. Methods of Assessment	Competency may be assessed through: 3.1. Demonstration with oral questioning 3.2. Written test 3.3. Portfolio with interview
4. Context for Assessment	4.1. Competency may be assessed in actual workplace or at the designated TESDA Accredited Assessment Center.

UNIT TITLE : **DIAGNOSE AND IDENTIFY HARDWARE AND SOFTWARE RELATED PROBLEMS**

UNIT CODE : **ELC742302**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes needed in diagnosing and identifying hardware and software related problems for both mobile phone units and handheld gadgets. This includes assessing customer's concerns, checking the condition of the unit/gadget and determining the hardware and software status of the unit/gadget.

This covers mobile phones (i.e., cellular phone, smartphone & phone-tablet) and handheld gadgets (i.e., tablet, iPad, notepad, portable media player, e-Watch and other similar gadgets).

ELEMENT	PERFORMANCE CRITERIA *Italicized Bold* items are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Assess customer's concern	1.1. Pre-history trouble of the ***unit/gadget*** is determined according to the customer's concern * 1.2. Customers are advised/ informed regarding the status and serviceability of the unit/gadget * 1.3. Customer's approval is sought prior to servicing	1.1. How to deal with customer satisfaction 1.2. Knowledge in systematic pre-testing procedures as per user's manual 1.3. Rules of effective business communication in customer service	1.1. Reading skills 1.2. Communication skills 1.3. Computer skills 1.4. Interpersonal skills 1.5. Internet browsing and forum chatting
2. Check the condition of the unit/ gadget	2.1. Task requirements are determined according to job specifications * 2.2. Visual checking is performed based on established procedures * 2.3. Defects and faults are listed and documented in accordance with service center guidelines	2.1. Knowledge in systematic pre-testing procedures as per user's manual 2.2. Usage of diagnostic tools 2.3. System and Processes ○ Computer operation ○ Electronic components and circuits ○ Analysis of troubles and isolation techniques 2.4. Visual checking procedure 2.5. Types of defects and faults in mobile phones and handheld gadgets	2.1. Reading skills 2.2. Communication skills 2.3. Computer skills 2.4. Interpersonal skills 2.5. Internet browsing and forum chatting 2.6. Diagnosing techniques
3. Determine the hardware status of the unit/gadget	3.1. ***Personal protective equipment*** is used in accordance with ***Occupational Health and Safety practices.*** * 3.2. Actual troubled/ damaged	3.1. Knowledge in systematic pre-testing procedures as per user's manual 3.2. How to deal with customer satisfaction	3.1. Reading skills 3.2. Communication skills 3.3. Computer skills 3.4. Interpersonal

ELEMENT	PERFORMANCE CRITERIA *Italicized Bold* items are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS

	part is checked using diagnostic tools to identify the problem *
	
	3.3. Results of diagnosis and testing are documented and completed within the specified time.
		3.3. Drawing and Schematic Diagram
		  o Reading and interpreting electronic schematic diagram and symbols
		3.4. Safety
		  o Work Safety requirements and economy of materials with durability
		3.5. System and Processes
		  o Computer operation
		  o Electronic components and circuits
		  o Analysis of troubles and isolation techniques
		3.6. Rules of effective business communication in customer service
			skills
			3.5. Internet browsing and forum chatting
			3.6. Diagnosing techniques
			3.7. Interpretation of diagrams

4. Determine the software status of the unit/gadget	4.1. Specific driver are installed, if necessary, based on unit/gadget model and brand * 4.2. *Chipset* is identified on unit/gadget model and brand. 4.3. Unit/Gadget status is verified based on the appropriate software tools "READ" information results/logs * 4.4. Firmware backup is performed to identify the appropriate firmware versions as per standard procedure * 4.5. Actual troubled/damaged part is checked using 3rd party software diagnostic tools to identify the problem* 4.6. Results of software diagnosis and testing are documented and completed within the specified time.	4.1. Knowledge in '*boot mode*' of different mobile phones 4.2. Knowledge in compatibility of drivers for mobile phone units and handheld gadgets 4.3. Knowledge in compatibility of firmware for mobile phone and handheld gadgets 4.4. Knowledge in interpreting data logs 4.5. Knowledge in mobile device and handheld gadgets settings' hardware specifications 4.6. Firmware backup procedures 4.7. Mobile phone and handheld gadget logic board/circuit 4.8. identification o Chipsets	4.1. Reading skills 4.2. Computer skills 4.3. Internet browsing and forum chatting 4.4. Skills in mobile device/phone and handheld gadgets operation 4.5. Interpreting data logs 4.6. diagnostic skills 4.7. documentation skills

RANGE OF VARIABLES

VARIABLE	RANGE

1. unit/ gadget	May include:
	1.1. Mobile phone units
	    1.1.1. Cellular phone
	    1.1.2. Smart phone
	    1.1.3. Phone-tablet
	1.2. Handheld gadgets
	    1.2.1. Tablet
	    1.2.2. iPad
	    1.2.3. Notepad
	    1.2.4. Portable media player
	    1.2.5. e-Watch
	    1.2.6. other similar gadgets

2. Personal protective equipment	May include but not limited to: 2.1. Working clothes/Apron 2.2. Face/Dust Mask 2.3. Goggles 2.4. Anti-static mat 2.5. Anti-static gloves 2.6. Anti-static wrist strap
3. OHS practices	May include but not limited to: 3.1. Use of proper tools and equipment 3.2. Observe workplace environment and safety 3.3. Adherence to safety requirements in handling the handheld gadgets 3.4. Use of protective device/shields 3.5. Proper ESD practices
4. Chipset	May include but not limited to: 4.1. Qualcomm 4.2. MTK 4.3. Spreadtrum

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate:
	1.1. Assessed customer's concern
	    1.1.1. Determined pre-history trouble of the unit/gadget according to the customer's concern
	    1.1.2. Advised/Informed customers regarding the status and serviceability of the unit
	1.2. Checked the condition of the unit/ gadget
	    1.2.1. Determined task requirements according to job specifications
	    1.2.2. Performed visual checking based on established procedures
	1.3. Determined the hardware status of the unit/gadget
	    1.3.1. Used personal protective equipment (PPE) in accordance with Occupational Health and Safety practices
	    1.3.2. Checked actual troubled/ damaged part using diagnostic tools to identify the problem
	1.4. Determined the software status of the unit/gadget
	    1.4.1. Installed specific driver, if necessary, based on unit/gadget model and brand
	    1.4.2. Verified unit/gadget status based on the appropriate software tools "READ" information results/logs
	    1.4.3. Performed firmware backup to identify the appropriate firmware versions as per standard procedure
	    1.4.4. Checked actual troubled/damaged part using 3rd party software diagnostic tools to identify the problem

2. Resource Implications	The following resources should be provided: 2.1. Work area with sufficient lighting and ventilation system 2.2. Tools, equipment and test instruments 2.3. ESD free working area/bench 2.4. Appropriate handheld gadgets 2.5. Service manuals/schematics 2.6. Desktop units / laptop and appropriate application software 2.7. Complete handheld gadgets spare parts and accessories
3. Methods of Assessment	Competency may be assessed through: 3.1. Demonstration with oral questioning 3.2. Written test 3.3. Portfolio with interview
4. Context for Assessment	4.1. Competency may be assessed in actual workplace or at the designated TESDA Accredited Assessment Center.

| | UNIT TITLE | : | **TROUBLESHOOT AND REPAIR MOBILE PHONE UNIT AND HANDHELD GADGET** |

UNIT TITLE   :   **TROUBLESHOOT AND REPAIR MOBILE PHONE UNIT AND HANDHELD GADGET**

UNIT CODE   :   **ELC742303**

UNIT DESCRIPTOR :   This unit covers the knowledge, skills and attitudes needed in troubleshooting and repairing hardware and software related problems for mobile phone units and handheld gadgets. This includes disassembling the unit/gadget, troubleshooting and repairing the unit/gadget hardware and also performing related mobile unit/handheld gadget software repair.

ELEMENT	PERFORMANCE CRITERIA *Italicized Bold* items are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Disassemble unit/gadget	1.1. ***Personal protective equipment*** is used in accordance with ***Occupational Health and Safety practices***. * 1.2. Necessary tools and instruments used for disassembly of unit/gadget are prepared in line with job requirements 1.3. ***Accessories*** are detached to the unit/gadget as per user's guide 1.4. Disassembly procedures are performed in accordance with OH&S policies and work instructions * 1.5. Parts and accessories are properly organized in accordance with its functionality and purpose *	1.1. Disassembly procedures as per user's guide 1.2. Safety ○ Work Safety requirements and economy of materials with durability 1.3. Tools and instruments used for disassembly 1.4. Parts and functions of mobile phone and handheld gadget parts and accessories 1.5. Mobile phone and handheld gadget parts functionality	1.1. Reading skills 1.2. Communication skills 1.3. Computer skills 1.4. Skills in assembly/ disassembly of mobile phone/handheld gadgets 1.5. Identifying parts and accessories 1.6. Internet browsing and forum chatting
2. Troubleshoot unit/gadget hardware related problem	2.1. Personal protective equipment is used in accordance with Occupational Health and Safety practices. * 2.2. Electro-static discharge (ESD) procedure is followed in accordance with current industry standards. * 2.3. Systematic ***pre-testing procedure*** is observed in accordance with user's manual. * 2.4. ***System defects/ Fault symptoms*** are identified in accordance with ***basic troubleshooting techniques***. *	2.1. Knowledge in systematic pre-testing procedures as per user's manual 2.2. Knowledge in new/ upcoming trends in mobile phone units and handheld gadgets 2.3. Types of systems defects/fault symptoms of a mobile/cellular phone units and handheld gadgets (see ROV) 2.4. Basic troubleshooting techniques for mobile/cellular phones and handheld gadgets	2.1. Reading skills 2.2. Communication skills 2.3. Computer skills 2.4. Background in basic electronics skills and theory 2.5. Internet browsing and forum chatting 2.6. Troubleshooting techniques 2.7. Interpretation of schematic diagrams

ELEMENT	PERFORMANCE CRITERIA *Italicized Bold* items are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS

	2.5. Chips and components are checked and isolated using specified testing procedures*
	2.6. ***Input/output (I/O) components*** are checked using specified testing procedures *
	2.7. Whenever applicable, identified defects and faults are explained to the ***responsible person*** in accordance with service center guidelines
	2.8. Results of diagnosis and testing are documented and completed within the specified time.
	2.9. Customers are advised/ informed regarding the status and serviceability of the unit.
		(see ROV)
		2.5. Drawing and Schematic Diagram
		  o Reading and interpreting electronic schematic diagram and symbols
		2.6. Safety
		  o Work Safety requirements and economy of materials with durability
		2.7. System and Processes
		  o Computer operation
		  o Electronic components and circuits
		  o Analysis of troubles and isolation techniques
		  o Types of I/O components	

3. Repair unit/ gadget hardware related problem	3.1. Personal protective equipment is used in accordance with Occupational Health and Safety practices. *
	3.2. Electro-static discharge (ESD) procedure is followed in accordance with current industry standards.*
	3.3. Defective parts/ components are replaced/ swapped with original/ compatible parts according to diagnostic results. *
	3.4. Repaired or replaced parts/components are soldered/mounted in accordance with the current industry standards.*
	3.5. Repair activity is performed within the required timeframe.*
	3.6. Repaired or replaced parts/components are checked for proper mounting and tested for its functionality. *
	3.7. Care and extreme precaution in handling the unit/gadget is
		3.1. Usage of personal protective equipment
		3.2. Knowledge of occupational health and safety practices
		3.3. Knowledge in using multi-tester/VOM and other testing instruments
		3.4. Knowledge in environmental safety
		  o E-Waste disposal
		  o Toxic fumes management
		3.5. Usage of Anti- Static package
		3.6. Soldering techniques and rework station (hot air) operation
		3.7. Parts/Components mounting procedures
		3.8. Functionality testing
		3.9. Drawing and Schematic Diagram
		  o Reading and interpreting electronic schematic diagram and symbols
		3.10. Knowledge in 5S
			3.1. Reading skills
			3.2. Communication skills
			3.3. Computer skills
			3.4. Internet browsing and forum chatting
			3.5. Troubleshooting techniques
			3.6. Soldering and desoldering skills
			3.7. Parts identification and function
			3.8. Interpretation of diagrams

ELEMENT	PERFORMANCE CRITERIA *Italicized Bold* items are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	observed as per procedures.*	application and observation of required procedure 3.11. Materials, tools & equipment – their functions and uses o Proper care and use of tools o Proper usage of test and measuring instruments 3.12. System and Processes o Computer operation o Electronic components and circuits o Analysis of troubles and isolation techniques o Soldering/ Desoldering techniques o Parts/components replacement o Reprogramming/ Flashing mobile/cellular phone unit	
4. Repair unit/ gadget software related problem	4.1. Identified unit/gadget firmware is prepared based on phone and mobile device settings' hardware specifications * 4.2. Battery life percentage is ensured to be 50% higher prior to installation of unit/gadget firmware and other related software * 4.3. Client is informed for possible loss of user data during software * 4.4. Formatting of user data is performed based on unit/gadget factory default settings * 4.5. ***Compatible firmware version*** is installed based on unit/gadget model/brand and standard procedures * 4.6. If necessary, unit/gadget backup and default settings	4.1. Knowledge in materials and tools for the different mobile phones and handheld gadgets 4.2. Knowledge in compatibility of drivers for mobile phone and handheld gadgets 4.3. Knowledge in compatibility of firmware version for mobile phones and handheld gadgets 4.4. User data formatting procedure 4.5. Knowledge in mobile device and handheld gadgets settings' hardware specifications 4.6. Firmware versions 4.7. Firmware installation procedure	4.1. Reading skills 4.2. Computer skills 4.3. Internet browsing and forum chatting 4.4. Skills in mobile device/phone and handheld gadgets operation 4.5. Software/ firmware installation skills

ELEMENT	PERFORMANCE CRITERIA *Italicized Bold* items are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	are restored based on standard procedures		
5. Reassemble unit/ gadget	5.1. Reassembly procedure is performed in accordance with OH&S policies *and* in conformity with user's manual * 5.2. Internal components are checked and verified if in placed based on standard procedures * 5.3. Accessories are installed to the unit/gadget as per user's guide * 5.4. Repaired unit/gadget is cleaned in in accordance with standard procedures 5.5. Waste materials are disposed of in accordance with environmental requirements. 5.6. Service completion report is prepared and documented as per service/repair center's guidelines and procedures	5.1. Knowledge on mobile phone unit and handheld gadget parts assembly and disassembly 5.2. Knowledge in mobile phone unit and handheld gadget operation 5.3. Normal working condition of mobile phone unit and handheld gadget 5.4. System and Processes o Parts/components assembly/ disassembly 5.5. E-waste management (DENR AO 2013-22)	5.1. Reading skills 5.2. Communicatio n skills 5.3. Interpretation of diagrams 5.4. Assembly and disassembly skills 5.5. Skills in mobile phone unit and handheld gadget operation

RANGE OF VARIABLES

VARIABLE	RANGE	
1. Personal protective equipment	May include but not limited to: 1.1. Working clothes/Apron 1.2. Face/Dust Mask 1.3. Goggles 1.4. Anti-static mat 1.5. Anti-static gloves 1.6. anti-static wrist strap	
2. OHS practices	May include but not limited to: 2.1. Use of proper tools and equipment 2.2. Observe workplace environment and safety 2.3. Adherence to safety requirements in handling the unit 2.4. Use of protective device/shields 2.5. Proper ESD practices	
3. Accessories	May include: 3.1. Casing 3.2. SIM card 3.3. SD card 3.4. Battery	
4. Pre-testing procedures	May include: 4.1. Visual inspection of the unit with the power off 4.2. Interview of customer, re: history of unit 4.3. Operate the unit according to manual to confirm defects	
5. System defect/ Fault symptoms	May include but not limited to: 5.1. <u>No power</u> • Water damaged unit • Dropped unit • Memory-full unit • Software incompatibility • Defective battery • Defective battery terminal • Defective ON/OFF switch 5.2. <u>No Signal</u> • No transmission/ reception • Intermittent signal • Shorted/grounded unit • Corrupted IMEI • Defective antenna 5.3. <u>Not charging</u> • Defective charging port • Overcharged battery • Defective Charging IC • Defective battery • Defective battery terminal • Corrupted software	5.4. <u>Defective User interface</u> • Buzzer • Vibrator • Keypad • Ear piece • Microphone • LCD problem • Camera problem • Charging port problem • Touch screen/digitizer • Antenna 5.5. <u>Defective modules</u> • Wi-Fi / Bluetooth • Radio / TV / Audio • Camera

VARIABLE	RANGE
6. Basic troubleshooting techniques	May include but not limited to: 6.1. Sensing methods (visual, hearing, smell, touch) 6.2. Component substitution/swapping method 6.3. Isolation method 6.4. Diagnostic software method 6.5. Diagnosing components using test instruments
7. Input/output (I/O) components	May include but not limited to: 7.1. Speaker/Loud speaker 7.2. Wireless / USB keyboard 7.3. Microphone/Mouth piece 7.4. LCD 7.5. Camera 7.6. Charging port 7.7. Touch screen/digitizer 7.8. Power switch/button 7.9. SIM/Memory card socket
8. Responsible person	May include but not limited to: 8.1. Immediate supervisor 8.2. Service supervisor/manager
9. Environmental Requirements	May include but not limited to: 9.1. Proper disposal of chemicals and components shall be based on existing requirements of the law and chemical waste management 9.2. Non-biodegradable parts or materials shall be packed and labeled properly for disposal. 9.3. Electronic waste are properly packed and labeled for disposal in accordance with environmental requirements.
10. Compatible firmware version	May include: 10.1. stockROM/Flash file 10.2. official latest update 10.3. custom firmware version

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate:
	1.1. Disassemble unit/gadget
	1.1.1. Used personal protective equipment (PPE) in accordance with Occupational Health and Safety practices
	1.1.2. Performed disassembly procedures in accordance with OH&S policies and work instructions
	1.1.3. Properly organized parts and accessories in accordance with its functionality and purpose
	1.2. Troubleshoot unit/gadget hardware related problem
	1.2.1. Followed electro-static discharge (ESD) procedure in accordance with current industry standards
	1.2.2. Observed systematic pre-testing procedure in accordance with user's manual
	1.2.3. Identified system defects/ fault symptoms in accordance with basic troubleshooting techniques
	1.2.4. Checked and isolated chips and components using specified testing procedures
	1.2.5. Checked input/output (I/O) components using specified testing procedures
	1.3. Repaired unit/ gadget hardware related problem
	1.3.1. Replaced/Swapped defective parts/ components with original/ compatible parts according to diagnostic results
	1.3.2. Soldered/Mounted repaired or replaced parts/ components in accordance with the current industry standards
	1.3.3. Performed repair activity within the required timeframe
	1.3.4. Checked repaired or replaced parts/components for proper mounting and tested for its functionality
	1.3.5. Observed care and extreme precaution in handling the unit/gadget as per procedures
	1.4. Repaired unit/ gadget software related problem
	1.4.1. Identified unit/gadget firmware is prepared based on phone and mobile device settings' hardware specifications
	1.4.2. Ensured battery life percentage to be 50% higher prior to installation of unit/gadget firmware and other related software
	1.4.3. Informed client for possible loss of user data during software
	1.4.4. Performed formatting of user data based on unit/gadget factory default settings
	1.4.5. Installed compatible firmware version based on unit/gadget model/brand and standard procedures
	1.5. Reassemble unit/ gadget
	1.5.1. Performed reassembly procedure in accordance with OH&S policies and in conformity with user's

		manual
		1.5.2. Checked and verified internal components if in placed based on standard procedures
		1.5.3. Cleaned repaired unit/gadget in in accordance with standard procedures
2. Resource Implications	The following resources should be provided:	
	2.1. Work area with sufficient lighting and ventilation system	
	2.2. ESD free working area/bench	
	2.3. Tools and equipment	
	2.4. Appropriate mobile/cellular phone units	
	2.5. Desktop/ laptop units and appropriate mobile application/add-ons software	
	2.6. Work Instructions Assessment rating sheet	
	2.7. Applicable forms for specific tasks	
3. Methods of Assessment	Competency may be assessed through:	
	3.1. Demonstration with oral questioning	
	3.2. Written test	
	3.3. Portfolio with interview	
4. Context for Assessment	4.1. Competency may be assessed in actual workplace or at the designated TESDA Accredited Assessment Center.	

TR – Mobile Phones & Handheld Gadgets Servicing NC III   (ELCMPS321)   Promulgated February 9, 2021   76

UNIT TITLE : **PERFORM FUNCTIONALITY TESTING AND DOCUMENTATION**
UNIT CODE : **ELC742304**
UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes needed in performing functionality testing and documentation. This includes checking the functionality of the mobile phone unit and handheld gadget, turning over repaired unit/gadget for customer's approval and documenting/recording service information.

ELEMENT	PERFORMANCE CRITERIA *Italicized Bold* items are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Check the functionality of the unit/ gadget	1.1. Full *functionality* of the repaired *unit/gadget* is verified in conformity with the customer's concern * 1.2. Unit's/Gadget's functionality is verified based on default settings * 1.3. *Accessories* are tested in accordance with manufacturer's specification* 1.4. Completeness and accuracy of documents are checked in accordance to service requirements and specifications	1.1. Mobile phone units and handheld gadgets' default settings 1.2. Security and account features 1.3. Knowledge in Internet/ network settings ○ configuration of mobile phones and handheld gadgets 1.4. Knowledge in mobile phones and handheld gadgets operations 1.5. Types of accessories for mobile phones and handheld gadgets	1.1. Communication skills 1.2. Computer skills 1.3. Internet browsing and forum chatting 1.4. Skills in mobile phone operation 1.5. Mobile internet/ network configuration skills 1.6. Product handling
2. Turn over repaired unit/gadget for customer's approval	2.1. Proper etiquette in handling customer is observed in accordance with workplace procedures 2.2. Unit/Gadget is endorsed to customer in accordance with service/repair center procedures and guidelines* 2.3. Orientation and technical assistance is provided to customer based on service/repair center procedures and guidelines 2.4. Performance of operation or quality of service to ensure *customer* satisfaction is monitored.	2.1. Quality improvement processes 2.2. Proper etiquette in handling customer 2.3. Knowledge in mobile phones and handheld gadgets operations 2.4. Service/Repair center procedures and guidelines	2.1. Communication skills 2.2. Computer skills 2.3. Internet browsing and forum chatting 2.4. Skills in mobile phone operation 2.5. Mobile internet/ network configuration skills
3. Document/ Record service information	3.1. *Information* on the quality and other indicators of service performance is recorded in accordance with workplace procedures. 3.2. Service completion	3.1. Service information 3.2. Fault identification and reporting 3.3. Workplace procedure in	3.1. Communicatio n skills 3.2. Computer skills 3.3. Internet browsing and forum chatting

ELEMENT	PERFORMANCE CRITERIA *Italicized Bold* items are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	procedures and ***documentations*** are complied with in accordance with service center guidelines.* 3.3. Deviations from specified ***quality standards*** causes are documented and reported in accordance with the workplace' standards operating procedures	documenting completed work 3.4. Workplace Quality Indicators	3.4. Skills in mobile phone operation 3.5. Mobile internet/ network configuration skills 3.6. Documentation skills

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TR – Mobile Phones & Handheld Gadgets Servicing NC III   (ELCMPS321)   Promulgated February 9, 2021   78

RANGE OF VARIABLES

VARIABLE	RANGE

1. Functionality	Functionality checks may include:
	1.1. touch screen/digitizer
	1.2. camera
	1.3. audio
	    1.3.1. microphone
	    1.3.2. Earpiece
	    1.3.3. Speaker/buzzer
	1.4. Wireless device
	    1.4.1. Bluetooth
	    1.4.2. Wi-Fi
	1.5. Signal
	    1.5.1. Outgoing/incoming call and text
	    1.5.2. Mobile data
	1.6. Charging and headset port
	1.7. Buttons
	1.8. sensors

2. Unit/ Gadget	May include:
	2.1. Mobile phone units
	    2.1.1. Cellular phone
	    2.1.2. Smart phone
	    2.1.3. Phone-tablet
	2.2. Handheld gadgets
	    2.2.1. Tablet
	    2.2.2. iPad
	    2.2.3. Notepad
	    2.2.4. Portable media player
	    2.2.5. e-Watch
	    2.2.6. other similar gadgets

3. Accessories	May include: 3.1. Headset/Earphone 3.2. Memory card 3.3. SIM card 3.4. Charger 3.5. Pen/stylus
4. Customer	May include: 4.1. Co-worker 4.2. Supplier 4.3. Client 4.4. Organization receiving the product or service
5. Service Information	May include: 5.1. Job Report Sheets 5.2. Job Order forms 5.3. Bill of materials 5.4. Customer index 5.5. Service flowchart 5.6. Stock and inventory record 5.7. Requisition slips (for acquisition of parts/components)

VARIABLE	RANGE
6. Documentation	May include: 6.1. Organization work procedures 6.2. Manufacturer's instruction manual 6.3. Customer requirements 6.4. Forms
7. Quality standards	Quality standards may relate but not limited to the following: 7.1. Materials 7.2. Component parts 7.3. Service processes

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate:
	1.1. Check the functionality of the unit/ gadget
	    1.1.1. Verified full functionality of the repaired unit/gadget in conformity with the customer's concern
	    1.1.2. Verified unit's/gadget's functionality based on default settings
	    1.1.3. Tested accessories in accordance with manufacturer's specification
	1.2. Turn over repaired unit/gadget for customer's approval
	    1.2.1. Endorsed unit/gadget to customer in accordance with service center procedures and guidelines
	1.3. Document/ Record service information Document/ Record service information
	    1.3.1. Complied with service completion procedures and documentations with in accordance with service center guidelines

2. Resource Implications	The following resources should be provided: 2.1. Work area with sufficient lighting and ventilation system 2.2. ESD free working area/bench 2.3. Tools and equipment 2.4. Appropriate handheld gadgets 2.5. Desktop/ laptop units and appropriate mobile application/add-ons software 2.6. Work Instructions Assessment rating sheet 2.7. Applicable forms for specific tasks
3. Methods of Assessment	Competency may be assessed through: 3.1. Demonstration with oral questioning 3.2. Written test 3.3. Portfolio with interview
4. Context for Assessment	4.1. Competency may be assessed in actual workplace or at the designated TESDA Accredited Assessment Center.

SECTION 3 TRAINING ARRANGEMENTS

This set of standards provides Technical and Vocational Education and Training (TVET) providers with information and other important requirements to consider when designing training programs for Mobile Phones and Handheld Gadgets Servicing NC III.

3.1 CURRICULUM DESIGN

TESDA shall provide the training on the development of competency-based curricula to enable training providers develop their own curricula with the components mentioned below.

Delivery of knowledge requirements for the basic, common and core units of competency specifically in the areas of mathematics, science/technology, communication/language and other academic subjects shall be contextualized. To this end, TVET providers shall develop a Contextual Learning Matrix (CLM) to accompany their curricula.

Course Title: Mobile Phones & Handheld Gadgets Servicing　　　**NC Level:** NC III

Nominal Training Duration:

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          40 hours – Basic Competencies
          52 hours – Common Competencies
         280 hours – Core Competencies
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         372 hours – Total (in-school / in-center)
         300 hours – Supervised Industry Learning (SIL)
        ------------------
         672 hours
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Course Description:

This course is designed to provide the learner with knowledge, practical skills and attitude, applicable in performing work activities involve in preparing workplace for servicing mobile phone unit and handheld gadget, diagnosing and identifying hardware and software related problems, troubleshooting and repairing mobile phone and handheld gadget and performing functionality testing and documentation. This includes classroom learning activities and practical work in actual work site or simulation area.

Upon completion of the course, the learners are expected to demonstrate the above-mentioned competencies to be employed. To obtain this, all units prescribed for this qualification must be achieved:

BASIC COMPETENCIES
(40 hrs)

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration

1. Lead workplace communication	1.1. Communicate information about workplace processes	• Read
		  o Effective verbal communication methods
		  o Sources of information
		• Practice organizing information
		• Identify organization requirements for written and electronic communication methods
		• Follow organization requirements for the use of written and electronic communication methods
		• Perform exercises on understanding and conveying intended meaning scenario
			• Lecture
			• Demonstration
			• Practical exercises
			• Role Play
				• Written Test
				• Observation
					2 Hours

	1.2. Lead workplace discussions	• Describe:
		  o Organizational policy on production, quality and safety
		  o Goals/ objectives and action plan setting
		• Read
		  o Effective verbal communication methods
		• Prepare/set action plans based on organizational goals and objectives
			• Group discussion
			• Lecture
			• Demonstration
				• Oral evaluation
				• Written Test
				• Observation
					2 Hours

	1.3. Identify and communicate issues arising in the workplace	• Describe:
		  o Organizational policy in dealing with issues and problems
		• Read
		  o Effective verbal communication methods
			• Group discussion
			• Lecture
				• Oral evaluation
				• Written Test
					2 Hours

2. Lead small teams	2.1. Provide team leadership	• Discussion of Company policies and procedures • Read web pages on situational leadership • Role play on situational leadership	• Group work • Role Play • Lecture/ Discussion • Individual Work	• Role Play • Written Test	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
	2.2. Assign responsibilities	• Read web pages on performance management • Case study on allocating roles and responsibilities based on competencies of current staff	• Individual Work • Case Study	• Role Play • Written Test	1 Hour
	2.3. Set performance expectations for team members	• Role play to communicate performance expectations with staff • Discussion on performance issues	• Lecture/ Discussion • Role Play	• Role Play • Written Test	1 Hour
	2.4. Supervise team performance	• Discussion on performance monitoring • Role play on providing feedback on performance • Role play on performance coaching • Discussion on keeping the team informed of team performance • Case study on Team performance monitoring and feedback	• Lecture/ Discussion • Role Play • Case Study	• Role Play • Written Test	1 Hour

3. Apply critical thinking and problem-solving techniques in the workplace	3.1. Examine specific workplace strategies	• Show thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations
		• Show mastery of the current industry hardware and software products and services
		• Discuss process of identification of fundamental causes of specific workplace challenges
		• Show mastery of knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations
		  - Relevant equipment and operational processes
		  - Enterprise goals, targets and measures
			• Group discussion
			• Lecture
			• Demonstration
			• Role playing
				• Case Formulation
				• Life Narrative Inquiry (Interview)
				• Standardized test
					1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		- Enterprise quality OHS and environmental requirement - Enterprise information systems and data collation - Industry codes and standards			

	3.2. Analyze the causes of specific workplace challenges	• Show thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations
		• Show mastery of the current industry hardware and software products and services
		• Discuss process of identification of fundamental causes of specific workplace challenges
		• Show mastery of knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations
		  - Relevant equipment and operational processes
		  - Enterprise goals, targets and measures
		  - Enterprise quality OHS and environmental requirement
		  - Enterprise information systems and data collation
		  - Industry codes and standards
		• Identify extent and causes of specific challenges in the workplace
		• Use of range of analytical problem-solving techniques
		• Formulate clear-cut findings on the nature of each identified workplace challenges
			• Group discussion
			• Lecture
			• Demonstration
			• Role playing
				• Case Formulation
				• Life Narrative Inquiry (Interview)
				• Standardized test
					1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration

	3.3. Formulate resolutions to specific workplace challenges	• Show thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations
		• Show mastery of the current industry hardware and software products and services
		• Discuss process of identification of fundamental causes of specific workplace challenges
		• Show mastery of knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations
		  - Relevant equipment and operational processes
		  - Enterprise goals, targets and measures
		  - Enterprise quality OHS and environmental requirement
		  - Enterprise information systems and data collation
		  - Industry codes and standards
		• Identify extent and causes of specific challenges in the workplace
		• Use of range of analytical problem-solving techniques
		• Formulate clear-cut findings on the nature of each identified workplace challenges
		• Discus strategies on devising, communicating, implementing and evaluating strategies and techniques in addressing specific workplace challenges
			• Group discussion
			• Lecture
			• Demonstration
			• Role playing
				• Case Formulation
				• Life Narrative Inquiry (Interview)
				• Standardized test
					1 Hour

TR – Mobile Phones & Handheld Gadgets Servicing NC III   (ELCMPS321)   Promulgated February 9, 2021   86

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
	3.4. Implement action plans and communicate results	• Identify extent and causes of specific challenges in the workplace • Use of range of analytical problem-solving techniques • Formulate clear-cut findings on the nature of each identified workplace challenges • Discus strategies on devising, communicating, implementing and evaluating strategies and techniques in addressing specific workplace challenges	• Group discussion • Lecture • Demonstration • Role playing	• Case Formulation • Life Narrative Inquiry (Interview) • Standardized test	1 Hour
4. Work in a Diverse Environment	4.1. Develop an individual's cultural awareness and sensitivity	• Show understanding of cultural diversity in the workplace • Recognize norms of behavior for interacting and dialogue with specific groups (e. g., Muslims and other non-Christians, non-Catholics, tribes/ethnic groups, foreigners) • Demonstrate different methods of verbal and non-verbal communication in a multicultural setting • Apply cross-cultural communication skills (i.e. different business customs, beliefs, communication strategies) • Show affective skills – establishing rapport and empathy, understanding, etc. • Demonstrate openness and flexibility in communication • Recognize diverse groups in the workplace and community as defined by divergent culture, religion, traditions and practices	• Small Group Discussion • Interactive Lecture • Brainstorming • Demonstration • Role-playing	• Demonstration or simulation with oral questioning • Group discussions and interactive activities • Case studies/ problems involving workplace diversity issues • Written examination • Role Playing	1 Hour
	4.2. Work effectively in an environment that acknowledges	• Explain the value of diversity in the economy and society in terms of Workforce development • Discuss the importance of inclusiveness in a diverse environment	• Small Group Discussion • Interactive Lecture • Brainstorming • Demonstration	• Demonstration or simulation with oral questioning • Group discussions and interactive	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
	and values cultural diversity	• Discuss the importance of shared vision and understanding of and commitment to team, departmental, and organizational goals and objectives • Identify and exhibit strategies for customer service excellence • Demonstrate cross-cultural communication skills and active listening • Recognize diverse groups in the workplace and community as defined by divergent culture, religion, traditions and practices • Demonstrate collaboration skills	• Role-playing	activities • Case studies/ problems involving workplace diversity issues • Written examination • Role Playing	
	4.3. Identify common issues in a multicultural and diverse environment	• Explain the value, and leverage of cultural diversity • Discuss the inclusivity and conflict resolution • Describe the workplace harassment • Explain the change management and cite ways to overcome resistance to change • Demonstrate advanced strategies for customer service excellence • Address diversity-related conflicts in the workplace • Eliminate discriminatory behavior towards customers and co-workers • Utilize change management policies in the workplace	• Small Group Discussion • Interactive Lecture • Brainstorming • Demonstration • Role-playing	• Demonstration or simulation with oral questioning • Group discussions and interactive activities • Case studies/ problems involving workplace diversity issues • Written examination • Role Playing	1 Hour
5. Propose methods of applying learning and innovation in the organization	5.1. Assess work procedures, processes and systems in terms of innovative practices	• Show mastery of the following practical concepts (e.g., 7 habits of highly effective people, character strengths that foster learning and innovation, five minds of the future, adaptation concepts and transtheoretical model of behavior change) • Demonstrate collaboration and networking skills	• Interactive Lecture • Appreciative Inquiry • Demonstration • Group work	• Psychological and behavioral Interviews • Performance Evaluation • Life Narrative Inquiry • Review of portfolios of evidence and third-party workplace	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		• Show basic skills in research • Generate practical insights on how to improve organizational procedures, processes and systems		reports of on-the-job performance. • Standardized assessment of character strengths and virtues applied	
	5.2. Generate practical action plans for improving work procedures, processes	• Show mastery of the following practical concepts (e.g., 7 habits of highly effective people, character strengths that foster learning and innovation, five minds of the future, adaptation concepts and transtheoretical model of behavior change) • Demonstrate collaboration and networking skills • Show basic skills in research • Generate practical insights on how to improve organizational procedures, processes and systems • Set up action plans on how to apply innovative procedures in the organization • Set up action plans on how to apply innovative procedures in the organization • Generate practical insights on how to improve organizational procedures, processes and systems	• Interactive Lecture • Appreciative Inquiry • Demonstration • Group work	• Psychological and behavioral Interviews • Performance Evaluation • Life Narrative Inquiry • Review of portfolios of evidence and third-party workplace reports of on-the-job performance. • Standardized assessment of character strengths and virtues applied	Hour
	5.3. Evaluate the effectiveness of the proposed action plans	• Show mastery of the following practical concepts (e.g., 7 habits of highly effective people, character strengths that foster learning and innovation, five minds of the future, adaptation concepts and transtheoretical model of behavior change) • Demonstrate collaboration and networking skills • Show basic skills in research	• Interactive Lecture • Appreciative Inquiry • Demonstration • Group work	• Psychological and behavioral Interviews • Performance Evaluation • Life Narrative Inquiry • Review of portfolios of evidence and third-party workplace reports of on-the-job	Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		• Generate practical insights on continuous improvement		performance. • Standardized assessment of character strengths and virtues applied	

6. Use information systematically	6.1. Use technical information	• Lecture and discussion on:
		  - Application in collating information
		  - Procedures for inputting, maintaining and archiving information
		  - Guidance to people who need to find and use information
		• Organizing information into a suitable form for reference and use
		• Classify stored information for identification and retrieval
		• Operate the technical information system by using agreed procedures
			• Lecture
			• Group Discussion
			• Hands on
			• Demonstration
				• Oral evaluation
				• Written Test
				• Observation
				• Presentation
					4 Hours

	6.2. Apply information technology (IT)	• Lecture and discussion on:
		  - Attributes and limitations of available software tool
		  - Procedures and work instructions for the use of IT
		  - Operational requirements for IT systems
		  - Sources and flow paths of data
		  - Security systems and measures that can be used
		  - Methods of entering and processing information
		• Use procedures and work instructions for the use of IT
		• Extract data and format reports
		• Use WWW applications
			• Lecture
			• Group Discussion
			• Self-paced handout/ module
			• Hands on
			• Demonstration
				• Oral evaluation
				• Written Test
				• Observation
				• Presentation
					2 Hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration

	6.3. Edit, format and check information	• Lecture and discussion on:
		  - Basic file-handling techniques
		  - Techniques in checking documents
		  - Techniques in editing and formatting
		  - Proof reading techniques
		• Use different techniques in checking documents
		• Edit and format information applying different techniques
		• Proof read information applying different techniques
			• Lecture
			• Group Discussion
			• Self-paced handout/ module
			• Hands on
			• Demonstration
				• Oral evaluation
				• Written Test
				• Observation
				• Presentation
					2 Hours

7. Evaluate Occupational Safety And Health Work Practices	7.1. Interpret Occupational Safety and Health practices	• Discuss the OSH standards, principles and legislations • Identify OSH work practices issues • Discuss standard safety requirements	• Lecture • Group Discussion	• Written Exam • Demonstration • Observation • Interviews/ Questioning	Hours
	7.2. Set OSH work targets	• Discussion in actions plans that are necessary in achieving the OSH target	• Lecture • Group Discussion	• Written Exam • Demonstration • Observation • Interviews/ Questioning	1 Hour
	7.3. Evaluate effectiveness of Occupational Safety and Health work instructions	• Practice evaluating safety data (Historical or Simulated)	• Lecture • Group Discussion	• Written Exam • Demonstration • Observation • Interviews/ Questioning	1.5 Hours

8. Evaluate Environmental Work Practices	8.1. Interpret Environmental practices, policies and procedures	• Discussion Environmental Issues regarding
		  - Water Quality
		  - National and Local Government Issues
		  - Safety
		  - Endangered Species
		  - Noise
			• Lecture
			• Group Discussion
			• Demonstration
				• Written Exam
				• Demonstration
				• Observation
				• Interviews/ Questioning
					1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		- Air Quality - Historic - Waste - Cultural • Updating of existing occupation practices			

	8.2. Establish targets to evaluate environmental practices	• Discussion on
		  - lower production costs and energy consumption
		  - Environmentally Sound Processes
		  - Resource Efficient
		  - Recycling and Waste Management
		• Simple case study regarding energy efficiency
			• Lecture
			• Group Discussion
			• Demonstration
				• Written Exam
				• Demonstration
				• Observation
				• Interviews/ Questioning
					1 Hour

	8.3. Evaluate effectiveness of environmental practices	• Identifying effective environmental practices relevant to the industry/occupation - Implementation of energy efficiency	• Lecture • Group Discussion • Demonstration • Case Study	• Written Exam • Demonstration • Observation • Interviews/ Questioning • Third Party Reports	1 Hour
9. Facilitate Entrepreneurial Skills For Micro-Small-Medium Enterprises (MSMEs)	9.1. Develop and maintain micro-small-medium enterprise (MSMEs) skills in the organization	• Discussions on business models and strategies • Discussion on Types and categories of businesses and business internal control • Discussion on Relevant National and local legislations affecting businesses • Prepare promotional materials • Practice basic bookkeeping	• Lecture/ Discussion • Case Study • Demonstration	• Written Test • Portfolio • Work Related Project	2 Hours
	9.2. Establish and Maintain client-base/market	• Role play on customer and employee relations • Discussion on Basic product promotion strategies • Preparation of Basic Feasibility study • Case studies on Basic Business ethics	• Role Play • Lecture Discussion • Case study	• Case problem • Written Test	2 Hours

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TR – Mobile Phones & Handheld Gadgets Servicing NC III   (ELCMPS321)   Promulgated February 9, 2021   92

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		• Prepare basic advertising materials			
	9.3. Apply budgeting and financial management skills	• Discussion on: - Basic cost-benefit analysis - Basic financial management - Basic financial accounting - Business internal controls	• Role Play • Lecture Discussion • Group work	• Written Test • Case problem	1 Hour

Note: Basic competencies may be embedded in the core competencies.

Unit of Competency	Learning Outcomes	Learning Activities	Methodologies	Assessment Approach	Nominal Duration
1. Use Hand Tools	1.1 Plan and prepare for tasks to be undertaken	• Plan and prepare for task/activity • Identify different types and functions of hand tools • Identify electronics hand tools and their uses • Identify function, operation and common faults in electronics hand tools	• Lecture / Demonstration • Group discussion	• Written/Oral examination	2 hours
	1.2 Prepare hand tools	• Practice proper use of hand tools • Practice checking and safety requirements in handling tools • Apply standard procedures in checking, identification and marking of safe or unsafe/ faulty tools • Perform marking of safe or unsafe/ faulty hand tools	• Lecture / Demonstration • Role play • Video presentation	• Written/Oral examination • Practical demonstration	2 hours

	1.3 Use appropriate hand tools and test equipment	• Apply safety handling of hand tools and test equipment
		• Identify/Select electronics hand tools for adjusting, dismantling, assembling, finishing, and cutting
		• Use appropriate hand tools and test equipment for the job requirement
		• Read and learn the -
		  o Proper usage and care of hand tools
		  o Types and uses of test equipment
		• Identify common faults in the use of hand tools
			• Lecture / Demonstration
			• Role play
			• Video presentation
				• Written/Oral examination
				• Practical demonstration
					2 hours

	1.4 Maintain hand tools	• Apply safety requirements in maintenance of hand tools
		• Read and understand processes, operations & systems for:
		  o Maintenance of tools
		  o Storage of hand tools
		• Apply 5S principles in maintenance of hand tools
			• Lecture / Demonstration
			• Group discussion
				• Written/Oral examination
				• Practical demonstration
					2 hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodologies	Assessment Approach	Nominal Duration
2. Perform Mensuration and Calculation	2.1 Select measuring instruments;	▪ Identify category and types of measuring tools and its uses ▪ Select measuring instruments as per category ▪ Interpret shapes and dimensions of objects/components	▪ Lecture ▪ Group discussion	▪ Written examination ▪ Oral evaluation	2 hours

	2.2 Carry-out measurements and calculations	▪ Read
		  a. Measurements
		    o Linear measurement
		    o Geometrical measurement
		  b. Trade Mathematics
		    o Unit conversion
		    o Ratio and proportion
		    o Area
		▪ Interpret formulas for volume, areas, perimeters of plane and geometric figures
		▪ Perform measurement
		▪ Compute measurement formulas
			▪ Lecture
			▪ Group discussion
			▪ Problem analysis
				▪ Written examination
				▪ Oral evaluation
				▪ Problem solving
					4 hours

	2.3 Maintain measuring instruments	▪ Identify and practice safe handling procedures in using measuring instruments ▪ Describe procedures on maintenance of measuring instruments ▪ Demonstrate proper cleaning and storage of measuring instruments	▪ Lecture ▪ Demonstration ▪ Group discussion ▪ Simulation	▪ Written examination ▪ Oral evaluation	2 hours

3. Prepare and Interpret Technical Drawing	3.1 Identify different kinds of technical drawings	▪ Read
		  o Types of technical drawings
		  o Technical drawing applications
		  o Mark up/Notation of Drawings
		▪ Identify type of drawing
		▪ Evaluate mark-up/ notation of drawings
		▪ Interpret signs and symbols
			▪ Lecture
			▪ Demonstration
			▪ Group discussion
			▪ Simulation
				▪ Written examination
				▪ Oral evaluation
					2 hours

	3.2 Interpret technical drawing	▪ Interpret blueprint reading and plan specification
		  o Electronics symbols and abbreviations
		  o Drawing standard symbols
			▪ Lecture
			▪ Demonstration
			▪ Group discussion
			▪ Basic technical
				▪ Written examination
				▪ Oral evaluation
				▪ Drafting
					2 hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodologies	Assessment Approach	Nominal Duration

		▪ Read:
		  a. Trade Theory
		     o Types of electronics/ semiconductors product plans
		     o Notes and specifications
		  b. Trade mathematics
		     o Linear measurement
		     o Dimension
		     o Unit convention
		▪ Match specification details with existing resources
			drafting activity	technical drawings and plans	

	3.3 Prepare/ make changes to electrical/ electronic schematics and drawings	▪ Read
		  o Freehand sketching techniques
		  o Pictorial drawing
		  o Drawing conventions
		  o Dimensioning conventions
		▪ Apply mathematics
		  o Four fundamental operations
		  o Percentage
		  o Fraction
		  o Algebra
		  o Geometry
		▪ Sketch drawings and plans
		▪ Sketch pictures
		▪ Compute formulas
		▪ Use drawing instruments
			▪ Lecture
			▪ Demonstration
			▪ Group discussion
			▪ Basic technical drafting activity
				▪ Written examination
				▪ Oral evaluation
				▪ Drafting technical drawings and plans
					2 hours

	3.4 Store technical drawings and equipment/ instruments	▪ Identify effective ways to catalogue and store technical drawings
		▪ Identify manual methods of handling, storing and maintaining paper drawings
		▪ Read and demonstrate
		  o Storing drawing in digital forms, i.e. Scanner, CAD
		  o Handling and storing of drawings
		  o Handling and storing drawing instruments
			▪ Lecture
			▪ Demonstration
			▪ Group discussion
			▪ Simulation
				▪ Written examination
				▪ Oral evaluation
					2 hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodologies	Assessment Approach	Nominal Duration
4. Apply Quality Standards	4.1 Assess quality of received materials	▪ Identify relevant production processes, materials and products ▪ Study and interpret characteristics of materials, software and hardware used in production processes ▪ Perform quality checking procedures ▪ Apply quality Workplace procedures ▪ Identify faulty materials ▪ Check quality of materials or component parts as per manufacturer's standards ▪ Interpret specifications or symbols	▪ Lecture ▪ Field trip ▪ Symposium ▪ Video clips ▪ Simulation/ Role playing	▪ Written test ▪ Demonstration & questioning ▪ Observation & questioning	3 hours
	4.2 Assess own work	▪ Perform workplace procedure in documenting completed work ▪ Perform fault identification and reporting ▪ Observe safety and environmental aspects of production processes ▪ Utilize workplace quality indicators ▪ Document and report deviations from specified quality standards	▪ Field trip ▪ Symposium ▪ Simulation ▪ On the job training	▪ Demonstration & questioning ▪ Observation & questioning	3 hours

	4.3 Engage in quality improvement	▪ Participate in quality improvement processes
		  a. IEC/ISO standards
		  b. Environmental and safety standards
		▪ Carry out work as per process improvement procedures
		▪ Monitor operation performance
		▪ Implement continuous improvement
			▪ Field trip
			▪ Symposium
			▪ Simulation
			▪ On the job training
				▪ Demonstration & questioning
				▪ Observation & questioning
					2 hours

5. Perform Computer Operation	5.1 Plan and prepare for task to be undertaken	▪ Plan and prepare computer operation activity ▪ Determine task requirements based on required output ▪ Determine appropriate hardware and software ▪ Identify/Select types of computers and basic features of different operating systems ▪ Interpret and follow client-specific guidelines & procedures ▪ Plan task as per data security guidelines	▪ Lecture ▪ Modular ▪ Computer based training (e-learning) ▪ Project method ▪ On the job training	▪ Demonstration & questioning ▪ Observation & questioning	2 hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodologies	Assessment Approach	Nominal Duration
	5.2 Input data into computer	▪ Apply basic ergonomics of keyboard and computer user ▪ Enter/Encode data using appropriate computer programs/applications ▪ Check accuracy of encoded data/information per SOP ▪ Save and store inputted data in storage media ▪ Storage devices and basic categories of memory ▪ Identify and define relevant types of software	▪ Lecture ▪ Modular ▪ Group discussion ▪ Project method ▪ On the job training	▪ Demonstration & questioning ▪ Assessment of output product ▪ Computer-based assessment	1 hour

	5.3 Access information using computer	▪ Select correct program/ application based on job requirements
		▪ Access computer data/files
		▪ Interpret general security, privacy legislation & copyright
		▪ Use Productivity Application
		  ▪ Microsoft office applications
		▪ Learn Business Application
		  ▪ Introduction to Basic Programming software
		▪ Apply basic ergonomics of keyboard and computer user
			▪ Lecture
			▪ Computer based training (e-learning)
			▪ On the job training
				▪ Demonstration & questioning
				▪ observation
				▪ Computer-based assessment
					2 hour

	5.4 Produce/ output data using computer system	▪ Identify types and function of computer peripheral devices
		▪ Print and scan office documents and materials
		▪ Send office/ business documents through facsimile
		▪ Transfer files or data between compatible systems using computer software, hardware/ peripheral devices
		▪ Save documents in storage devices
		  a. CD/DVD
		  b. USB drives
		  c. Hard disk drives
			▪ Lecture
			▪ Group discussion
			▪ Modular
			▪ On the job training
				▪ Demonstration & questioning
				▪ Observation & questioning
				▪ Computer-based assessment
					1 hour

	5.5 Maintain computer equipment and	▪ Perform computer equipment/system basic maintenance procedures a. Perform basic file maintenance procedures	▪ Demonstration ▪ Simulation ▪ Modular	▪ Demonstration & questioning ▪ Third party	2 hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodologies	Assessment Approach	Nominal Duration
	systems	b. Perform cleaning of PC parts/ hardware components c. Scan/Debug computer software and applications d. Perform cleaning and defragmentation of computer files e. Perform backup of computer files ▪ Enumerate and define different types of computer viruses	▪ Video clips ▪ Computer based training (e-learning)	report ▪ Assessment of output product ▪ Portfolio	

6. Terminate and Connect Electrical wiring and Electronic Circuit	6.1 Plan and prepare for termination/ connection of electrical wiring/ electronics circuits	▪ Read and familiarize
		  ○ Use of hand tools and test instruments / equipment
		  ○ Basic Electrical theory and application
		  ○ OH & S guidelines and procedures
		  ○ Basic electrical and electronic devices
		▪ Prepare hand tools and test equipment for termination
		▪ Prepare electrical/ electronic materials for termination
			▪ Film Viewing
			▪ Individualized Learning
			▪ Direct Student Laboratory Experience
			▪ On the Job Training
			▪ Project Method
				▪ Demonstration and Questioning
				▪ Assessment of Output Product
					1 hour

	6.2 Terminate/ connect electrical wirings/ electronic circuits	▪ Learn and apply
		  a. Electrical wirings
		    ○ Wiring techniques
		    ○ OH & S principles
		    ○ Specifications and methods for terminating different materials
		  b. Electronics circuits
		    ○ Soldering techniques and procedures
		    ○ OH & S principles
		    ○ Surface mount soldering techniques
		    • Use of lead-free soldering technology
		▪ Perform different types of splices
		▪ Perform soldering techniques and procedures
			▪ Film Viewing
			▪ Individualized Learning
			▪ Direct Student Laboratory Experience
			▪ On the Job Training
			▪ Project Method
				▪ Demonstration and Questioning
				▪ Assessment of Output Product
					3 hours

	6.3 Test termination/ connections of	▪ Read and familiarize
		  a. AC and DC power supplies
		  b. Use of diagnostic equipment
			▪ Film Viewing
			▪ Individualized Learning
				▪ Demonstration and Questioning	1 hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodologies	Assessment Approach	Nominal Duration
	electrical wiring/ electronics circuits	c. Surface mount soldering techniques d. Tests for wiring and connections e. Wiring support techniques and alternatives ▪ Practice soldering techniques ▪ Practice printed circuit board repair and techniques ▪ Apply electronic assembly functional and quality testing ▪ Perform testing of wiring and connections for conformance to specification ▪ Use language and literacy skills to complete short reports and required ▪ Adjust and fix wiring supports	▪ Direct Student Laboratory Experience ▪ On the Job Training ▪ Project Method	▪ Assessment of Output Product	
7. Test electronic components	7.1 Determine criteria for testing electronics components	▪ Determine work safety requirements and economy of materials with durability ▪ Familiarize Testing Criteria: 　o controls 　o effectiveness 　o efficiency 　o bug detection 　o functionality, including flow 　o interoperability 　o performance 　o reliability 　o operating parameters ▪ Apply testing criteria for electronics components	▪ Film Viewing ▪ Individualized Learning ▪ Direct Student Laboratory Experience ▪ On the Job Training ▪ Project Method	▪ Demonstration and Questioning ▪ Assessment of Output Product	1 hours
	7.2 Plan an approach for component testing	▪ Read and familiarize 　o 5S application and observation of required timeframe 　o Work Safety requirements and economy of materials with durability 　o Various testing methods	▪ Film Viewing ▪ Individualized Learning ▪ Direct Student Laboratory Experience ▪ On the Job	▪ Demonstration and Questioning ▪ Assessment of Output Product	1 hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodologies	Assessment Approach	Nominal Duration
		o Types of electronic components ▪ Observe proper use of VOM/DMM ▪ Observe OH&S principles ▪ Identify electronics components ▪ Identify testing methods	Training ▪ Project Method		
	7.3 Test components	▪ Study materials, tools and equipment uses and specifications 　o Proper care and use of tools ▪ Familiarize types of electronic components 　o Passive components 　o Active components 　o Dynamic components 　o Hybrid components ▪ Learn testing methods 　o automated 　o debugging 　o inspection 　o platform testing 　o prototyping ▪ Measure capacitance and resistance using VOM/ DMM ▪ Determine testing procedures for electronics components ▪ Identify electronics component parts ▪ Apply proper use of testing instruments	▪ Film Viewing ▪ Individualized Learning ▪ Direct Student Laboratory Experience ▪ On the Job Training ▪ Project Method	▪ Demonstration and Questioning ▪ Assessment of Output Product	3 hours
	7.4 Evaluate the testing process	▪ Study the evaluation of testing process and records system ▪ Study Systems and Processes 　o Analyzing simple circuit using ohms and power law 　o Analyzing series/parallel circuits using ohms and power law 　o Analyzing series/parallel capacitances 　o analyzing series parallel inductors 　o analyzing rectifier circuits	▪ Film Viewing ▪ Individualized Learning ▪ Direct Student Laboratory Experience ▪ On the Job Training ▪ Project Method	▪ Demonstration and Questioning ▪ Assessment of Output Product	2 hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodologies	Assessment Approach	Nominal Duration
		o analyzing amplifier circuit o analyzing multi-vibrator circuit o analyzing logic networks o analyzing sequence circuits ▪ Perform data evaluation and records ▪ Evaluate functionality and operation of electronic system			

CORE COMPETENCIES
(280 hours + 300 hours SIL)

Unit of Competency	Learning Outcomes	Learning Activities	Methodologies	Assessment Approach	Nominal Duration

1. Prepare workplace for servicing mobile phone unit and handheld gadget
 	
48 hours
	1.1. Organize workplace equipment/ instrument, tools and materials for servicing	• Lecture and discussion on:
		  ○ Service center rules and requirements (e.g. service flowchart, service forms, repair/service fees, type of services to be rendered, etc.)
		  ○ Knowledge in 5S application and observation of required procedure
		  ○ Materials, tools, instruments & equipment for mobile/cellular phone servicing
		  ○ Service manuals and service information
		  ○ Laws and regulations
		    - RA 9292, Sec.5
		    - NTC memorandum circulars (i.e., certification, permits, TESDA certification)
		    - Local ordinances (Business permit)
		    - DTI regulations (i.e., Warranty period, certification, etc.)
		    - E-waste management (DENR AO 2013-22)
		• Familiarization of materials, tools, instruments & equipment for mobile phone and handheld gadget servicing
		• Familiarization on user's manual and operational instructions of mobile/cellular phones
		• Identify appropriate tools for mobile phone and handheld gadget servicing
		• Identify safety precautions in the usage of tools and equipment
		• Check internet service requirements and perform speed test
			• Lecture/ Discussion
			• Demonstration
			• Viewing multimedia
			• Individualized Learning
			• Hands on/ Practical exercises
				• Written exam
				• Practical exam
				• Demonstration
				• Oral questioning
				• Written report
					20 hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodologies	Assessment Approach	Nominal Duration

	1.2. Set-up ESD and other safety procedures	• Lecture and discussion on:
		  o Electro-static discharge set-up
		  o Usage of Anti- Static package
		  o Usage of personal protective equipment
		  o Occupational health & safety (OH&S) guidelines, procedures and practices
		  o Proper identification of faulty tools, components or materials
		• Setting up ESD
		• Identifying faulty materials/components and tools
			• Lecture/ Discussion
			• Demonstration
			• Viewing multimedia
			• Individualized Learning
			• Hands on/ Practical exercises
				• Written exam
				• Practical exam
				• Demonstration
				• Oral questioning
				• Written report
					16 hours

	1.3. Review customer related information	• Lecture and discussion on:
		  o Methods of communication
		  o Relevant sources of information
		• Interpret given work instructions
		• Review of sample job order forms on customer's concern and related issues
		• Read and familiarize on sources of information
			• Lecture/ Discussion
			• Demonstration
			• Viewing multimedia
			• Individualized Learning
			• Hands on/ Practical exercises
				• Written exam
				• Practical exam
				• Demonstration
				• Oral questioning
				• Written report
					12 hours

		• **Supervise Industry Learning**			**50 hours**

2. Diagnose and identify hardware and software related problems
 	
80 hours
	2.1. Assess customer's concern	• Lecture and discussion on:
		  o How to deal with customer satisfaction
		  o Rules of effective business communication in customer service
		  o Knowledge in systematic pre-testing procedures as per user's manual
		  o How to prepare pre-history trouble report
		• Conduct pre-history trouble of mobile phone unit/handheld gadget
		• Prepare pre-history trouble report on status and serviceability of mobile phone unit/handheld gadget
			• Lecture/ Discussion
			• Demonstration
			• Viewing multimedia
			• Individualized Learning
			• Hands on/ Practical exercises
				• Written exam
				• Practical exam
				• Demonstration
				• Oral questioning
				• Written report
					16 hours

TR – Mobile Phones & Handheld Gadgets Servicing NC III   (ELCMPS321)   Promulgated February 9, 2021   104

Unit of Competency	Learning Outcomes	Learning Activities	Methodologies	Assessment Approach	Nominal Duration

	2.2. Check the condition of the unit/gadget	• Lecture and discussion on:
		  ○ Systematic pre-testing procedures for mobile phone and handheld gadget as per user's manual
		  ○ Visual checking procedure
		  ○ Types of defects and faults in mobile phones and handheld gadgets
		• Perform visual checking of the gadget
		• Identify types of defects and faults in mobile phones and handheld gadgets
		• Prepare sample documentation
			• Lecture/ Discussion
			• Demonstration
			• Viewing multimedia
			• Individualized Learning
			• Hands on/ Practical exercises
				• Written exam
				• Practical exam
				• Demonstration
				• Oral questioning
				• Written report
					16 hours

	2.3. Determine the hardware status of the unit/gadget	• Lecture and discussion on:
		  ○ Usage of diagnostic tools
		  ○ Drawing and Schematic Diagram
		    - Reading and interpreting electronic schematic diagram and symbols
		  ○ Work Safety requirements and economy of materials with durability
		  ○ Electronic components and circuits
		  ○ Analysis of troubles and isolation techniques
		• Reading and interpreting electronic schematic diagram and symbols of gadget
		• Check actual troubled/damaged part of the unit/gadget using diagnostic tools to identify hardware problem/fault
			• Lecture/ Discussion
			• Demonstration
			• Viewing multimedia
			• Individualized Learning
			• Hands on/ Practical exercises
				• Written exam
				• Practical exam
				• Demonstration
				• Oral questioning
				• Written report
					24 hours

	2.4. Determine the software status of the unit/gadget	• Lecture and discussion on:
		  ○ 'boot mode' of different mobile phones and handheld gadgets
		  ○ compatibility of drivers for mobile phone and handheld gadgets
		  ○ compatibility of firmware for mobile phone and handheld gadgets
		  ○ interpretation of data logs
			• Lecture/ Discussion
			• Demonstration
			• Viewing multimedia
			• Individualized Learning
			• Hands on/
				• Written exam
				• Practical exam
				• Demonstration
				• Oral questioning
				• Written report
					24 hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodologies	Assessment Approach	Nominal Duration
		○ mobile device and handheld gadgets settings' hardware specifications ○ Firmware backup procedures ○ Mobile phone and handheld gadgets logic board/circuit identification - Chipsets • install specific driver as per unit model and brand • verify mobile phone and handheld gadgets status • perform mobile phones and handheld gadgets firmware backup	Practical exercises		
		• **Supervise Industry Learning**			**100 hours**

3. Troubleshoot and repair mobile phones and handheld gadgets
 	
120 hours
	3.1. Disassemble unit and gadget	• Lecture and discussion on:
		○ Disassembly procedures as per user's guide
		○ Parts and functions of:
		  - mobile phone parts and accessories
		  - handheld gadget's parts and accessories
		○ Proper documentation of unit and gadget parts
		○ Necessary tools and instruments used for disassembly of unit and gadget
		○ OHS policies and work instructions
		• Perform disassembly of the mobile phone unit and handheld gadget
		• identify and organize unit and gadget parts and components
			• Lecture/ Discussion
			• Demonstration
			• Viewing multimedia
			• Individualized Learning
			• Hands on/ Practical exercises
				• Written exam
				• Practical exam
				• Demonstration
				• Oral questioning
				• Written report
					8 hours

	3.2. Troubleshoot unit/gadget hardware related problem	• Lecture and discussion on: ○ Systematic pre-testing procedures in troubleshooting unit and gadget as per user's manual ○ New/ upcoming trends in mobile phone units and handheld gadgets ○ Types of systems defects/fault symptoms of mobile phones and handheld gadgets ○ Types of input/output (I/O) component for mobile	• Lecture/ Discussion • Demonstration • Viewing multimedia • Individualized Learning • Hands on/ Practical	• Written exam • Practical exam • Demonstration • Oral questioning • Written report	32 hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodologies	Assessment Approach	Nominal Duration
		phone units and handheld gadgets o Basic troubleshooting techniques for mobile phone units and handheld gadgets • Perform pre-testing procedures for mobile phone units and handheld gadgets • Apply troubleshooting techniques to identify systems defects or fault symptoms to mobile phone units and handheld gadgets • Document results of diagnosis and testing	exercises		

	3.3. Repair unit/ gadget hardware related problem	• Lecture and discussion on:
		o Usage of personal protective equipment
		o Usage of multi-tester/VOM and other testing instruments
		o Electro-static discharge (ESD) procedure
		o environmental safety
		  - E-Waste disposal
		  - Toxic fumes management
		o Soldering techniques and rework station (hot air) operation
		o Parts/Components mounting procedures
		o Functionality testing
		o 5S application and observation of required procedure
		o Analysis of troubles and isolation techniques
		o Parts/components replacement
		o Reprogramming/ Flashing of mobile/cellular phone unit and handheld gadgets
		• Perform proper testing of installed components and parts
		• Perform proper usage and operation of flasher tools
		• Replace/Swap defective parts/components with original/compatible parts
		• Solder/Mount repaired or replaced components
			• Lecture/ Discussion
			• Demonstration
			• Viewing multimedia
			• Individualized Learning
			• Hands on/ Practical exercises
				• Written exam
				• Practical exam
				• Demonstration
				• Oral questioning
				• Written report
					40 hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodologies	Assessment Approach	Nominal Duration
		• Test repaired/replaced parts/components for its functionality • Clean unit and dispose waste materials as per environmental requirements			

	3.4. Repair unit/ gadget software related problem	• Lecture and discussion on:
		  ○ compatibility of firmware version for mobile phones and handheld gadgets
		  ○ User data formatting procedure
		  ○ mobile device and handheld gadgets settings' hardware specifications
		  ○ Firmware versions
		  ○ Firmware installation procedure
		• identify firmware version of the mobile phone unit handheld gadgets
		• check battery life percentage of the mobile phone units and handheld gadgets
		• perform formatting of user data
		• install compatible firmware version based on mobile phone units' and handheld gadgets' model/brand
		• restore backup and default settings
			• Lecture/ Discussion
			• Demonstration
			• Viewing multimedia
			• Individualized Learning
			• Hands on/ Practical exercises
				• Written exam
				• Practical exam
				• Demonstration
				• Oral questioning
				• Written report
					32 hours

	3.5. Reassemble unit/ gadget	• Lecture and discussion on:
		  ○ mobile phone unit and handheld gadget parts assembly and disassembly
		  ○ Normal working condition of mobile phone unit and handheld gadget
		• Perform reassembly of mobile phone units and handheld gadgets
		• Install accessories to the units/gadgets
		• Clean repaired units/ gadgets
		• Document service completion and procedures
		• Disposed waste materials properly
			• Lecture/ Discussion
			• Demonstration
			• Viewing multimedia
			• Individualized Learning
			• Hands on/ Practical exercises
				• Written exam
				• Practical exam
				• Demonstration
				• Oral questioning
				• Written report
					8 hours

		• **Supervise Industry Learning**			**100 hours**

TR – Mobile Phones & Handheld Gadgets Servicing NC III   (ELCMPS321)   Promulgated February 9, 2021   108

Unit of Competency	Learning Outcomes	Learning Activities	Methodologies	Assessment Approach	Nominal Duration
4. Perform Functionality Testing and Documentation

32 hours | 4.1. Check the functionality of the mobile phone unit/ handheld gadgets | • Lecture and discussion on:
　o mobile phones' and handheld gadgets' default settings
　o Security and account features
　o Internet/ network settings
　　- configuration of mobile phones and handheld gadgets
　o Mobile phone units and handheld gadgets functionalities
　o Types of accessories for mobile phones and handheld gadgets
• Check and verify unit and gadget functionality
• Check and verify security and accounts
• Document service completion and procedure | • Lecture/ Discussion
• Demonstration
• Viewing multimedia
• Individualized Learning
• Hands on/ Practical exercises | • Written exam
• Practical exam
• Demonstration
• Oral questioning
• Written report | 16 hours |
| | 4.2. Turn over repaired unit/gadget for customer's approval | • Lecture and discussion on:
　o Quality improvement processes
　o Proper etiquette in handling customer
　o Service/Repair center procedures and guidelines
　o Mobile phones and handheld gadgets operations
• Endorse unit/gadget to customer
• Conduct orientation and provision of technical assistance to customer on the features and operation of mobile phone unit and handheld gadget
• Monitor satisfactory service performance to customer | • Lecture/ Discussion
• Demonstration
• Viewing multimedia
• Individualized Learning
• Hands on/ Practical exercises | • Written exam
• Practical exam
• Demonstration
• Oral questioning
• Written report | 8 hours |
| | 4.3. Document/ Record service information | • Lecture and discussion on:
　o Service information
　o Fault identification and reporting
　o Workplace procedure in documenting completed work
　o Workplace Quality Indicators | • Lecture/ Discussion
• Demonstration
• Viewing multimedia
• Individualized | • Written exam
• Practical exam
• Demonstration
• Oral questioning
• Written report | 8 hours |

Unit of Competency	Learning Outcomes	Learning Activities	Methodologies	Assessment Approach	Nominal Duration
		• Record service information on the quality and other indicators of service performance	Learning • Hands on/ Practical exercises		
		• **Supervise Industry Learning**			**50 hours**

3.2   TRAINING DELIVERY

1. The delivery of training shall adhere to the design of the curriculum. Delivery   shall be guided by the principles of competency-based TVET.

   a. Course design is based on competency standards set by the industry or recognized industry sector; (Learning system is driven by competencies written to industry standards)
   b. Training delivery is learner-centered and should accommodate individualized and self-paced learning strategies;
   c. Training can be done on an actual workplace setting, simulation of a workplace and/or through adoption of modern technology.
   d. Assessment is based in the collection of evidence of the performance of work to the industry required standards;
   e. Assessment of competency takes the trainee's knowledge and attitude into account but requires evidence of actual performance of the competency as the primary source of evidence.
   f. Training program allows for recognition of prior learning (RPL) or current competencies;
   g. Training completion is based on satisfactory performance of all specified competencies.

2. The competency-based TVET system recognizes various types of delivery modes, both on-and off-the-job as long as the learning is driven by the competency standards specified by the industry. The following training modalities and their variations/components may be adopted singly or in combination with other modalities when designing and delivering training programs:

   ### 2.1. Institution- Based:

   - Dual Training System (DTS)/Dualized Training Program (DTP) which contain both in-school and in-industry training or fieldwork components. Details can be referred to the Implementing Rules and Regulations of the DTS Law and the TESDA Guidelines on the DTP;

   - Distance learning is a formal education process in which majority of the instruction occurs when the students and instructor are not in the same place. Distance learning may employ correspondence study, audio, video, computer technologies or other modern technology that can be used to facilitate learning and formal and non-formal training. Specific guidelines on this mode shall be issued by the TESDA Secretariat.

   - Supervised Industry Learning (SIL) or on-the-job training (OJT) is an approach in training designed to enhance the knowledge and skills of the trainee through actual experience in the workplace to acquire specific competencies as prescribed in the training regulations. It is imperative that the deployment of trainees in the workplace is adhered to training programs agreed by the institution and enterprise and status and progress of trainees are closely monitored by the training institutions to prevent opportunity for work exploitation.

- The classroom-based or in-center instruction uses learner-centered methods as well as laboratory or field-work components.

2.2. Enterprise-Based:

- **Formal Apprenticeship** is training within employment involving a contract between an apprentice and an enterprise on an approved apprenticeable occupation.

- **Informal Apprenticeship** is based on a training (and working) agreement between an apprentice and a master craftsperson wherein the agreement may be written or oral and the master craftsperson commits to training the apprentice in all the skills relevant to his or her trade over a significant period of time, usually between one and four years, while the apprentice commits to contributing productively to the work of the business. Training is integrated into the production process and apprentices learn by working alongside the experienced craftsperson.

- **Enterprise-based Training** where training is implemented within the company in accordance with the requirements of the specific company. Specific guidelines on this mode shall be issued by the TESDA Secretariat.

2.3. Community-Based

- Community-Based is short term programs conducted by non-government organizations (NGOs), LGUs, training centers and other TVET providers which are intended to address the specific needs of a community. Such programs can be conducted in informal settings such as barangay hall, basketball courts, etc. These programs can also be mobile training program (MTP).

3.3 TRAINEE ENTRY REQUIREMENTS

The trainees or students who wish to enroll in this program must possess the following requirements:

- Have completed at least 10 yrs. basic education or an alternative learning systems (ALS) certificate of completion with grade 10 equivalent holder
- Communicate effectively both oral and written form
- Can perform basic mathematical computations

This list does not include specific institutional requirements such as written entrance exam, and other that may be required of the trainees by the school or training center delivering TVET program.

3.4 LIST OF TOOLS, EQUIPMENT AND MATERIALS

Recommended list of tools, equipment and materials for the training of 20 trainees for **Mobile Phones and Handheld Gadgets Servicing NC III**.

Up-to-date tools, materials, and equipment of equivalent functions can be used as alternatives. This also applies in consideration of community practices and their availability in the local market.

Qty.	Unit	Description/Specification
TOOLS
20	pcs	Soldering iron, 40W / 60W
20	pcs	Soldering stand
10	pcs	Desoldering tools
20	pcs	Tweezer
10	pcs	Opening tool (SRT type)
20	sets	Blade cutter/scissor
10	sets	Precision screwdrivers, assorted
10	sets	Set of torx/star bit
20	pcs	Multi-testers (analog/digital)
20	sets	Pliers, assorted
2	pcs	Flat file
20	pcs	PCB holder
20	pcs	Anti-static mat, small
4	pcs	Heating pad
5	pcs	USB cable
5	sets	Charger, for mobile phone/handheld gadget, assorted
1	subscription	Internet connection, at least 25 Mbps
GSM box/dongle
1	set	Z3X box
1	set	CM2 dongle
1	set	MRT dongle
1	set	Schematic applications (dongle)
As required	set	Appropriate GSM box/software tools for mobile phone and handheld gadgets model and brand

Qty.	Unit	Description/Specification
EQUIPMENT
4	units	Desktop computer/ laptop with appropriate operating system (32-/64-bits), at least i3, 8 GB RAM, 120 GB SSD
4	units	Mobile phone, assorted model with parts (for demo)
4	units	Tablet/iPad, assorted model with parts (for demo)
4	units	Power Supply-variables
1	unit	Oscilloscope (optional)
4	units	Rework station (Hot air) with soldering tool
4	units	High-grade magnifying glass with lamp
1	unit	Trinocular microscope
10	pcs	Flashlight
1	unit	Modem/router
1	unit	LCD projector
PPEs
20	pcs	Face/Dust Mask
20	pairs	Anti-static gloves
20	pcs	Goggles/eye protector

MATERIALS		
Qty.	Unit	Description/Specification
20	pcs	Assorted mobile phone logic board with parts
20	pcs	Assorted handheld gadgets logic board with parts
20	pcs	Power switch, assorted
20	pcs	Charging pin, assorted
20	pcs	Mouthpiece/Buzzer/Earpiece, assorted
20	pcs	Plastic container, small (for screw)
4	sets	Memory card reader
4	roll	magnetic wires/jumper wire
4	sets	USB cable, assorted
4	roll	Soldering lead
4	pcs	Soldering wick
4	cans	Soldering paste
4	cans	Flux
4	tubes	Adhesive paste
4	bottles	Anti-adhesive liquid
1	roll	Kapton tape
4	bottles	Cleaning agent
20	pcs	Cleaning brush
1	unit	White board
10	pcs	White board marker (assorted color)

3.5   TRAINING FACILITIES

Based on class size of 25 students/trainees 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
Lecture/Laboratory Area	5 x 8	40	1	40
Learning Resource Area	4 x 5	20	1	20
Tool Room / Storage Area	2 x 2	4	1	4
Wash ,Toilet & Locker Room	1 x 2	2	2	4
Total				68
Facilities /Equipment/Circulation**				20
Total Area				**88**

*** Area requirement is equivalent to 30% of the total teaching/learning areas*

3.6   TRAINERS QUALIFICATIONS

Mobile Phones and Handheld Gadgets Servicing NC III

- Must be a holder of National TVET Trainer's Certificate (NTTC) I in Mobile Phones and Handheld Device Servicing NC III

- Must have at least three (3) years relevant industry experience in mobile devices servicing within the last six (6) years.

3.7   INSTITUTIONAL ASSESSMENT

Institutional assessment is undertaken by trainees to determine their achievement of units of competency. A certificate of achievement is issued for each unit of competency. It is recommended that a comprehensive written examination covering the basic, common and core competencies be administered at the end of the training.

SECTION 4. ASSESSMENT AND CERTIFICATION ARRANGEMENT

Competency Assessment is the process of collecting evidence and making judgments whether competency has been achieved. The purpose of assessment is to confirm that an individual can perform to the standards expected at the workplace as expressed in relevant competency standards.

The assessment process is based on evidence or information gathered to prove achievement of competencies. The process may be applied to an employable unit(s) of competency in partial fulfillment of the requirements of the national qualification.

4.1. NATIONAL ASSESSMENT AND CERTIFICATION ARRANGEMENTS

4.1.1. To attain the National Qualification of **Mobile Phones and Handheld Gadgets Servicing NC III**, the candidate must demonstrate competence in all the units listed in Section 1. Successful candidates shall be awarded a **National Certificate III** signed by the TESDA Director General.

4.1.2. The qualification of **Mobile Phones and Handheld Gadgets Servicing NC III** may be attained through demonstration of competence through project-type assessment covering all the units of competency required in the qualification.

4.1.3. Assessment shall focus on the core units of competency. The basic and common units shall be integrated or assessed concurrently with the core units.

4.1.4. Any of the following are qualified to apply for assessment and certification:

- Graduates of WTR-registered program, NTR-registered programs or formal/non-formal/informal including enterprise-based trainings related to mobile devices and handheld gadgets servicing courses and/or programs.

- Experienced workers (wage employed or self-employed) who gained competencies in mobile devices and handheld gadgets servicing for at least one (1) year within the last five (5) years

4.1.5. Recognition of Prior Learning (RPL). Candidates who have gained competencies through informal training, previous work or life experiences may apply for recognition in a particular qualification through a recognition/ assessment process.

4.1.6. Individuals who already possess Certificate of Competency (COC) in Maintain and Repair Cellular Phones are required to take the assessment for this TR on or before the expiration of their COCs.

4.1.7. The guidelines on assessment and certification are discussed in detail in the "Procedures Manual on Assessment and Certification" and "Guidelines on the Implementation of the Philippine TVET Competency Assessment and Certification System (PTCACS)".

4.2. COMPETENCY ASSESSMENT REQUISITE

4.2.1 *Self-Assessment Guide*. The self-assessment guide (SAG) is accomplished by the candidate prior to actual competency assessment. SAG is a pre-assessment tool to help the candidate and the assessor determine what evidence is available, where gaps exist, including readiness for assessment.

This document can:
   a. Identify the candidate's skills and knowledge
   b. Highlight gaps in candidate's skills and knowledge
   c. Provide critical guidance to the assessor and candidate on the evidence that need to be presented
   d. Assist the candidate to identify key areas in which practice is needed or additional information or skills that should be gained prior`

4.2.2 *Accredited Assessment Center*. Only Assessment Center accredited by TESDA is authorized to manage the assessment activities of candidates for national certification.

4.2.3 *Accredited Competency Assessor*. Only competency assessor accredited by TESDA is authorized to assess the competencies of candidates for national certification.

1) ANNEX A - COMPETENCY MAP   (Electronics Sector)

Mobile Phones and Handheld Gadgets Servicing NC III

BASIC COMPETENCIES

Receive and respond to workplace communication	Participate in workplace communication	**Lead workplace communication**	Utilize specialized communication skill	Manage and sustain effective communication strategies
Work with others	Work in team environment	**Lead small teams**	Develop and lead teams	Manage and sustain high performing teams
Solve/address routine problems	Solve/address general workplace problems	**Apply critical thinking and problem solving techniques in the workplace**	Perform higher order thinking processes and apply techniques in the workplace	Evaluate higher order thinking skills and adjust problem solving techniques
Enhance self-management skills	Develop career and life decisions	**Work in a diverse environment**	Contribute to the practice of social justice in the workplace	Advocate strategic thinking for global citizenship
Support Innovation	Contribute to workplace innovation	**Propose methods of applying learning and innovation in the organization**	Manage innovative work instructions	Incorporate innovation into work procedures
Access and maintain information	Present relevant information	**Use information systematically**	Manage and evaluate usage of information	Develop systems in managing, and maintaining information
Follow occupational safety and health policies and procedures	Practice occupational safety and health policies and procedures	**Evaluate occupational safety and health work practices**	Lead in improvement of Occupational Safety and Health Program, Policies and Procedures	Manage implementation of occupational safety and health programs in the workplace
Apply environmental work standards	Exercise efficient and effective sustainable practices in the workplace	**Evaluate environmental work practices**	Lead towards improvement of environmental work programs, policies and procedures	Manage implementation of environmental programs in the workplace
Adopt entrepreneurial mindset in the workplace	Practice entrepreneurial skills in the workplace	**Facilitate entrepreneurial skills for micro-small-medium enterprises (MSMEs)**	Sustain entrepreneurial skills	Develop and sustain a high-performing enterprise

COMMON COMPETENCIES

Use Hand Tools	**Perform Mensuration and Calculation**	**Prepare and Interpret Technical Drawing**	**Apply Quality Standards**	**Perform Computer Operations**
Terminate and Connect Electrical Wiring and Electronic Circuits	**Test Electronic Components**			

TR – Mobile Phones & Handheld Gadgets Servicing NC III   (ELCMPS321)   Promulgated February 9, 2021   118

CORE COMPETENCIES

Install Instrumentation and Control Devices	Calibrate Instrumentation and Control Devices	Configure Instrumentation and Control Devices	Loop Check Instrumentation and Control Devices	Maintain and Repair Instrumentation & Control Devices
Start-up Instrumentation and Control Systems	Diagnose and Troubleshoot Instrumentation and Control Systems	Install Mechatronics Devices	Configure & Test Mechatronics Devices	Maintain and Repair Mechatronics Devices
Develop Mechatronics Control Circuits & Software Application Programs	Commission Mechatronics Systems	Diagnose and Troubleshoot Mechatronics Systems	Service and Repair Audio Systems and Products	Service and Repair Video Systems and Products
Service and Repair Business Machines	Assemble and Disassemble Consumer Electronic Products	Maintain and Repair Electronically Controlled Domestic Appliances	Maintain and Repair Audio-Video Products and Systems	Maintain and Repair Cellular Phones
Commission Consumer Electronic Products and Systems	Develop Servicing Systems for Consumer Electronic Products	Train service technician	Manage Servicing Systems for Consumer Electronics Products and Systems	Train service technician supervisors
Setup Backend Operation Workplace for Electronics Production Line	Perform Backend Operation for Electronics Production Line	Setup Backend Operation Workplace for Semiconductor Production Line	Perform Backend Operation for Semiconductor Production Line	Check quality compliance of backend operation for Semiconductors production line
Check quality compliance of backend operation for electronics production line	Setup Front-of-Line (FOL) Operation Workplace for Electronics Production Line	Setup Front-of-Line (FOL) Operation Workplace for Semiconductor Production Line	Perform Front-of-Line (FOL) Operation for Semiconductor Production Line	Check quality compliance of Front-of-Line (FOL) operation for Semiconductors production line
Perform Front-of-Line (FOL) Operation for Electronics Production Line	Check quality compliance of Front-of-Line (FOL) operation for electronics production line	Setup Backend Operation Workplace for HDD Production Line	Perform Backend Operation for Hard Disk Drives (HDD) Production Line	Check quality compliance of backend operation for HDD production line
Perform Machine Setup/Conversion	Perform Machine Troubleshooting and Repair	Setup Front-of-Line (FOL) Operation Workplace for HDD Production Line	Perform Front-of-Line (FOL) Operation for HDD Production Line	Check quality compliance of Front-of-Line (FOL) operation for HDD production line
Monitor Machine Performance	Perform Machine Preventive Maintenance and Calibration	Install Instrumentation and Automation Devices	Configure & Test Instrumentation and Automation System	
Calibrate Instrumentation and Automation Devices	Maintain, Troubleshoot and Repair Instrumentation and Automation Devices	Loop Check Instrumentation and Automation Devices	Commission and Start-up Instrumentation & Automation Loops and Systems	
Prepare workplace for servicing mobile phone unit and handheld gadget	**Diagnose and identity hardware and software related problems**	**Troubleshoot and repair mobile phone unit and handheld gadget**	**Perform functionality testing and documentation**	

TR – Mobile Phones & Handheld Gadgets Servicing NC III   (ELCMPS321)   Promulgated February 9, 2021   119

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

20) **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

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

22) **Training Regulations (TR)** – refers to the document promulgated and issued by TESDA consisting of competency standards, national qualifications and training guidelines for specific sectors/occupations. The TR serves as basis for establishment of qualification and certification under the PTQF. It also serves as guide for development of competency-based curricula and instructional materials including registration of TVET programs offered by TVET providers

23) **Underpinning 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

24) **Underpinning 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

25) **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

SECTOR SPECIFIC

1) **Android** is a mobile operating system (OS) based on the Linux kernel and currently developed by Google. With a user interface based on direct manipulation, Android is designed primarily for touchscreen handheld gadgets such as smartphones and tablet computers, with specialized user interfaces for televisions (Android TV), cars (Android Auto), and wrist watches (Android Wear). The OS uses touch inputs that loosely correspond to real-world actions, like swiping, tapping, pinching, and reverse pinching to manipulate on-screen objects, and a virtual keyboard.

2) **Apple device** - typically refers to an iPhone, iPad or iPod rather than a Mac laptop; however, depending on context, the laptop might be included. Since "device" refers to hardware in general, Apple devices may encompass everything in the Apple line, including Mac desktop computers.

3) **Bluetooth** - is a wireless technology standard for exchanging data over short distances (using short-wavelength UHF radio waves in the ISM band from 2.4 to 2.485 GHz) from fixed and handheld gadgets, and building personal area networks (PANs). It can connect several devices, overcoming problems of synchronization.

4) **Broadband** – is a high-speed, high-capacity transmission medium that can carry signals from multiple independent network carriers. It is a high-capacity transmission technique using a wide range of frequencies, which enables a large number of messages to be communicated simultaneously.

5) **Card reader** - is a data input device that reads data from a card-shaped storage medium.

6) **Cellular phone** – see mobile phone definitions.

7) **Chat room** - a site on the internet where a number of users can communicate in real time (typically one dedicated to a particular topic).

8) **Customer service** – is the provision of service to customers before, during and after a purchase. It is the process of ensuring customer satisfaction with a product or service. Often, customer service takes place while performing a transaction for the customer, such as making a sale or returning an item or replacing / repairing a product or device. Customer service can take the form of an in-person interaction, a phone call, self-service systems, or by other means.

9) **Digitizer** - device for converting analogue signals into digital signals.

10) **ESD** - **Electrostatic discharge** (**ESD**) - is the sudden flow of electricity between two electrically charged objects caused by contact, an electrical short or dielectric breakdown. A buildup of static electricity can be caused by turbocharging or by electrostatic induction. The ESD occurs when differently-charged objects are brought close together or when the dielectric between them breaks down, often creating a visible spark.

11) **Flashers -** are a combination of software, hardware and drivers. There are many varieties of flasher boxes covering a wide variety of mobile phones. Therefore, choosing the correct box for a type of mobile phone device or phone model or mobile phone manufacturer can be a daunting task.

12) **Flasher box** or **flasher tool** - is a programming hardware and/or software that can be used to program (flash) the device memory, e.g., EEPROM or flash memory. These tools mainly originate from the manufacturer or service centers for debugging, repair, or upgrade services. They can overwrite the non-volatile memory and some, depending on the manufacturer or device, can also read the memory to make a copy, originally intended as a backup. The memory can be protected from reading, e.g., by software command or destruction of fuses in the read circuit.

13) **GSM box / dongle** - is a tool designed to repair software related problem of mobile phones and handheld gadgets. These devices can only be used in interface with personal computer/laptop.

14) **Flashing** - means reinstalling the operating system (OS) of the cell phone. In this process, we erase the entire OS and install a new OS. This will repair any problem that was there before due to the OS being corrupt.

15) **Functionality** - the quality or state of being functional; especially: the set of functions or capabilities associated with computer software or hardware or an electronic or mobile device.

16) **Gadget** - an often small mechanical or electronic device with a practical use but often thought of as a novelty.

17) **Handheld device -** is any portable device that can be carried and held in one's palm. A handheld can be any computing or electronic device that is compact and portable enough to be held and used in one or both hands. Typically, handheld gadgets are not as powerful as a computer, but modern handhelds increasingly include powerful dual-core processors, RAM, SD storage capacity, an operating system, and native and add-on applications. They are often powered by a dry cell lithium or similar battery. Moreover, these types of devices increasingly use a touch screen interface. Personal digital assistants (PDA), tablet PCs and portable media players are all considered handheld gadgets.

18) **Hard reset** - also known as a *factory reset* or *master reset*, is the restoration of a device to the state it was in when it left the factory. All settings, applications and data added by the user are removed. The term is often heard in reference to smartphones and tablets but laptop and desktop computers, as well as most other electronic devices, can usually be restored to factory conditions.

19) **Hot air gun or hot air station -** is used to heat devices and melt solder, and specialized tools are used to pick up and position often tiny components.

20) **IMEI** - International Mobile Equipment Identity (IMEI) is a unique 15 digit international serial number used to identify a mobile phone handset to a mobile phone network. This number can used to identify illegal mobile phone handsets. Each time a mobile phone is switched on or a call is made on it, the network provider checks the IMEI

number of the handset, then it cross references it with a blacklist register. If it is on the blacklist then the network will either refuse to send a signal to the phone or will supply a signal but will not allow any outgoing or incoming calls.

21) **Internet** - an electronic communications network that connects computer networks and organizational computer facilities around the world the Internet is a public, cooperative and self-sustaining facility accessible to hundreds of millions of people worldwide.

22) **Internet browser** - is the program that you use to access the internet and view web pages on your computer. Some common internet browser examples include - Microsoft Internet Explorer; Mozilla Firefox; AOL Explorer; Apple Safari and Opera.

23) **Internet browsing** - exploration of the World Wide Web by following one interesting link to another, usually with a definite objective but without a planned search strategy. In comparison 'surfing' is exploration without a definite objective or search strategy, and 'searching' are exploration definite in both objective and strategy.

24) **iOS -** (formerly iPhone OS) is a mobile operating system created and developed by Apple Inc. exclusively for its hardware. It is the operating system that presently powers many of the company's mobile devices, including the iPhone, and iPod Touch; it also powered the iPad prior to the introduction of iPadOS in 2019.

25) **LTE** (Long Term Evolution) - is a wireless broadband technology designed to support roaming Internet access via cell phones and handheld gadgets.

26) **Memory card reader** - is a device for accessing the data on a memory card such as a CompactFlash (CF), Secure Digital (SD) or Multi-Media Card (MMC).

27) **Memory card** (sometimes called a flash memory card or a storage card) - is a small storage medium used to store data such as text, pictures, audio, and video, for use on small, portable or remote computing devices.

28) **Mobile application** - also called **mobile apps**, it is a term used to describe Internet applications that run on smartphones and other mobile devices. Mobile applications usually help users by connecting them to Internet services more commonly accessed on desktop or notebook computers, or help them by making it easier to use the Internet on their portable devices. A mobile app may be a mobile site bookmarking utility, a mobile-based instant messaging client, Gmail for mobile, and many other applications.

29) **Mobile broadband** - is a wireless technology that allows you to connect a mobile device such as your smartphone or tablet to a broadband internet connection wirelessly through a mobile phone network.

30) **Mobile operating system (OS)** - is software that allows smartphones, tablet PCs and other devices to run applications and programs. A mobile OS typically starts up when a device powers on, presenting a screen with icons or tiles that present information and provide application access. Mobile operating systems also manage mobile/cellular and wireless network connectivity, as well as phone access.

31) **Mobile phone** - is an electronic telecommunication device, often referred to as cellular phone or cellphone or. These communication devices connect to a wireless communications network through radio waves or satellite transmissions. Most mobile phones provide voice communications, Short Message Service (SMS), Multimedia Message Service (MMS), and newer phones may also provide Internet services such as Web browsing, instant messaging capabilities and e-mail.

32) **Modem** - (modulator-demodulator) is a device that modulates signals to encode digital information and demodulates signals to decode the transmitted information. The goal is to produce a signal that can be transmitted easily and decoded to reproduce the original digital data.

33) **Open-source** - means that you can get the source code of the software for free (source code is the code of the program written in a certain programing language).

34) **Online Forum** – An Internet forum, or message board, is an online discussion site where people can hold conversations in the form of posted messages

35) **Service center** – an authorized commercial establishment or a store where you can buy the products, parts for the products that are sold there, and can have the products repaired or replaced.

36) **Service manual** – is a handbook published by a product manufacturer or a specialized servicing company that contains instructions and specifications for the maintenance and repair of specific product. They also include wiring diagrams and troubleshooting guides. Most service manuals deal with only one make, model, or year, and nearly all are intended for professionals, technicians or the very experienced amateur.

37) **Smartphone** - is handheld device/gadget that integrates mobile phone capabilities with the more common features of a handheld computer or PDA. Smartphones allow users to store information, e-mail, and install programs, along with using a mobile phone in one device. A smartphone's features are usually more oriented towards mobile phone options than the PDA-like features. There is no industry standard for what defines a smartphone, so any mobile device that has more than basic cellphone capabilities can actually be filed under the smartphone category of devices/gadgets.

38) **SRT** - special reopening tool.

39) **Reprogramming** – is the process of changing the programming of a system or device.

40) **Rework station (hot air)** – *Rework* (or re-work) is the term for the refinishing operation or repair of an electronic printed circuit board(PCB) assembly, usually involving desoldering and re-soldering of surface-mounted electronic components (SMD).

41) **Router** - is a device that forwards data packets along networks. A router is connected to at least two networks, commonly two LANs or WANs or a LAN and its ISP's network. Routers are located at gateways, the places where two or more networks connect.

42) **Sensor:** A transducer whose input is a physical phenomenon and whose output is a quantitative measure of the phenomenon.

43) **SIM card**, also known as a **subscriber identity module** - is a smart card that stores data for GSM mobile/cellular telephone subscribers. Such data includes user identity, location and phone number, network authorization data, personal security keys, contact lists and stored text messages. Security features include authentication and encryption to protect data and prevent eavesdropping.

44) **Software**: The entire set of programs, procedures, and related documentation associated with a computer.

45) **Soft reset** - is a *restart* of a device, such as a smartphone, tablet, laptop or personal computer (PC). The action closes applications and clears any data in RAM (random access memory). Unsaved data in current use may be lost but data stored on the hard drive, applications and settings are not affected.

46) **Software stack** - it's made up of the operating system (the platform on which everything runs), the middleware (the programming that allows applications to talk to a network and to one another), and the applications (the actual programs that the phones will run). In short, the Android software stack is all the software that will make an Android phone an Android phone.

47) **Soldering flux** - flux applied to surfaces that are to be joined by soldering; flux cleans the surfaces and results in a better bond.

48) **stockROM –** official firmware of the unit.

49) **Tablet** - is a mobile computer with a touchscreen display, circuitry, and battery in a single device. Tablets come equipped with sensors, including cameras, a microphone, and an accelerometer, and the touchscreen display uses the recognition of finger or stylus gestures replacing the usage of the mouse and keyboard. They usually feature on-screen, pop-up virtual keyboards for typing. Tablets may include physical buttons for basic features such as speaker volume and power, and ports for network communications and battery charging. Tablets are typically larger than smartphones or personal digital assistants at 7 inches (18 cm) or larger, measured diagonally.

50) **Touch screen** – is a display that also serves as an input device. Some touchscreens require a proprietary pen for input, though most modern touchscreens detect human touch. Since touchscreen devices accept input directly through the screen, they do not require external input devices, such as mice and keyboards. This makes touchscreens ideal for computer kiosks, as well as portable devices, such as tablets and smartphones.

51) **USB flash drive**, also known under a variety of other names - is a data storage device that includes flash memory with an integrated Universal Serial Bus (USB) interface. USB flash drives are typically removable and rewritable, and physically much smaller than an optical disc.

52) **Wi-Fi** - Wireless Fidelity (WiFi) - is a wireless networking technology that allows computers and other devices or handheld devices/gadgets to communicate over a wireless signal. It describes network components that are based on one of the 802.11 standards developed by the IEEE and adopted by the Wi-Fi Alliance.

53) **Win mobile (Windows Mobile)** - is a family of mobile operating systems developed by Microsoft for smartphones and Pocket PCs.

54) **Z3X** - tool for Samsung phones and GSM solutions.

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TRAINING REGULATIONS (TR)
DOCUMENT REVISION HISTORY

Qualification Title: <u>Mobile Phones and Handheld Gadgets Servicing NC III</u>
Qualification Code: <u>ELCMPS321</u>

Revision No.	Document Description Types*	Replaces Version (TESDA Board Resolution No./ Date)	New Version (TESDA Board Resolution No./ Date)	Deployment Circular (TESDA Circular/ Implementing Guidelines)
00	Document Created - Consumer Electronics Servicing NC II (COC #3)	Not Applicable	TBR No. 2006-28/ December 14, 2006	Not Applicable
01	Document Created - Mobile Phones and Handheld Gadgets Servicing NC III	TBR No. 2006-28/ December 14, 2006	TBR No. 2021- 05/ February 9, 2021	TESDA Circular No. 034 s. 2021

Legend: *Description Types
- **Document Created**
- **Document Amended**

TR – Mobile Phones & Handheld Gadgets Servicing NC III   (ELCMPS321)   Promulgated February 9, 2021   131