Federal Democratic Republic of Ethiopia

OCCUPATIONAL STANDARD

BASIC ELECTRONIC COMMUNICATION AND MULTIMEDIA EQUIPMENT SERVICING

Ministry of Education

May 2011

Introduction

Ethiopia has embarked on a process of reforming its TVET-System. Within the policies and strategies of the Ethiopian Government, technology transformation – by using international standards and international best practices as the basis, and, adopting, adapting and verifying them in the Ethiopian context – is a pivotal element. TVET is given an important role with regard to technology transfer. The new paradigm in the outcome-based TVET system is the orientation at the current and anticipated future demand of the economy and the labor market.

The Ethiopia Occupational Standards (EOS) is the core element of the Ethiopian National TVET-Strategy and an important factor within the context of the National TVET Qualification Framework (NTQF).They are national Ethiopia standards, which define the occupational requirements and expected outcome related to a specific occupation without taking TVET delivery into account.

This document details the mandatory format, sequencing, wording and layout for the Ethiopia Occupational Standard which comprised of Units of Competence.

A Unit of Competence describes a distinct work activity. It is documented in a standard format that comprises:
- Occupational title, NTQF level
- Unit code
- Unit title
- Unit descriptor
- Elements and Performance criteria
- Variables and Range statement
- Evidence guide

Together all the parts of a Unit of Competence guide the assessor in determining whether the candidate is competent.

The ensuing sections of this EOS document comprise a description of the occupation with all the key components of a Unit of Competence:
- chart with an overview of all Units of Competence for the respective level including the Unit Codes and the Unit Titles
- contents of each Unit of Competence (competence standard)
- occupational map providing the technical and vocational education and training (TVET) providers with information and important requirements to consider when designing training programs for this standards and for the individual, a career path

UNIT OF COMPETENCE CHART

Occupational Standard: Basic Electronic Communication and Multimedia Equipment Servicing

Occupational Code: EEL CMS

NTQF Level II

EEL CMS2 01 0511 Assemble/Disassemble Communication and Multimedia Equipment	EEL CMS2 02 0511 Implement Maintenance Procedures	EEL CMS2 03 0511 Maintain and Repair Audio/Video Equipment
EEL CMS2 04 0511 Service and Repair Mobile Phones	EEL CMS2 05 0511 Install and Repair Antenna and Satellite System	EEL CMS2 06 0511 Apply Routine Problem Solving Techniques
EEL CMS2 07 0511 Dismantle and Dispose Communication and Multimedia Equipment	EEL CMS2 08 0511 Carry-out Preventive Maintenance in Communication and Multimedia Equipment	EEL CMS2 09 0511 Participate in Workplace Communication
EEL CMS2 10 0511 Work in Team Environment	EEL CMS2 11 0511 Maintain an Effective Relationship with Client/Customers	EEL CMS2 12 0511 Develop Business Practice
EEL CMS2 13 1012 Apply Continuous Improvement Processes (Kaizen)		

Occupational Standard: Basic Electronics Communication and Multimedia Equipment Servicing Level II	
Unit Title	**Assemble and Disassemble Communication and Multimedia Equipment**
Unit Code	**EEL CMS2 01 0511**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to assemble/ disassemble consumer electronic products and systems.

Elements	Performance Criteria
1. Prepare product and work station for assembly	1.1 Assembly workplace is prepared in accordance with *OH&S policies and procedures* 1.2 *Responsible person* is consulted for effective and proper work coordination 1.3 Required *materials, tools and equipment* are prepared and checked in accordance with established procedures 1.4 Parts and materials needed to complete the work are prepared and obtained according to requirements
2. Solder/ De-solder components to the board	2.1 *Soldering and de-soldering processes* are performed in accordance with OH&S policies and procedures 2.2 Process is checked according to established standards and requirements 2.3 Soldered products are checked in accordance with quality standards
3. Assemble/ disassemble boards	3.1 *Assembling and disassembling processes* are performed in accordance with OH&S policies and procedures 3.2 Process is checked according to established standards and requirements 3.3 Assembled products are checked in accordance with quality standards
4. Test and inspect assembled products	4.1 Finished products are subjected to final visual inspection and testing in accordance with quality standards, procedures and requirements 4.2 Work completion is documented and responsible person is informed in accordance with established procedures 4.3 Housekeeping procedures are observed in accordance with

	5S discipline and established procedures

Variable	Range
OH&S policies and procedures	Arrangements of an organization or enterprise to meet their legal and ethical obligations of ensuring the workplace is safe and without risk to health. This may include: • hazardous and risk assessment mechanisms • implementation of safety regulations • safety training • safety systems incorporating, 　▪ work clearance procedures 　▪ isolation procedures 　▪ gas and vapor 　▪ monitoring/testing procedures 　▪ use of protective equipment and clothing • use of codes of practice 　▪ Ethiopia electronics code
Responsible person	• Immediate supervisor • Service supervisor/manager
Materials, tools and equipment	• soldering iron and de-soldering tools • screwdriver (assorted) • wrenches (assorted) • Allen wrench/key • utility knife/stripper • pliers (assorted) • test jig • ESD-free work bench with mirror
Soldering and de-soldering processes	Soldering 　▪ prepare the materials and equipment needed 　▪ wipe the soldering iron tip on a damp sponge and wet it with a small amount of solder 　• apply the hot iron to one side of the joint and then feed in solder from the other 　▪ allow the flux to work on the surfaces and the solder to flow across the whole joint, this should take no more than a couple of seconds 　▪ remove the solder, then the iron 　▪ inspect the work De-soldering 　▪ lay the iron tip to rest against component leads on the board

	▪ use solder sucker to quickly remove molten solder on the connection ▪ remove the component on the board ▪ clean the solder pad to remove left-over
Assembling and disassembling processes	• supplies, materials and equipment preparation • familiarize with the diagram and the product • perform assembly and disassembly • check the assembled and disassembled product

Evidence Guide	
Critical Aspects of Competence	Assessment requires evidence that the candidate: • Assembled the unit according to specific requirements within timeframe allotted • Applied safety rules and procedures • Used tools and equipment properly • Identified electronic components and devices and its proper handling • Applied appropriate knowledge and technique on actual assembly

Underpinning Knowledge and Attitudes	- Mensuration/Mathematics
	  - Conversion of Units
	  - Applied Mathematics
	- Safety
	  - Work Safety requirements and economy of materials with durability
	  - Knowledge in 5S application and observation of required timeframe
	  - Knowledge of proper handling and disposal of chemicals
	- Materials, tools and equipment uses and specifications
	  - Identification of hand and power tools
	  - Proper care and use of tools
	- System and Processes
	  - Principles of Electrical Circuits
	  - Identifying and Proper Handling Of Electronic Components
	  - Identifying and Proper Handling Of Digital Components
	  - Fundamentals of ESD Handling
	  - Fundamentals of Thru-Hole Assembly
	  - Fundamentals of Surface-Mount Assembly
	  - Theories of Lead-Free Solders
	  - Fundamentals of Soldering Irons
	  - Fundamentals of Cabling And Wiring Harness
	  - Identifying Connectors And Terminators
	  - Theories of PCB Artwork
	  - Theories of Etching PCB
	  - Fundamentals of soldering and de-soldering

Underpinning Skills	Assessment requires evidence that the candidate: - Assembled the unit according to specific requirements within timeframe allotted - Applied safety rules and procedures - Used tools and equipment properly - Identified electronic components and devices and its proper handling - Applied appropriate knowledge and technique on actual assembly
Resources Implication	The following resources must be provided: - Tools and equipment (see range of variables) - Working area/bench - Sufficient lighting and ventilation system - Complete electronic supplies - Assessment rating sheet

	• Reporting forms
Assessment Methods	Competence may be assessed through: • Interview / Oral questioning / Written test • Demonstration / Observation
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting

Occupational Standard: Electronics Communication & Multimedia Equipment Servicing Level II	
Unit Title	**Implement Maintenance Procedures**
Unit Code	**EEL CMS2 02 0511**
Unit Descriptor	This unit defines the competence required to set up maintenance procedures to keep equipment and software operating effectively and efficiently.

Elements	Performance Criteria
1. Determine best practices for equipment and software maintenance	1.1 ***Equipment*** and ***software*** to be maintained and implemented processes are identified to ensure future acquisitions of equipment and software.
	1.2 Vendor ***documentation***, peer organizations or research information detailing best practices in equipment and software maintenance are identified to improve system performance and reliability.
	1.3 ***Requirements*** are obtained from user in the area of equipment maintenance and reliability.
	1.4 Procedures are documented for maintenance based upon best practices.
2. Revise practices, where appropriate	2.1 Maintenance operation is monitored and reviewed where appropriate.
	2.2 Problem areas including failures are identified to meet ***service-level agreements***, and consider changes to maintenance procedures.
	2.3 Changes are assessed in consultation with user, support staff and third party suppliers.
	2.4 Improvements are designed and implemented to maintenance procedures.
3. Identify and analyze IT system components to be maintained	3.1 Warranty status of components and/or software is determined and documented according to vendor, project or organizational requirements.
	3.2 ***System architecture*** and configuration documentation are reviewed for currency status.
	3.3 Critical components and/or software are identified and

	recommendations are documented regarding possible service arrangements.
4. Apply maintenance procedures	4.1 Preventative maintenance schedule is created based on cost, business and service-level agreements requirements
	4.2 Specific and appropriate maintenance procedure is identified and applied based on cost, business and service-level agreements requirements
	4.3 Recommended procedures are documented and submitted for approval in accordance with organizational requirements and service-level agreement
	4.4 Implementing staff are oriented on the procedures and ensured to follow the maintenance schedule
	4.5 **OHS** is observed throughout the process

Variable	Range
Equipment	May include but is not limited to workstations, personal computers, modems and other connectivity devices, printers, DSL modems, hard drives, monitors, switches, hubs, personal digital assistants and other peripheral devices
Software	May include but is not limited to commercial, in-house, packaged or customized software
Documentation	May follow ISO/IEC/AS standards, audit trails, naming standards, version control, project management templates and report writing, maintaining equipment inventory; client training and satisfaction reports
Requirements	May be in reference to the business, system, application, network or people in the organization
Service-level agreement	May exist for many different infrastructure services, including communications carriers, ISPs, ASPs and SLAs for vendor products, workload and performance considerations, expectations regarding servicing, penalties, and charge back to business units.
Systems architecture	May include but not limited to: • Operating system: Novell NetWare 5 or above or operating system that has multi-user ability, Linux, Mac OS, Windows 2000 or above • Database software: Oracle, Sybase, Microsoft SQL server, Ingres, DB2, Informix, MSQL, MySQL, SQL server • Configuration: small memory model, large memory model, requests per second

Tools	• Hardware and Software • Blower • Cleaning agents(alcohol, contact cleaner) • Tool kit • Static wrist strap • Multi meter

Occupational Health and Safety (OHS)	OHS precautions and measures may include against:
	• Physical hazards – impact, illumination, pressure, noise, vibration, temperature, radiation
	• Chemical hazards – dusts, fibers, mists, fumes, smoke, gasses, vapors
	• Ergonomics
	  ▪ Psychological factors – over exertion/ excessive force, awkward/static positions, fatigue, direct pressure, varying metabolic cycles
	  ▪ Physiological factors – monotony, personal relationship, work out cycle
	• Burglary, Fire and Power accidents

Evidence Guide	
Critical Aspects of Competence	Assessment must confirm ability to- • determine the best practice for hardware and software maintenance • set up efficient and responsive maintenance procedures to keep equipment and software operating
Underpinning Knowledge and Attitudes	Demonstrates knowledge of: • client business domain • current industry-standard hardware and software products and its features • equipment and software maintenance • safety procedures and practices in computer maintenance • techniques and procedure in determining system's current functionality • system performance and maintenance procedures • operation and use of diagnostic tools
Underpinning Skills	Demonstrates skills to: • identify and analyze maintenance needs • analyze IT system components to be maintained • determine and apply best practices for equipment and software maintenance

	• use diagnostic tools
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Assessment Methods	Competency may be assessed through: • Interview / Written Test / Oral Questioning • Observation / Demonstration
Context of Assessment	Competency may be assessed in the work place or in a simulated work place setting

Occupational Standard: Electronics Communication & Multimedia Equipment Servicing Level II	
Unit Title	Maintain and Repair Audio / Video Equipment
Unit Code	EEL CMS2 03 0511
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to maintain and repair audio-video products and systems including diagnosing faults, reassembling, testing and preparing reports.

Elements	Performance Criteria	
1. Prepare unit, tools and workstation	1.1	Complete check-up of **audio-video systems and products** is conducted and defects are identified, verified and documented against customer description
	1.2	Repair/maintenance history is verified in line with the company procedures
	1.3	**Service manuals** and **service information** required for repair/maintenance are acquired as per standard procedure
	1.4	Workstation is set/prepared for repair job in line with the company requirements and work specifications
	1.5	Necessary **tools**, **test instruments and personal protective equipment** are prepared in line with job requirements
2. Diagnose faults	2.1	Systematic **pre-testing procedure** is observed in accordance with manufacturer's instructions
	2.2	System defects/fault symptoms are identified using appropriate tools and equipment and in accordance with safety procedures
	2.3	Test instruments required for the job are used in accordance with user manuals
	2.4	Circuits are checked and isolated using specified testing procedures
	2.5	Identified defects and faults are explained to the **responsible person** in accordance with enterprise or company policy and procedures
	2.6	Control settings/adjustments are checked in conformity with service-manual specifications
	2.7	Results of diagnosis and testing are documented accurately and completely within the specified time

	2.8 Customers are advised / informed regarding the status and serviceability of the unit according to company procedures
3. Maintain/repair product	3.1 Personal protective equipment is used in accordance with *Occupational Health and Safety* practices
	3.2 Electro-static discharge (ESD) protection procedure is followed in accordance with current industry standards
	3.3 Defective parts/components are replaced with identical or recommended appropriate equivalent ratings
	3.4 Repaired or replaced parts/components are soldered/mounted in accordance with the current industry standards
	3.5 Control settings/adjustments are performed in conformity with service-manual specifications
	3.6 Repair activity is performed within the required timeframe
	3.7 Care and extreme precaution in handling the unit/product is observed as per procedures
	3.8 Cleaning of unit is performed in accordance with standard procedures
4. Test repaired product	4.1 Repaired units are reassembled according to manufacturer's specifications
	4.2 Reassembled units are subjected to final testing and cleaning in conformity with manufacturer's specifications
	4.3 Service completion procedures and documentations are complied with based on workplace requirements
	4.4 Waste materials are disposed of in accordance with *environmental requirements*

Variable	Range
Audio-Video Products and Systems	Audio-Video products and systems include but may not be limited to the following: • AM-FM radio receivers • Audio cassette recorders • Video systems • Electronic musical instruments/keyboards • DVD/VCD Player • Professional audio/Public-address (PA) systems • Television ▪ Home ▪ Portable

	• PC Monitors
Service manuals	May include but not limited to: • Service manual/schematic diagram/parts list • Operating instructions/User's/Owner's manual
Service Information	May include but not limited to: • job report sheets • job order • bill of materials • customer index • service flowchart • stock and inventory record • requisition slips (for acquisition of parts) • supplier index
Tools, Materials and Test Instruments	May include but not limited to: • variable power supply • step-down transformer • soldering iron/gun • de-soldering tools • screwdriver (assorted) • wrenches (assorted) • Allen wrench/key • signal generator - AF/RF • multi-testers (analog/digital) • utility knife/stripper • pliers (assorted) • test jig • ESD-free work bench with mirror • Degaussing • RCA Cables/connectors • oscilloscope • TV pattern generator • high-grade magnifying glass with lamp • flashlight • cleaning brush • high voltage probe • ball peen hammer • soldering lead • wires • assorted electronic components • Contact Cleaner • Tweezers • Silicon Grease • Insulation tester w/ stand
Personal protective equipment	May include but not limited to: • Working clothes/Apron • Hand gloves • Face/Dust Mask • Goggles

Pre- testing procedures	• Visual inspection of the unit with power off • Interview of customer re history of unit • Operate the unit according to manual to confirm defects
Responsible person	• immediate supervisor • service supervisor / manager
OHS requirements in accordance with legislation & regulations	• Use of proper tools and equipment • Observe workplace environment and safety • Adherence to safety requirements in handling the unit • Use of protective device/shields • Ethiopia Electrical Code
Environmental Requirements	• Proper disposal of chemicals and components shall be based on existing requirements of the law and chemical waste management • Non-biodegradable parts or materials shall be packed and labeled properly for disposal

Evidence Guide	
Critical Aspects of Competence	Assessment requires evidence that the candidate: • prepared the unit and required materials, tools equipment and workshop properly • applied safety rules and procedures • identified faults and defects in accordance with testing procedures and documented the programs • explained faults' defect to the responsible person and informed costumer accordingly • used tools and equipment properly • followed service manual specifications/instructions • applied appropriate knowledge and technique on actual repair activity • restored unit to normal operating condition within timeframe

Underpinning Knowledge and Attitudes	• Mensuration/Mathematics
	  ▪ Conversion of units
	  ▪ Applied mathematics
	• Drawing and Schematic Diagram
	  ▪ Reading and interpreting orthographic projections and isometric views
	  ▪ Reading and interpreting electronic schematic symbols and diagram

	• Safety
	  ▪ Work Safety requirements and economy of materials with durability
	  ▪ Knowledge in 5S application and observation of required procedure
	• Materials, tools/instruments and equipment uses and specifications
	  ▪ Identification of hand and power tools
	  ▪ Proper care and use of tools
	  ▪ Identification of test and measuring instruments
	  ▪ Proper care and use of test and measuring instruments
	• System and Processes
	  ▪ Principles of Electrical Circuits
	  ▪ Fundamentals of Direct Current Circuits
	  ▪ Fundamentals of Alternating Current Circuits
	  ▪ Fundamentals of Electronic Components And Circuits
	  ▪ Fundamentals of Digital Logics, Components & Circuits
	  ▪ Fundamentals of Microprocessor Circuits And Programming
	  ▪ Analysis of Troubles And Isolation Techniques
	  ▪ Principles of Sound And Acoustics
	  ▪ Fundamentals of Audio Amplifiers
	  ▪ Fundamentals of Audio Source & Noise Reduction System
	  ▪ Fundamentals of Am & Fm Receivers
	  ▪ Principles of Vision And Color
	  ▪ Fundamentals of Color Television
	  ▪ Fundamentals of Video Sources & Noise Reduction System

Underpinning Skills	Demonstrates skills to: • application of troubleshooting technique • use and maintenance of test instruments, tools, & equipment • application of work safety practices and time management • application of substitution technique • soldering/de-soldering and wiring/cabling techniques • schematic diagram reading skills
Resources Implication	The following resources must be provided: • tools, equipment and test instruments • audio-video products and systems • service manuals/schematics • ESD free working area/bench • complete electronic spare parts/supplies

Assessment Methods	Competence may be assessed through: • Interview / written test / oral questioning • Observation/Demonstration
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting

Occupational Standard: Electronics Communication & Multimedia Equipment Servicing Level II	
Unit Title	**Service and Repair mobile phones**
Unit Code	**EEL CMS2 04 0511**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to service and repair cellular mobile phones including diagnosing faults, and preparing reports.

Elements	Performance Criteria
1. Prepare unit and workplace	1.1 Workplace is set/arranged for repair job in line with the company requirements and standards
	1.2 Necessary **tools**, **test instruments** and **personal protective equipment** are made ready in line with job requirements
	1.3 **Service manuals** and **service information** required for repair/maintenance are acquired at commencement of activities
	1.4 Repair/maintenance history of the unit is properly verified
2. Diagnose faults of cellular phone unit	2.1 Complete check-up of **cellular phone** is conducted and defects are identified, verified and documented against customer description
	2.2 Systematic **pre-testing procedure** is followed in accordance with manufacturer's instructions
	2.3 **System defects/fault symptoms** are identified using appropriate diagnostic software, tools and equipment in accordance with manufacturers' specifications
	2.4 Chips are checked and isolated using specified testing procedures
	2.5 Proper troubleshooting procedures are implemented
	2.6 Identified defects and faults are explained to the responsible person in accordance with company policy and procedures
	2.7 Results of diagnosis and testing are documented accurately and completely within the specified time
	2.8 Customers are advised / informed regarding the status and serviceability of the unit

3. Service/repair cellular phone unit	3.1 Personal protective equipments are 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 parts according to manufacturers' specifications
	3.4 Repaired units are flashed using appropriate *application software* based on manufacturers' requirements
	3.5 Repaired or replaced parts/components are soldered/ mounted in accordance with the current industry standards
	3.6 Repair activity is performed within the required timeframe
	3.7 Care and extreme precaution in handling the unit/product is observed as per standard procedures
	3.8 Cleaning of unit is performed in accordance with safety standard procedures
4. Test repaired unit	4.1 Repaired unit is reassembled according to procedures
	4.2 Reassembled units are subjected to final testing and cleaning in conformity with manufacturer's specifications
	4.3 Service completion procedures and documentations are complied with based on manual
	4.4 Waste materials are disposed of in accordance with *environmental requirements*
5. Install additional/ enhancement features	5.1 *Enhancements and applications* are installed to the unit based on customers' request and manufacturers' recommendation
	5.2 Customers' are advised/oriented on the operation of additional operator services that maybe availed of based on manufacturer's standards

Variable	Range
Service manuals	• Service manual/schematic diagram/parts list • operating instructions/user's/owner's manual • repair handbooks for cellular phones

Service information	• Job Report Sheets • Job Order • Bill of materials • Customer index	• Service flowchart • Stock and inventory record • Requisition slips (for acquisition of parts) • Supplier Index
Tools, materials and test instruments	• hot air soldering tool • power supply-variables • soldering iron/weller w/stand • de-soldering tools • tweezers (assorted) • T-Screwdriver (assorted) • wrenches (assorted) • set of torks/star bit • open tool 6600/7650 • Allen wrench/key • signal generator - AF/RF • multi-testers (analog/digital) • utility knife/stripper • pliers (assorted) • test jig • ESD-free work bench with mirror • bluetooth • microscope • assorted cable/signal connectors • cotton, rugs (cotton) • cutter • magnetic coil • pencil eraser	• oscilloscope • high-grade magnifying glass with lamp • flashlight • cleaning brush • ball peen hammer (small) • soldering lead • cleaning agent • wires • silicon grease • lubricants • USB software flasher • rework board plate • PC computer • Infrared • unleaded gas • assorted cell phone spare parts • diagonal side cutting pliers (4 inches) • soldering lead
Personal protective equipment	May include but not limited to: • working clothes/apron • face/dust mask • goggles • safety shoes	
Pre-testing procedures	• Visual inspection of the unit with power off • Interview of customer re history of unit • Operate the appliance according to manual to confirm defects	
System defect/fault symptoms	May include but not limited to: • No power ▪ Wet unit	

	▪ Dropped unit
	▪ Over downloaded unit
	▪ System error
	• Contact service/contact retailer
	• No Signal
	▪ No transmission/reception
	▪ Intermittent signal
	▪ Shorted/grounded unit
	• Not charging
	• Defective User interface
	▪ Buzzer
	▪ Vibrator
	▪ Keypad
	▪ Backlights
	▪ Ear piece
	▪ Microphone
	▪ LCD problem
	▪ Camera problem
	▪ Bluetooth
	▪ Infra red
	▪ Radio
	• Software-related troubles
	▪ Hang-up
	▪ Virus
	▪ Four blinks / blinking display
	▪ Rebooting
	• Auto-shut-off
	• Flexible wire connection
OHS requirements in accordance with legislation and regulations	May include but not limited to: • Use of proper tools and equipment • Observe workplace environment and safety • Adherence to safety requirements in handling the unit • Use of protective device/shields
Application software	May include the following but not limited to: • N-box • Power flasher • BB5 • NSS • Tornado • Griffin • Twister
Environmental Requirements	• Proper disposal of chemicals and components shall be based on existing requirements of the law and chemical waste management • Non-biodegradable parts or materials shall be packed and labeled properly for disposal.

Enhancements and applications	May include the following but not limited to:
	• Enhancement • Applications
	▪ Backlights ▪ Ring tones ▪ MP3/MP4
	▪ Housing and accessories ▪ Logos ▪ Wallpapers
	▪ Additional memory ▪ Games

Evidence Guide	
Critical Aspects of Competence	Assessment requires evidence that the candidate:
	• prepared workplace, unit, materials, tools and equipment properly
	• applied safety rules and procedures
	• followed service manual specifications/instructions
	• used tools and equipment properly
	• identified faults and defects according to required procedures
	• explained diagnosed faults/defects to responsible person
	• informed the customer on the diagnosed defects
	• replaced/swapped defective parts/components with original parts
	• flashed repaired units using appropriate application software
	• applied appropriate knowledge and technique in actual repair activity
	• restored unit to normal operating condition within timeframe

Underpinning Knowledge and Attitudes	Demonstrates knowledge of:
	• Mensuration/Mathematics
	  ▪ Conversion of Units
	  ▪ Applied Mathematics
	• Drawing and Schematic Diagram
	  ▪ Reading and interpreting orthographic projections and isometric views
	  ▪ Reading and interpreting electronic schematic diagram and symbols
	• Safety
	  ▪ Work Safety requirements and economy of materials with durability
	  ▪ Knowledge in 5S application and observation of required procedure
	• Materials, tools/instruments & equipment uses and specifications
	  ▪ Identification of hand tools
	  ▪ Proper care and use of tools
	  ▪ Identification of test and measuring instruments
	• System and Processes
	  ▪ fundamentals of personal computer
	  ▪ fundamentals of electronic components and circuits
	  ▪ fundamentals of digital logics, components & circuits
	  ▪ fundamentals of microprocessor circuits and programming
	  ▪ Fundamentals of communications system
	  ▪ analysis of troubles and isolation techniques
	• Laws and regulations
	  ▪ Federal and Regional Laws on Communication

Underpinning Skills	Demonstrates skills to: • Application of troubleshooting technique • Use and maintenance of test instruments, tools, & equipment • Application of substitution technique • Soldering/de-soldering technique • Schematic diagram reading skills

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Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials, tools and equipment, and to information on workplace practices and OHS practices. *Tools, equipment and test instruments:* • ESD free working area/bench • Sufficient lighting and ventilation system • Cellular phone units • Service manuals/schematics • PC units and appropriate application software • Complete cellular phone spare parts and accessories
Assessment Methods	Competence may be assessed through: • Interview / Oral questioning / Written exam • Demonstration / Observation
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting

Occupational Standard: Electronics Communication & Multimedia Equipment Servicing Level II	
Unit Title	**Install and Repair Antenna and Satellite System**
Unit Code	**EEL CMS2 05 0511**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to install and repair antenna and satellite system including diagnosing faults, and preparing reports.

Elements	Performance Criteria
1. Prepare unit and workstation	1.1 Workplace is made ready in accordance with work / job requirements
	1.2 Necessary *tools*, *test instruments* and *personal protective equipment* are made ready in line with job requirements
	1.3 Units are visually inspected and checked for physical defects
	1.4 *Service manuals* and *service information* required for the job are acquired at commencement of activities
2. Install satellite/ antenna system	2.1 Location of satellite / antenna for good reception is determined
	2.2 Petals/arms of the dish is assembled and LNB unit fixed according to operating manual
	2.3 Dish/antenna is tightened firmly with stand after optional signal obtained
	2.4 Signal finder is connected /disconnected between LNB and satellite /antenna receiver to tune until the system obtain maximum output
	2.5 Operational check is performed according to manual
	2.6 Azimuth and elevation is determined using service manual

3. Adjust satellite dish / antenna	3.1	Satellite / antenna direction is identified using operating manual
	3.2	Satellite dish /antenna Azimuth angle is checked and adjusted using compass
	3.3	Elevation is checked and adjusted using inclinometer and elevation meter
	3.4	Satellite dish / antenna is checked for normal operation
	3.5	Support or checked for proper position and feed horn adjusted for normal operation
	3.6	Low noise block (LNB) is checked for functionality in accordance with operational manual
	3.7	Maximum interception is checked for normal operation
4. Repair dish drive mechanism	4.1	Supply power to motor is checked by voltmeter and power connector cable checked by ohmmeter
	4.2	Defective power connector cable is repaired /replaced according to the specification
	4.3	Mechanical arm is checked for normal operation
	4.4	Defective mechanical arm and gear are repaired /replaced according to the manufacturer's specification/service manual
	4.5	Sensor/limit switch is checked using ohmmeter and defective sensor/limit switch repaired /replaced according to the specification
	4.6	Motor winding is checked using ohmmeter
	4.7	Faulty motor winding is repaired /replaced according to the manufacturer's specification
5. Perform preventive maintenance	5.1	External part of satellite receiver is inspected visually and carefully
	5.2	Satellite case is opened according to manual
	5.3	Internal part of satellite receiver is freed from dust using blower
	5.4	Loose connection is tightened firmly or re-soldered correctly and firmly with cold solder if appropriate
	5.5	Moving parts are lubricated in accordance with manufacturer's specifications and magnetic head & tape path cleaned using appropriate materials and tools
	5.6	Mechanical parts are cleaned using appropriate cleaning materials
Variable	**Range**	

Service manuals	• service manual/schematic diagram/parts list • operating instructions/user's/owner's manual • repair handbooks for cellular phones
Service information	• job report sheets • job order • bill of materials • customer index • service flowchart • stock and inventory record • requisition slips (for acquisition of parts) • supplier index
OHS requirements in accordance with legislation and regulations	May include but not limited to: • use of proper tools and equipment • observe workplace environment and safety • adherence to safety requirements in handling the unit • use of protective device/shields
Tools and equipment	May include but not limited to: • screw driver • brush • blower • contact cleaner • sand paper • soldering iron, soldering sucker, soldering lead and soldering paste • TV set, VCR • glove, antistatic wrist • tweezers • wire stripper, tape measure • crimp tool, wire cutter, razor • knife, drill and drill bit • extension cord • DC power supply (0-30 v) • AC source • cups screw • ladder • antenna • pliers, wrenches • compass • dish antenna • water level meter, coaxial cable, low noise block (LNB) • inclined meter • satellite dish finder, satellite dish and receiver • sensitive voltmeter • alcohol and cotton • motor • Regenerated Signal • voltage surge protectors • oscilloscope, multimeter • IC regulator, switching transistor, resistor, capacitor, diodes, bridge rectifier, fuse resistor, transistor • Zener diode • voltage dependant resistor, inductor, continuity tester • magnifier glass, audio head, • Insulator remover • Booster • Splitter

Evidence Guide	
Critical Aspects of Competence	Demonstrates skills and knowledge in: • install satellite / antenna • adjust satellite and antenna for good reception • assemble and repair satellite / antenna systems • repair dish drive mechanism • perform preventive maintenance
Underpinning Knowledge and Attitudes	Demonstrates knowledge of: • safety regulations, source of electrical connection, switches • effect of magnetism, micro wave system • compass usage • chart reading for azimuth elevation • microwave devices • component testing • identifying stages of amplifiers • principle of operation of magnetic head • basic knowledge in troubleshooting • multi-meter reading • soldering technique • basic electronic • fundamentals of communication systems
Underpinning Skills	Demonstrates skills to: • install satellite / antenna • adjust satellite and antenna for good reception • assemble and repair satellite / antenna systems • repair dish drive mechanism • perform preventive maintenance
Resources Implication	Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.
Assessment Methods	Competence may be assessed through: • Interview / Oral questioning / Written exam • Demonstration / Observation
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting

Occupational Standard: Electronics Communication & Multimedia Equipment Servicing Level II	
Unit Title	**Apply routine Problem Solving Techniques**
Unit Code	**EEL CMS2 06 0511**
Unit Descriptor	This competency covers the knowledge, skills and attitudes required to apply the process of problem solving and other problems beyond those associated directly with the process unit. It includes the application of structured processes and improvement tools.

Element	Performance Criteria
1. Analyze the problem	1.1. Issues/concerns are evaluated based on data gathered 1.2. Possible causes of problem are identified within the ***area of responsibility*** as based on experience and the use of problem solving tools/analytical techniques 1.3 Possible cause statements are developed based on findings
2. Identify possible solutions	2.1 All possible options are considered for resolution of the problem in accordance with ***safety*** and operating procedures 2.2 Strengths and weaknesses of possible options are considered 2.3 Corrective action is determined to resolve the problem and its possible future causes
3. Recommend solution to higher management	3.1 Report/***communication*** or ***documentation*** are prepared 3.2 Recommendations are presented to appropriate personnel 3.3 Recommendations are followed-up, if required 3.4 Proposed solutions are experimented
4. Implement solution	4.1 Measurable objectives are identified 4.2 Resource needs are identified 4.3 Timelines are identified in accordance with plan
5. Evaluate/Monitor results and outcome	5.1. Processes and improvements are identified based on evaluative assessment of problem 5.2. Recommendations are prepared and submitted to superiors/suppervisors.

Variable	Range
Area of responsibility	Variables may include but are limited to: • Work environment • Problem solution processes • Preventative maintenance and diagnostic policy • Roles and technical responsibilities
Occupational Health and Safety	As per company statutory and vendor requirements. Economic and environmental factors must be considered during the demonstration of this competency.
Communication	Variables may include but are not limited to: • both hand written and printed material • internal memos • electronic mail • briefing notes and • bulletin boards.
Documentation	• Audit trails • Naming standards • Version control

Evidence Guide

Critical aspects of Competency	Assessment requires evidence that the candidate: • Analysed the problem • Identified possible solutions • Implemented solutions • Recommended solutions to higher management • Outcome evaluated/monitored Evidence of satisfactory performance in this unit can be obtained by observation of performance and questioning to indicate knowledge and understanding of the elements of the competency and performance criteria.
Underpinning Knowledge	• Broad understanding of systems, organizational systems and functions • Broad knowledge of help desk and maintenance practices • Current industry accepted hardware and software products with broad and detailed knowledge of its general features and capabilities • Broad knowledge of the operating system • Broad knowledge of the client business domain • Broad knowledge based incorporating current industry practices related to escalation procedures • Broad knowledge based of diagnostic tools • General principles of OHS • Divisional/unit responsibilities
Underpinning Skills	• Decision making within a limited range of options. • Communication is clear, precise and varies according to the type of audience • Teamwork in reference to personal responsibility • Time management as applied to self-management. • Analytical skills in relation to routine malfunctions. • General customer service skills displayed. • Questioning and active listening is employed to clarify general information
Method of assessment	The assessor may select at least two of the following assessment methods to objectively assess the candidate: • Observation • Questioning • Practical demonstration
Resource implication	• Computer hardware with peripherals • Appropriate software

Context of Assessment	Assessment may be conducted in the workplace or in a simulated work environment

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Occupational Standard: Electronics Communication & Multimedia Equipment Servicing Level II	
Unit Title	**Dismantle and Dispose Communication & Multimedia Equipment**
Unit Code	**EEL CMS2 07 0511**
Unit Descriptor	**This unit covers the knowledge, skills and attitudes in dismantling and disposing of electrical/electronic equipment**

Elements	Performance Criteria
1. Ensure decision for dismantling and disposal	1.1 Equipment is identified for *no more service* 1.2 Approval for dismantling is obtained from concerned body 1.3 End users are informed about the equipment to be dismantled
2. Plan to dismantle and dispose equipment	2.1 Store house for dismantled equipment is prepared, 2.2 Dismantling schedule is fixed and communicated to end users 2.3 Equipment is decontaminated (if necessary)
3. Organize resources needed	3.1 Work force is organize and work assignments finalized 3.2 Financial resources are insured 3.3 Necessary materials, *tools and equipment* are prepared
4. Dismantle the equipment	4.1 Equipment is dismantled following correct procedures and *OHS measures* 4.2 Dismantled parts are marked and labeled 4.3 Parts are cleaned , checked, and readied for packing 4.4 Parts are identified for reuse and disposal and reusable items are packed 4.5 Items to be disposed are identified
5. Dispose the equipment	5.1 Concerned body is consulted and obtained approval for disposal 5.2 Equipment is disposed off following disposal **procedures and regulations,** 5.3 Disposal report is prepared using approved format 5.4 Equipment is discarded following discarding procedures 5.5 Necessary reports and documentation are accomplished in accordance with the company standard procedures

Variable	Range
No more service	Equipment is obsolete, no spare part available, major damage and not maintainable
Tools and equipment	The following tools and equipment but not limited to are required: • different sizes of flat screw drivers • different sizes of Allen keys • adjustable wrench and set of box wrenches • pliers • insulating tape • multimeter • hammer, chisel and knife • hacksaw
OHS	• Use proper safety rules • Proper usage of electrical tool and instruments • Use protective equipment / devices
Disposals procedures and regulation	• Company disposal policy • National disposal regulations • Disposal procedures

Evidence Guide	
Critical Aspects of Competence	Assessment requires evidence that the candidate: • Ensured decision for dismantling and disposal • Planned to dismantle and dispose electrical/electronic equipment • Organized resources needed for activities • Dismantled the equipment • Disposed the equipment based on the regulations and report
Underpinning knowledge	Basic Electricity and Electronics, Basic Digital Electronics, Basic General Mechanics, Basic Technical Drawing, Basic optical, Environmental Science, Workshop practice.
Underpinning skill	• Ensure decision for dismantling and disposal • Plan to dismantle and dispose electrical/electronic equipment • Organize resources needed for activities • Dismantle the equipment • Dispose the equipment and report

Resource Implication	The following resources must be provided: • materials • tools and test equipment/instrument • equipment to be used in a real or simulated situations
Assessment Methods	Competence may be assessed through: • Interview / Oral Questioning / Written Test • Observation/Demonstration
Context of Assessment	Assessment may be conducted in the workplace or in a simulated environment

Occupational Standard: Electronics Communication & Multimedia Equipment Servicing Level II	
Unit Title	**Carry out preventive maintenance in Electronics Communication & Multimedia Equipment**
Unit Code	**EEL CMS2 08 0511**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to Carry out preventive maintenance in home/office Electrical/ Electronics Equipment.

Elements	Performance Criteria
1 Prepare unit, tools, equipment and workstation for preventive maintenance	1.1 Workplace/equipment is made ready for maintenance 1.2 preventive maintenance history is verified in line with the company procedures 1.3 *Service manuals* and *service information* required for preventive maintenance are acquired as per standard procedures. 1.4 Workplace is set / arrange for repair job in accordance with company standard procedures 1.5 Necessary *tools*, *test instruments* and *personal protective equipment* are prepared in line with job requirements
2 Perform preventive maintenance	2.1 External part of the equipment is inspected visually and carefully 2.2 equipment case is opened according to manual 2.3 Internal part of the equipment is freed from dust using blower 2.4 Loose connection is tightened firmly or re-soldered correctly and firmly with cold solder if appropriate 2.5 Moving parts are lubricated in accordance with manufacturer's specifications using appropriate materials and tools 2.6 Mechanical parts are cleaned using appropriate cleaning materials

Variable	Range
equipment	Office Equipment may include but not limited to the following:

	• Photo copy machine (analogue & Digital) • Fax machine • Printer • Scanner • UPS • PC
Service manuals	May include but not limited to: • Service manual/schematic diagram/parts list • Operating instructions/User's/Owner's manual • Component data sheet/handbook
Service Information	May include but not limited to: • job report sheets • job order • bill of materials • customer index • service flowchart • stock and inventory record • requisition slips (for acquisition of parts) • supplier index
Tools, Materials and Test Instruments	May include but not limited to: • step-down transformer • soldering iron/gun • screwdriver (assorted) • nut drivers (assorted) • wrenches (assorted) • Allen wrench/key • multi-testers (analog/digital) • Clamp meter • utility knife • wire stripper • pliers (assorted) • work bench • flashlight • test light • cleaning brush • ball peen hammer • soldering lead • wires, various sizes • assorted electronic components • Tweezers • Glue Gun/Stick • Air Compressor • Cleaning Material • Tie (plastic/metal) • Toner • Paper • Spare parts for office equipment

Personal protective equipment	May include but not limited to: • working clothes/apron • hand gloves • face/dust mask • goggles • safety shoes
OHS requirements in accordance with legislation & regulations	• use of proper tools and equipment • observe workplace environment and safety • adherence to safety requirements in handling the unit • use of protective device/shields • Ethiopia Electrical Code

Evidence Guide	
Critical Aspects of Competence	Assessment requires evidence that the candidate: • Set/Prepared workplace for repair job in line with the company requirements. • Prepared necessary tools, test instruments and personal protective equipment in line with job requirements • Performed preventive maintenance with service manual specifications • Subjected reassembled units to final testing and cleaning in conformity with manufacturer's specifications
Underpinning Knowledge and Attitudes	• Measurement/Mathematics ▪ Conversion of Units ▪ Applied Mathematics • Drawing, Block and Schematic Diagram ▪ Reading and interpreting orthographic projections and isometric views ▪ Reading and interpreting electronic schematic diagram, block diagram and symbols

Underpinning Knowledge and Attitudes	• Safety
	  ▪ Work Safety requirements and economy of materials with durability
	  ▪ Knowledge in 5S application and observation of required procedures
	• Materials, tools/instruments & equipment uses and specifications
	  ▪ identification of hand and power tools
	  ▪ proper care and use of tools
	  ▪ identification of test and measuring instruments
	  ▪ proper care and use of test and measuring instruments

Underpinning Skills	Demonstrates skills in: • application of preventive maintenance technique • soldering/de-soldering and wiring/cabling techniques • schematic diagram reading skills
Resources Implication	The following resources must be provided: • tools, equipment and test instruments • electronically-controlled domestic appliances • service manuals/schematics • ESD free working area/bench
Assessment Methods	Competence may be assessed through: • Interview / written test / oral questioning • Observation/Demonstration
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting

Occupational Standard: Electronics Communication & Multimedia Equipment Servicing Level II	
Unit Title	**Participate In Workplace Communication**
Unit Code	**EEL CMS2 09 0511**
Unit Descriptor	This unit covers the knowledge, skills and attitudes required to gather, interpret and convey information in response to workplace requirements.

Elements	Performance Criteria
1. Obtain and convey workplace information	1.1 Specific and relevant information is accessed from *appropriate sources*
	1.2 Effective questioning , active listening and speaking skills are used to gather and convey information
	1.3 Appropriate *medium* is used to transfer information and ideas
	1.4 Appropriate non- verbal communication is used
	1.5 Appropriate lines of communication with supervisors and colleagues are identified and followed
	1.6 Defined workplace procedures for the location and *storage* of information are used
	1.7 Personal interaction is carried out clearly and concisely
2. Participate in workplace meetings and discussions	2.1 Team meetings are attended on time
	2.2 Own opinions are clearly expressed and those of others are listened to without interruption
	2.3 Meeting inputs are consistent with the meeting purpose and established *protocols*
	2.4 *Workplace interactions* are conducted in a courteous manner
	2.5 Questions about simple routine workplace procedures and maters concerning working conditions of employment are asked and responded to
	2.6 Meetings outcomes are interpreted and implemented

3. Complete relevant work related documents	3.1 Range of *forms* relating to conditions of employment are completed accurately and legibly
	3.2 Workplace data is recorded on standard workplace forms and documents
	3.3 Basic mathematical processes are used for routine calculations
	3.4 Errors in recording information on forms/ documents are identified and properly acted upon
	3.5 Reporting requirements to supervisor are completed according to organizational guidelines

Variable	Range
Appropriate sources	• Team members • Suppliers • Trade personnel • Local government • Industry bodies
Medium	• Memorandum • Circular • Notice • Information discussion • Follow-up or verbal instructions • Face to face communication
Storage	• Manual filing system • Computer-based filing system
Forms	• Personnel forms, telephone message forms, safety reports
Workplace interactions	• Face to face • Telephone • Electronic and two way radio • Written including electronic, memos, instruction and forms, non-verbal including gestures, signals, signs and diagrams
Protocols	• Observing meeting • Compliance with meeting decisions • Obeying meeting instructions

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Evidence Guide	
Critical Aspects of Competence	Assessment requires evidence that the candidate: • Prepared written communication following standard format of the organization • Accessed information using communication equipment • Made use of relevant terms as an aid to transfer information effectively • Conveyed information effectively adopting the formal or informal communication
Underpinning Knowledge and Attitudes	• Effective communication • Different modes of communication • Written communication • Organizational policies • Communication procedures and systems • Technology relevant to the enterprise and the individual's work responsibilities
Underpinning Skills	• Follow simple spoken language • Perform routine workplace duties following simple written notices • Participate in workplace meetings and discussions • Complete work related documents • Estimate, calculate and record routine workplace measures • Basic mathematical processes of addition, subtraction, division and multiplication • Ability to relate to people of social range in the workplace • Gather and provide information in response to workplace Requirements
Resource Implications	• Fax machine • Telephone • Writing materials • Internet
Assessment Methods	Competence may be assessed through: • Interview / questioning / written test • Simulation/demonstration • Observation

Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting

Occupational Standard: Electronics Communication & Multimedia Equipment Servicing Level II	
Unit Title	**Work In Team Environment**
Unit Code	**EEL CMS2 10 0511**
Unit Descriptor	This unit covers the skills, knowledge and attitudes to identify role and responsibility as a member of a team.

Elements	Performance Criteria
1. Describe team role and scope	1.1 The ***role and objective of the team*** is identified from available ***sources of information*** 1.2 Team parameters, reporting relationships and responsibilities are identified from team discussions and appropriate external sources
2. Identify own role and responsibility within team	2.1 Individual role and responsibilities within the team environment are identified 2.2 Roles and responsibility of other team members are identified and recognized 2.3 Reporting relationships within team and external to team are identified
3. Work as a team member	3.1 Effective and appropriate forms of communications used and interactions undertaken with team members who contribute to known team activities and objectives 3.2 Effective and appropriate contributions made to complement team activities and objectives, based on individual skills and competencies and ***workplace context*** 3.3 Observed protocols in reporting using standard operating procedures 3.4 Contribute to the development of team work plans based on an understanding of team's role and objectives and individual competencies of the members.

Variable	Range
Role and objective of team	• Work activities in a team environment with enterprise or specific sector • Limited discretion, initiative and judgment maybe demonstrated on the job, either individually or in a team environment
Sources of information	• Standard operating and/or other workplace procedures • Job procedures • Machine/equipment manufacturer's specifications and instructions • Organizational or external personnel • Client/supplier instructions • Quality standards • OHS and environmental standards
Workplace context	• Work procedures and practices • Conditions of work environments • Legislation and industrial agreements • Standard work practice including the storage, safe handling and disposal of chemicals • Safety, environmental, housekeeping and quality guidelines

Evidence Guide	
Critical Aspects of competence	Assessment requires evidence that the candidate: • Operated in a team to complete workplace activity • Worked effectively with others • Conveyed information in written or oral form • Selected and used appropriate workplace language • Followed designated work plan for the job • Reported outcomes
Underpinning Knowledge and	• Communication process • Team structure

Attitude	• Team roles
	• Group planning and decision making
Underpinning Skills	• Communicate appropriately, consistent with the culture of the workplace

Evidence Guide	
Resource Implications	The following resources must be provided: • Access to relevant workplace or appropriately simulated environment where assessment can take place • Materials relevant to the proposed activity or tasks
Methods of Assessment	Competence may be assessed through: • Observation of the individual member in relation to the work activities of the group • Observation of simulation and or role play involving the participation of individual member to the attainment of organizational goal • Case studies and scenarios as a basis for discussion of issues and strategies in teamwork
Context for Assessment	• Competence may be assessed in workplace or in a simulated workplace setting • Assessment shall be observed while task are being undertaken whether individually or in group

Occupational Standard: Electronics Communication & Multimedia Equipment Servicing Level II	
Unit Title	**Maintain an Effective Relationship with Client/Customers**
Unit Code	**EEL CMS2 11 0511**
Unit Descriptor	This unit covers the knowledge, skills and attitudes and values required in building and maintaining an effective relationship with clients, customers and the public.

Elements	Performance Criteria
1.Maintain a clean and hygienic environment	1.1 Uniform and personal grooming maintained to assignment requirements. 1.2 *Personal presence* maintained according to *employer standards*. 1.3 Visible work area kept tidy and uncluttered. 1.4 Equipment stored according to assignment requirements.
2.Meet client/ customer requirements	2.1 **Client requirements** identified and understood by referral to the **assignment instructions**. 2.2 Client requirements met according to the assignment instructions. 2.3 Changes to **client's needs and requirements** monitored and **appropriate action taken**. 2.4 All communication with the client or **customer** is clear and complied with assignment requirements.
3.Work as a team member	1.1 Effective and appropriate forms of communications used and interactions undertaken with team members who contribute to known team activities and objectives *1.2* Effective and appropriate contributions made to complement team activities and objectives, based on individual skills and competencies and *workplace context* 1.3 Observed protocols in reporting using standard operating procedures 1.4 Contribute to the development of team work plans based on an understanding of team's role and objectives and individual competencies of the members.

4. Build credibility with customers/ clients	1.1 Client expectations for reliability, punctuality and appearance adhered to.
	1.2 Possible causes of client/customer dissatisfaction identified, dealt with recorded according to employer policy.
	1.3 Client fully informed of all relevant security matters in a timely manner and according to agreed reporting procedures.

Variable	Range
Personal Presence	May include: • Stance • Posture • Body Language • Demeanor • Grooming
Client Requirements	May include: • Assignment Instructions • Post Orders • Scope to modify instructions/orders in light of changed situations
Assignment Instructions	May conveyed in: • Writing • Verbally • Electronically
Client Needs and Requirements	May be detected by: • Review of the client brief and/or assignment instructions Discussion with the client/customer
Appropriate Action	May include: • Implementing required changes • Referral to appropriate employer personnel Clarification of client needs and instructions
Customers	May include: All members of the public

Evidence Guide	
Critical aspects of competence	Assessment requires that the candidate: • Maintained a professional image. • Interpreted client/customer requirements from information contained in the client brief and/or assignment instructions. • Dealt successfully with a variety of client/customer interactions.

	• Monitored and acted on changing client or customer needs.
	• Met client/customer requirements.
	• Built credibility with customers/clients
Underpinning Knowledge and Attitude	• Uniform and personal grooming requirements f the employer and the client
	• Occupational health and safety requirement for the assignment
	• Assignment Instructions
Underpinning Skills	• Attention to detail when completing client/employer documentation
	• Interpersonal and communication skills required in client contact assignments
	• Customer service skills required to meet client/customer needs
	• Punctuality
	• Customer Service
	• Telephone Technique
	• Problem Solving and Negotiation
	• Maintaining Records
Resources Implication	Assessment is required to take place in real or appropriate simulated situations, including work areas, materials & equipment, & information on workplace practices and OHS practices.
Assessment Methods	Competency may be assessed through:
	• Interview / Written Test / Oral Questioning
	• Observation / Demonstration
Context of Assessment	Competence may be assessed in the work place or in a simulated work place setting

Occupational Standard: Electronics Communication & Multimedia Equipment Servicing Level II	
Unit Title	**Develop Business Practice**
Unit Code	**EEL CMS2 12 0511**
Unit Descriptor	This unit specifies the outcomes required to establish a business operation from a planned concept. It includes researching the feasibility of establishing a business operation, planning the setting up of the business, implementing the plan and reviewing operations once commenced

Elements	Performance Criteria
1. Identify business opportunities	1.1 **Business opportunities** are investigated and identified
	1.2 Feasibility study is undertaken to determine likely **business viability**
	1.3 Market research on product or service is undertaken
	1.4 Assistance with feasibility study of **specialist and relevant parties** is sought as required
	1.5 Impact of emerging or changing technology including e-commerce, on business operations are evaluated
	1.6 Practicability of business opportunity assessed in line with perceived risks, returns sought and resources available
	1.7 Business plan for operation is completed
2. Identify personal business skills	2.1 Financial and business skills available are identified and taken into account when business opportunities are researched
	2.2 **Personal skills/attributes** are assessed and matched against those perceived as necessary for a particular business opportunity
	2.3 Business risks are identified and assessed according to resources available and personal preferences
3. Plan for establishment of business operation	3.1 Business structure and operations are determined and documented
	3.2 Procedures to guide operations are developed and documented

	3.3	Financial backing for business operation is secured
	3.4	Business legal and regulatory requirements are identified and complied
	3.5	**Human and physical resources** required to commence business operation are determined
	3.6	Recruitment strategies are developed and implemented
4. Implement establishment plan	4.1	Marketing of business operation is undertaken
	4.2	Physical and human resources to implement business operation are obtained
	4.3	**Operational unit** to support and coordinate business operation is established
	4.4	Monitoring process for managing operation is developed and implemented
	4.5	**Legal documents** are carefully maintained and relevant **records** are kept and updated to ensure validity and accessibility
	4.6	Contractual procurement rights for goods and services including **contracts with relevant people**, negotiated and secured as required in accordance with the business plan
	4.7	Options for leasing/ownership of business premises identified and contractual arrangements completed in accordance with the business plan
5. Review implementation process	5.1	Review process for implementation of business operation is developed and implemented
	5.2	Improvements in business operation and associated management process are identified
	5.3	Identified improvements are implemented and monitored for effectiveness

Variable	Range
Resources may include:	• staff • money • time • equipment • space

Business goals may include:	• sales targets • budgetary targets • team and individual goals • production targets • reporting deadlines
Problem solving techniques may include:	• gaining additional research and information to make better informed decisions • looking for patterns • considering related problems or those from the past and how they were handled • eliminating possibilities • identifying and attempting sub-tasks • collaborating and asking for advice or help from additional sources
Time management strategies may include:	• prioritizing and anticipating • short term and long term planning and scheduling • creating a positive and organized work environment • clear timelines and goal setting that is regularly reviewed and adjusted as necessary • breaking large tasks into smaller tasks • getting additional support if identified and necessary
Internal and external sources may include:	• staff and colleagues • management, supervisors, advisors or head office • relevant professionals such as lawyers, accountants, management consultants • professional associations

Evidence Guide	
Critical Aspects of Competence	A person must be able to demonstrate: • ability to identify daily work requirements and allocate work appropriately • ability to interpret financial documents in accordance with legal requirements
Underpinning Knowledge and Attitudes	• Federal and Local Government legislative requirements affecting business operations, especially in regard to occupational health and safety (OH&S), equal employment opportunity (EEO), industrial relations and anti-discrimination • technical or specialist skills relevant to the business operation • relevant industry code of practice

	• planning techniques to establish realistic timelines and priorities • identification of relevant performance measures • quality assurance principles and methods • relevant marketing, management, sales and financial concepts • methods for monitoring performance and implementing improvements • structured approaches to problem solving, idea management and time management
Underpinning Skills	• literacy skills to interpret legal requirements, company policies and procedures and immediate, day-to-day demands • communication skills including questioning, clarifying, reporting, and giving and receiving constructive feedback • numeracy skills for performance information, setting targets and interpreting financial documents and reports • technical and analytical skills to interpret business documents, reports and financial statements and projections • ability to relate to people from a range of social, cultural and ethnic backgrounds and physical and mental abilities • problem solving skills to develop contingency plans • using computers and software packages to record and manage data and to produce reports • evaluation skills for assessing work and outcomes • observation skills for identifying appropriate people, resources and to monitor work
Resource Implications	The following resources should be provided: • Access to relevant workplace documentation, financial records, and equipment
Methods of Assessment	Competence may be assessed through: • Interview / Written exam • Observation/Demonstration with Oral questioning
Context for Assessment	Competence may be assessed in the workplace or in a simulated work environment

Occupational Standard: Basic Electronics Communication and Multimedia Equipment Servicing Level II	
Unit Title	**Apply Continuous Improvement Processes (Kaizen)**
Unit Code	**EEL CMS2 13 1012**
Unit Descriptor	This unit of competence covers the exercise of good workplace practice and effective participation in quality improvement teams. Personnel are required to ensure the quality and integrity of their own work, detect non-conformances and work with others to suggest improvements in productivity and quality.

Elements	Performance Criteria
1. Satisfy quality system requirements in daily work	1.1 Access information on quality system requirements for own job function
	1.2 Record and report quality control data in accordance with quality system
	1.3 Follow *quality control procedures* to ensure products, or data, are of a defined quality as an aid to acceptance or rejection
	1.4 Recognize and report non-conformances or problems
	1.5 Conduct work in accordance with *sustainable energy work practices*
	1.6 Promote sustainable energy principles and work practices to other workers
2. Analyze opportunities for corrective and/or optimization action	2.1 Compare current work practices, procedures and process or equipment performance with requirements and/or historical data or records
	2.2 Recognize variances that indicate abnormal or sub-optimal performance
	2.3 Collect and/or evaluate batch and/or historical records to determine possible causes for sub-optimal performance
	2.4 Use appropriate quality improvement techniques to rank the probabilities of possible causes
3. Recommend corrective and/or optimization actions	3.1 Analyze causes to predict likely impacts of changes and decide on the appropriate actions
	3.2 Identify required changes to standards and procedures and training
	3.3 *Report* recommendations to designated personnel

4. Participate in the implementation of recommended actions	4.1	Implement approved actions and monitor performance following changes to evaluate results
	4.2	Implement changes to systems and procedures to eliminate possible causes
	4.3	Document outcomes of actions and communicate them to *relevant personnel*
5. Participate in the development of continuous improvement strategies	5.1	Review all relevant features of work practice to identify possible contributing factors leading to sub-optimal performance
	5.2	Identify options for removing or controlling the risk of sub-optimal performance
	5.3	Assess the adequacy of current controls, quality methods and systems
	5.4	Identify opportunities to continuously improve performance
	5.5	Develop recommendations for continual improvements of work practices, methods, procedures and equipment effectiveness
	5.6	Consult with appropriate personnel to refine recommendations before implementation of approved improvement strategies
	5.7	Document outcomes of strategies and communicate them to relevant personnel

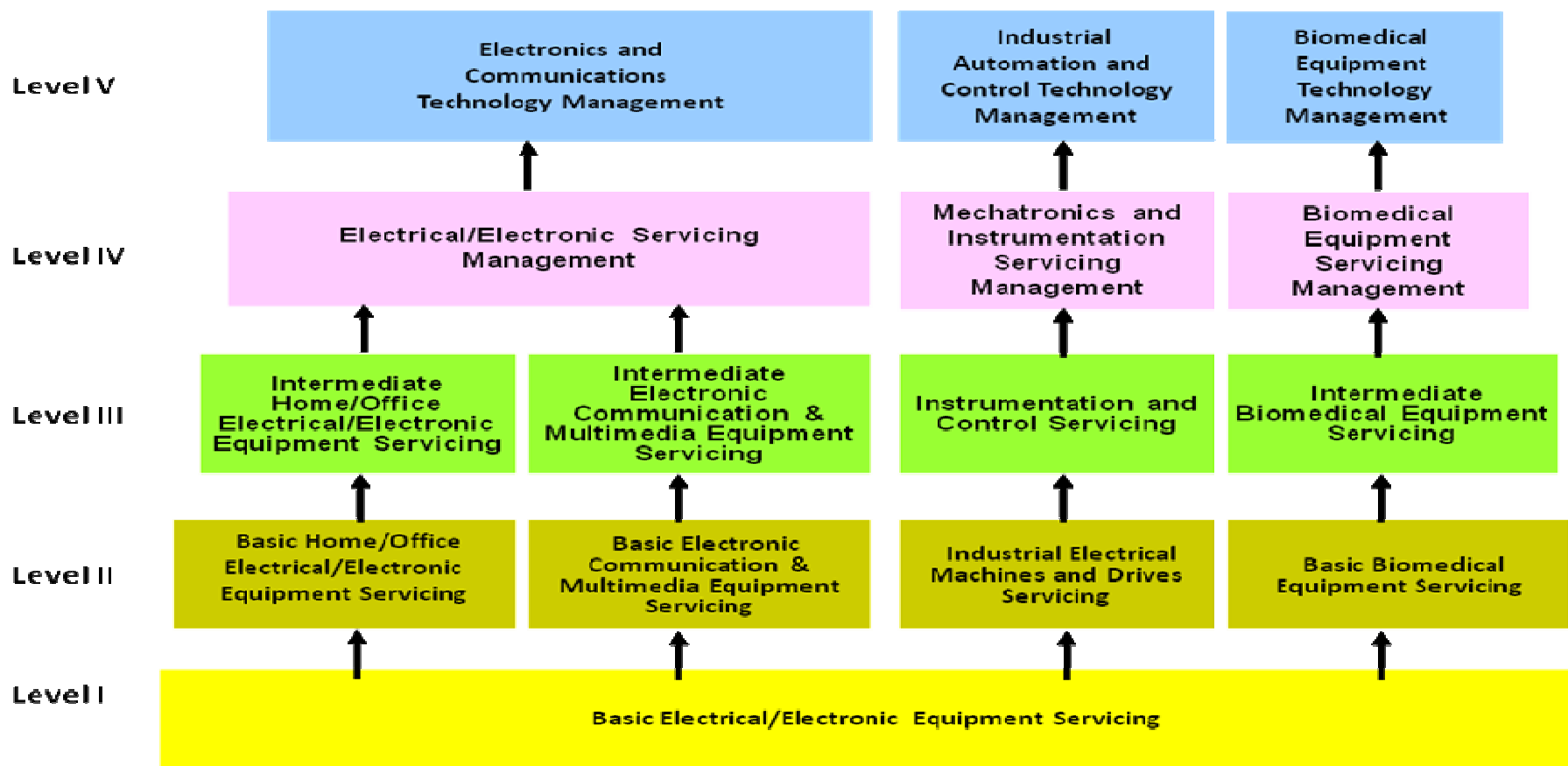| Variable	Range
Quality control procedures	Quality control procedures may include: • standards imposed by regulatory and licensing bodies • enterprise quality procedures • working to a customer brief or batch card and associated quality procedures • checklists to monitor job progress against agreed time, costs and quality standards • preparation of sampling plans • the use of hold points to evaluate conformance • the use of inspection and test plans to check compliance
Methods for statistical analysis	Methods for statistical analysis may include: • means • median • mode • ranges • standard deviations • statistical sampling procedures

Problem solving techniques	Problem solving techniques may include:
	• identifying inputs and outputs
	• sequencing a process
	• identifying and rectifying a problem step
	• root cause analysis
	• implementing preventative strategies
Quality improvement tools and techniques	Quality improvement tools and techniques may include:
	• run charts, control charts, histograms and scattergrams to present routine quality control data
	• plan, do, check, act (PDCA)
	• Ishikawa fishbone diagrams and cause and effect diagrams
	• logic tree
	• similarity/difference analysis
	• Pareto charts and analysis
	• force field/strength weakness opportunities threats (SWOT) analysis
Sustainable energy principles and work practices	Sustainable energy principles and work practices may include:
	• examining work practices that use excessive electricity
	• switching off equipment when not in use
	• regularly cleaning filters
	• insulating rooms and buildings to reduce energy use
	• recycling and reusing materials wherever practicable
	• minimizing process waste
Relevant personnel	Communication to relevant personnel may involve:
	• supervisors, managers and quality managers
	• administrative, laboratory and production personnel
	• internal/external contractors, customers and suppliers
Reporting	Reporting may include:
	• verbal responses
	• data entry into laboratory or enterprise database
	• brief written reports using enterprise proformas
Quality improvement opportunities	Quality improvement opportunities could include improved:
	• production processes
	• hygiene and sanitation procedures
	• reductions in waste and re-work
	• laboratory layout and work flow
	• safety procedures
	• communication with customers
	• methods for sampling, testing and recording data
Occupational health and safety (OHS) and environmental management requirements	OHS and environmental management requirements:
	• all operations must comply with enterprise OHS and environmental management requirements, which may be imposed through regional or federal legislation - these requirements must not be compromised at any time
	• all operations assume the potentially hazardous nature of samples and require standard precautions to be applied

	• where relevant, users should access and apply current industry understanding of infection control issued by the Ministry of Health

Evidence Guide	
Critical Aspects of Competence	Assessors should ensure that candidates can: • use the enterprise's quality systems and business goals as a basis for decision making and action • apply all relevant procedures and regulatory requirements to ensure the quality and integrity of the products/services or data provided • apply and promote sustainable energy principles and work practices • detect non-conforming products or services in the work area • follow enterprise procedures for documenting and reporting information about quality • contribute effectively within a team to recognize and recommend improvements in productivity and quality • apply effective problem solving strategies • implement and monitor improved practices and procedures
Underpinning Knowledge and Attitudes	Demonstrates knowledge of: • specifications for laboratory products and services in the candidate's work area • quality requirements associated with the individual's job function and/or work area • scientific and technical knowledge underpinning the processes, procedures, equipment and instrumentation associated with the candidate's work tasks and duties • workplace procedures associated with the candidate's regular technical duties • sustainable energy principles • relevant health, safety and environment requirements • layout of the enterprise, divisions and laboratory • organizational structure of the enterprise • lines of communication • role of laboratory services to the enterprise and customers • methods of making/recommending improvements • Standards, procedures and/or enterprise requirements
Underpinning Skills	Demonstrates skills to: • applying problem solving techniques and strategies • applying statistical analysis and statistical sampling procedures • detecting non-conforming products or services in the work area

	• documenting and reporting information about quality • contributing effectively within a team to recognize and recommend improvements in productivity and quality • implementing and monitoring improved practices and procedures • organizing, prioritizing activities and items • reading and interpreting documents describing procedures • recording activities and results against templates and other prescribed formats • working with others
Resources Implication	Access may be required to: • workplace procedures and plans relevant to work area • specifications and documentation relating to planned, currently being implemented, or implemented changes to work processes and procedures relevant to the candidate • documentation and information in relation to production, waste, overheads and hazard control/management • reports from supervisors/managers • case studies and scenarios to assess responses to contingencies • enterprise quality manual and procedures • quality control data/records • customer complaints and rectifications
Methods of Assessment	Competence in this unit may be assessed by using a combination of the following to generate evidence: • demonstration in the workplace • suitable simulation • case studies/scenarios (particularly for assessment of contingencies, improvement scenarios, and so on) • verified reports of improvements suggested and implemented by the candidate individually Those aspects of competence dealing with improvement processes could be assessed by the use of suitable simulations and/or a pilot plant and/or a range of case studies and scenarios. In all cases, practical assessment should be supported by questions to assess essential knowledge and those aspects of competence which are difficult to assess directly.
Context of Assessment	Competence may be assessed in the work place or in a simulated workplace setting / environment.

Sector: Electrotechnology and Telecommunication
Sub-Sector: Electrotechnology

Level V	Electronics and Communications Technology Management	Industrial Automation and Control Technology Management	Biomedical Equipment Technology Management
Level IV	Electrical/Electronic Servicing Management	Mechatronics and Instrumentation Servicing Management	Biomedical Equipment Servicing Management
Level III	Intermediate Home/Office Electrical/Electronic Equipment Servicing / Intermediate Electronic Communication & Multimedia Equipment Servicing	Instrumentation and Control Servicing	Intermediate Biomedical Equipment Servicing
Level II	Basic Home/Office Electrical/Electronic Equipment Servicing / Basic Electronic Communication & Multimedia Equipment Servicing	Industrial Electrical Machines and Drives Servicing	Basic Biomedical Equipment Servicing
Level I	Basic Electrical/Electronic Equipment Servicing		

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