TRAINING REGULATIONS

COMPUTER SYSTEMS SERVICING NC II

ELECTRONICS SECTOR

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

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TRAINING REGULATIONS FOR
COMPUTER SYSTEMS SERVICING NC II

Section 1 COMPUTER SYSTEMS SERVICING NC II QUALIFICATIONS

The **COMPUTER SYSTEMS SERVICING NC II** Qualification consists of competencies that must possess to enable to install and configure computers systems, set-up computer networks and servers and to maintain and repair computer systems and networks.

This Qualification is packaged from the competency map of the Electronics Industry as shown in Annex A.

The units of competency comprising this qualification include the following:

Code	BASIC COMPETENCIES
500311105	Participate in workplace communication
500311106	Work in a team environment
500311107	Practice career professionalism
500311108	Practice occupational health and safety procedures
Code	**COMMON COMPETENCIES**
ELC315202	Apply quality standards
ELC311203	Perform computer operations
ELC311201	Perform mensuration and calculation
ELC311202	Prepare and interpret technical drawing
ELC724201	Use hand tools
ELC724202	Terminate and connect electrical wiring and electronic circuits
ELC724205	Test electronic components
Code	**CORE COMPETENCIES**
ELC724331	Install and configure computer systems
ELC724332	Set-up Computer Networks
ELC724333	Set-up Computer Servers
ELC724334	Maintain and Repair Computer Systems and Networks

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

- Computer Assembler
- Computer Service Technician
- Network Technician
- Computer Maintenance Technician

SECTION 2 COMPETENCY STANDARDS

This section gives the details of the contents of the core units of competency required for **COMPUTER SYSTEMS SERVICING NC II.**

BASIC COMPETENCIES

UNIT OF COMPETENCY : PARTICIPATE IN WORKPLACE COMMUNICATION
UNIT CODE : 500311105
UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to gather, interpret and convey information in response to workplace requirements.

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

RANGE OF VARIABLES

VARIABLE	RANGE
1. Appropriate sources	1.1. Team members 1.2. Suppliers 1.3. Trade personnel 1.4. Local government 1.5. Industry bodies
2. Medium	2.1. Memorandum 2.2. Circular 2.3. Notice 2.4. Information discussion 2.5. Follow-up or verbal instructions 2.6. Face to face communication
3. Storage	3.1. Manual filing system 3.2. Computer-based filing system
4. Forms	4.1. Personnel forms, telephone message forms, safety reports
5. Workplace interactions	5.1. Face to face 5.2. Telephone 5.3. Electronic and two way radio 5.4. Written including electronic, memos, instruction and forms, non-verbal including gestures, signals, signs and diagrams
6. Protocols	6.1. Observing meeting 6.2. Compliance with meeting decisions 6.3. Obeying meeting instructions

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1. Prepared written communication following standard format of the organization 1.2. Accessed information using communication equipment 1.3. Made use of relevant terms as an aid to transfer information effectively 1.4. Conveyed information effectively adopting the formal or informal communication
2. Underpinning Knowledge and Attitudes	2.1. Effective communication 2.2. Different modes of communication 2.3. Written communication 2.4. Organizational policies 2.5. Communication procedures and systems 2.6. Technology relevant to the enterprise and the individual's work responsibilities
3. Underpinning Skills	3.1. Follow simple spoken language 3.2. Perform routine workplace duties following simple written notices 3.3. Participate in workplace meetings and discussions 3.4. Complete work related documents 3.5. Estimate, calculate and record routine workplace measures 3.6. Basic mathematical processes of addition, subtraction, division and multiplication 3.7. Ability to relate to people of social range in the workplace 3.8. Gather and provide information in response to workplace Requirements
4. Resource Implications	4.1. Fax machine 4.2. Telephone 4.3. Writing materials 4.4. Internet
5. Methods of Assessment	5.1. Direct Observation 5.2. Oral interview and written test
6. Context of Assessment	6.1. Competency may be assessed individually in the actual workplace or through accredited institution

UNIT OF COMPETENCY: WORK IN TEAM ENVIRONMENT

UNIT CODE : 500311106

UNIT DESCRIPTOR : This unit covers the skills, knowledge and attitudes to identify role and responsibility as a member of a team.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
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.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Role and objective of team	1.1. Work activities in a team environment with enterprise or specific sector 1.2. Limited discretion, initiative and judgement maybe demonstrated on the job, either individually or in a team environment
2. Sources of information	2.1. Standard operating and/or other workplace procedures 2.2. Job procedures 2.3. Machine/equipment manufacturer's specifications and instructions 2.4. Organizational or external personnel 2.5. Client/supplier instructions 2.6. Quality standards 2.7. OHS and environmental standards
3. Workplace context	3.1. Work procedures and practices 3.2. Conditions of work environments 3.3. Legislation and industrial agreements 3.4. Standard work practice including the storage, safe handling and disposal of chemicals 3.5. Safety, environmental, housekeeping and quality guidelines

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1. Operated in a team to complete workplace activity 1.2. Worked effectively with others 1.3. Conveyed information in written or oral form 1.4. Selected and used appropriate workplace language 1.5. Followed designated work plan for the job 1.6. Reported outcomes
2. Underpinning Knowledge and Attitude	2.1. Communication process 2.2. Team structure 2.3. Team roles 2.4. Group planning and decision making
3. Underpinning Skills	3.1. Communicate appropriately, consistent with the culture of the workplace
4. Resource Implications	The following resources **MUST** be provided: 4.1. Access to relevant workplace or appropriately simulated environment where assessment can take place 4.2. Materials relevant to the proposed activity or tasks
5. Methods of Assessment	Competency may be assessed through: 5.1. Observation of the individual member in relation to the work activities of the group 5.2. Observation of simulation and or role play involving the participation of individual member to the attainment of organizational goal 5.3. Case studies and scenarios as a basis for discussion of issues and strategies in teamwork
6. Context for Assessment	6.1. Competency may be assessed in workplace or in a simulated workplace setting 6.2. Assessment shall be observed while task are being undertaken whether individually or in group

UNIT OF COMPETENCY: PRACTICE CAREER PROFESSIONALISM

UNIT CODE : 500311107

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes in promoting career growth and advancement.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
1. Integrate personal objectives with organizational goals	1.1 Personal growth and work plans are pursued towards improving the qualifications set for the profession 1.2 Intra- and interpersonal relationships ~~is~~ are maintained in the course of managing oneself based on performance ***evaluation*** 1.3 Commitment to the organization and its goal is demonstrated in the performance of duties
2. Set and meet work priorities	2.1 Competing demands are prioritized to achieve personal, team and organizational goals and objectives. 2.2 ***Resources*** are utilized efficiently and effectively to manage work priorities and commitments 2.3 Practices along economic use and maintenance of equipment and facilities are followed as per established procedures
3. Maintain professional growth and development	3.1 ***Trainings and career opportunities*** are identified and availed of based on job requirements 3.2 ***Recognitions*** are sought/received and demonstrated as proof of career advancement 3.3 ***Licenses and/or certifications*** relevant to job and career are obtained and renewed

RANGE OF VARIABLES

VARIABLE	RANGE
1. Evaluation	1.1 Performance Appraisal 1.2 Psychological Profile 1.3 Aptitude Tests
2. Resources	2.1 Human 2.2 Financial 2.3 Technology 2.3.1 Hardware 2.3.2 Software
3. Trainings and career opportunities	3.1 Participation in training programs 3.1.1 Technical 3.1.2 Supervisory 3.1.3 Managerial 3.1.4 Continuing Education 3.2 Serving as Resource Persons in conferences and workshops
4. Recognitions	4.1 Recommendations 4.2 Citations 4.3 Certificate of Appreciations 4.4 Commendations 4.5 Awards 4.6 Tangible and Intangible Rewards
5. Licenses and/or certifications	5.1 National Certificates 5.2 Certificate of Competency 5.3 Support Level Licenses 5.4 Professional Licenses

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Attained job targets within key result areas (KRAs) 1.2 Maintained intra - and interpersonal relationship in the course of managing oneself based on performance evaluation 1.3 Completed trainings and career opportunities which are based on the requirements of the industries 1.4 Acquired and maintained licenses and/or certifications according to the requirement of the qualification
2. Underpinning Knowledge	2.1 Work values and ethics (Code of Conduct, Code of Ethics, etc.) 2.2 Company policies 2.3 Company-operations, procedures and standards 2.4 Fundamental rights at work including gender sensitivity 2.5 Personal hygiene practices
3. Underpinning Skills	3.1 Appropriate practice of personal hygiene 3.2 Intra and Interpersonal skills 3.3 Communication skills
4. Resource Implications	The following resources **MUST** be provided: 4.1 Workplace or assessment location 4.2 Case studies/scenarios
5. Methods of Assessment	Competency may be assessed through: 5.1 Portfolio Assessment 5.2 Interview 5.3 Simulation/Role-plays 5.4 Observation 5.5 Third Party Reports 5.6 Exams and Tests
6. Context of Assessment	6.1 Competency may be assessed in the work place or in a simulated work place setting

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

UNIT CODE : **500311108**

UNIT DESCRIPTOR : This unit covers the outcomes required to comply with regulatory and organizational requirements for occupational health and safety.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
1. Identify hazards and risks	1.1 ***Safety regulations*** and workplace safety and hazard control practices and procedures are clarified and explained based on organization procedures 1.2 ***Hazards/risks*** in the workplace and their corresponding indicators are identified to minimize or eliminate risk to co-workers, workplace and environment in accordance with organization procedures 1.3 ***Contingency measures*** during workplace accidents, fire and other emergencies are recognized and established in accordance with organization procedures
2. Evaluate hazards and risks	2.1 Terms of maximum tolerable limits which when exceeded will result in harm or damage are identified based on threshold limit values (TLV) 2.2 Effects of the hazards are determined 2.3 OHS issues and/or concerns and identified safety hazards are reported to designated personnel in accordance with workplace requirements and relevant workplace OHS legislation
3. Control hazards and risks	3.1 Occupational Health and Safety (OHS) procedures for controlling hazards/risks in workplace are consistently followed 3.2 Procedures for dealing with workplace accidents, fire and emergencies are followed in accordance with organization OHS policies 3.3 ***Personal protective equipment (PPE)*** is correctly used in accordance with organization OHS procedures and practices 3.4 Appropriate assistance is provided in the event of a workplace emergency in accordance with established organization protocol
4. Maintain OHS awareness	4.1 ***Emergency-related drills and trainings*** are participated in as per established organization guidelines and procedures 4.2 ***OHS personal records*** are completed and updated in accordance with workplace requirements

RANGE OF VARIABLES

VARIABLE	RANGE
1. Safety regulations	May include but are not limited to: 1.1 Clean Air Act 1.2 Building code 1.3 National Electrical and Fire Safety Codes 1.4 Waste management statutes and rules 1.5 Philippine Occupational Safety and Health Standards 1.6 DOLE regulations on safety legal requirements 1.7 ECC regulations
2. Hazards/Risks	May include but are not limited to: 2.1 Physical hazards – impact, illumination, pressure, noise, vibration, temperature, radiation 2.2 Biological hazards- bacteria, viruses, plants, parasites, mites, molds, fungi, insects 2.3 Chemical hazards – dusts, fibers, mists, fumes, smoke, gasses, vapors 2.4 Ergonomics 2.4.1 Psychological factors – over exertion/ excessive force, awkward/static positions, fatigue, direct pressure, varying metabolic cycles 2.4.2 Physiological factors – monotony, personal relationship, work out cycle
3. Contingency measures	May include but are not limited to: 3.1 Evacuation 3.2 Isolation 3.3 Decontamination 3.4 Calling emergency personnel
4. PPE	May include but are not limited to: 4.1 Mask 4.2 Gloves 4.3 Goggles 4.4 Hair Net/cap/bonnet 4.5 Face mask/shield 4.6 Ear muffs 4.7 Apron/Gown/coverall/jump suit 4.8 Anti-static suits
5. Emergency-related drills and training	5.1 Fire drill 5.2 Earthquake drill 5.3 Basic life support/CPR 5.4 First aid 5.5 Spillage control 5.6 Decontamination of chemical and toxic 5.7 Disaster preparedness/management
6. OHS personal records	6.1 Medical/Health records 6.2 Incident reports 6.3 Accident reports 6.4 OHS-related training completed

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Explained clearly established workplace safety and hazard control practices and procedures 1.2 Identified hazards/risks in the workplace and its corresponding indicators in accordance with company procedures 1.3 Recognized contingency measures during workplace accidents, fire and other emergencies 1.4 Identified terms of maximum tolerable limits based on threshold limit value- TLV. 1.5 Followed Occupational Health and Safety (OHS) procedures for controlling hazards/risks in workplace 1.6 Used Personal Protective Equipment (PPE) in accordance with company OHS procedures and practices 1.7 Completed and updated OHS personal records in accordance with workplace requirements
2. Underpinning Knowledge and Attitude	2.1 OHS procedures and practices and regulations 2.2 PPE types and uses 2.3 Personal hygiene practices 2.4 Hazards/risks identification and control 2.5 Threshold Limit Value -TLV 2.6 OHS indicators 2.7 Organization safety and health protocol 2.8 Safety consciousness 2.9 Health consciousness
3. Underpinning Skills	3.1 Practice of personal hygiene 3.1 Hazards/risks identification and control skills 3.2 Interpersonal skills 3.3 Communication skills
4. Resource Implications	The following resources must be provided: 4.1 Workplace or assessment location 4.2 OHS personal records 4.3 PPE 4.4 Health records
5. Methods of Assessment	Competency may be assessed through: 5.1 Portfolio Assessment 5.2 Interview 5.3 Case Study/Situation
6. Context for Assessment	6.1 Competency may be assessed in the work place or in a simulated work place setting

COMMON COMPETENCIES

UNIT TITLE : APPLY QUALITY STANDARDS

UNIT CODE : ELC315202

UNIT DESCRIPTOR : This unit covers the knowledge, skills, 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.

ELEMENTS	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
1. Assess quality of received materials	1.1. Work instruction is obtained and work is carried out in accordance with standard operating procedures. 1.2. Received ***materials*** are checked against workplace standards and specifications. 1.3. Faulty materials 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 are replaced in accordance with workplace procedures.
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. ***Errors*** are identified and isolated. 2.4. Information on the quality and other indicators of production performance are recorded in accordance with workplace procedures. 2.5. In cases of deviations from specific ***quality standards***, causes are documented and reported in accordance with the workplace' s standards operating procedures.
3. Engage in quality improvement	3.1. Process improvement procedures are participated in relative to workplace assignment. 3.2. Work is carried out in accordance with process improvement procedures. 3.3. Performance of operation or quality of product of service to ensure ***customer*** satisfaction is monitored.

RANGE OF VARIABLES

VARIABLE	RANGE
1 Materials	1.1 Materials may include but not limited to: 1.1.1. Manuals 1.1.2. Job orders 1.1.3. Instructional videos
2 Faults	2.1 Faults may include but not limited to: 2.1.1. Materials not to specification 2.1.2. Materials contain incorrect/outdated information 2.1.3. Hardware defects 2.1.4. Materials that do not conform with any regulatory agencies
3 Documentation	3.1 Organization work procedures 3.2 Manufacturer's instruction manual 3.3 Customer requirements 3.4 Forms
4 Errors	4.1 Errors may be related but not limited to the following: 4.1.1. Deviation from the requirements of the Client 4.1.2. Deviation from the requirement of the organization
5 Quality standards	5.1 Quality standards may be related but not limited to the following: 5.1.1. Materials 5.1.2. Hardware 5.1.3. Final product 5.1.4. Production processes 5.1.5. Customer service
6 Customer	6.1 Co-worker 6.2 Supplier/Vendor 6.3 Client 6.4 Organization receiving the product or service

EVIDENCE GUIDE

1 Critical aspect of competency	Assessment must show that the candidate: 1.1 Carried out work in accordance with the company's standard operating procedures 1.2 Performed task according to specifications 1.3 Reported defects detected in accordance with standard operating procedures 1.4 Carried out work in accordance with the process improvement procedures
2 Underpinning knowledge	2.1 Relevant production processes, materials and products 2.2 Characteristics of materials, software and hardware used in production processes 2.3 Quality checking procedures 2.4 Workplace procedures 2.5 Safety and environmental aspects of production processes 2.6 Fault identification and reporting 2.7 Quality improvement processes
3 Underpinning skills	3.1 Reading skills required to interpret work instruction 3.2 Communication skills needed to interpret and apply defined work procedures 3.3 Carry out work in accordance with OHS policies and procedures 3.4 Critical thinking 3.5 Solution providing and decision-making
4 Method of assessment	The assessor must select two of the following to objectively evaluate the candidate: 4.1 Observation and oral questioning 4.2 Third party report 4.3 Portfolio 4.4 Practical demonstration
5 Resource implication	5.1 Materials, software and hardware to be used in a real or simulated situation
6 Context of Assessment	6.1 Assessment may be conducted in the workplace or in a simulated environment

UNIT TITLE : **PERFORM COMPUTER OPERATIONS**

UNIT CODE : **ELC311203**

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

ELEMENTS	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
1. Plan and prepare for task to be taken undertaken	1.1. Requirements of task are determined in accordance with the required output. 1.2. Appropriate ***hardware*** and ***software*** are selected according to task assigned and required outcome. 1.3. Task is planned to ensure that ***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.
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 is stored in ***storage media*** according to requirements. 2.4. Work is performed within ***ergonomic guidelines***.
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. 3.3. ***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 are printed out as required using computer ***hardware /peripheral devices*** in accordance with standard operating procedures. 4.3. Files and data are transferred between compatible systems using computer software, hardware/peripheral devices in accordance with standard operating procedures.
5. Use basic functions of a www-browser to locate information	5.1. Information requirements for internet search are established. 5.2. Browser is launched. 5.3. Search engine is loaded. 5.4. Appropriate search criteria/or URL of site is entered. 5.5. Relevant links are followed to locate required information. 5.6. Useful pages are bookmarked or printed as required.
6. Maintain computer equipment and systems	6.1. Procedures for ensuring security of data, including regular back-ups and virus checks are implemented in accordance with standard operating procedures. 6.2. Basic file ***maintenance*** procedures are implemented in line with the standards operating procedures.

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 1.8 Voice/Data logger
2 Software	Software includes the following but not limited to: 2.1 Word processing packages 2.2 Database packages 2.3 Internet 2.4 Spreadsheets 2.5 Client Specific Software
3 OH & S guidelines	3.1 OHS guidelines 3.2 Enterprise procedures
4 Storage media	Storage media include the following but not limited to: 4.1 Diskettes 4.2 CDs 4.3 Zip disks 4.4 hard disk drives, local and remote 4.5 Optical drives
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 6.5 Program icons
7 Maintenance	7.1 Creating and managing more space in the hard disk and other peripherals 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 aspects of competency	1.1 Assessment must show that the candidate: 1.2 Selected and used hardware components correctly and according to the task requirement 1.3 used basic software applications to create new files and documents 1.4 Produced accurate and complete data in accordance with the requirements 1.5 Used appropriate devices and procedures to transfer files/data accurately 1.6 Used basic functions of a www-browser to locate information.
2 Underpinning knowledge	2.1 Basic ergonomics of keyboard and computer user 2.2 Main types of computers and basic features of different operating systems 2.3 Main parts of a computer 2.4 Storage devices and basic categories of memory 2.5 Relevant types of software 2.6 General security, privacy legislation and copyright 2.7 Viruses 2.8 OH & S principles and responsibilities 2.9 Calculating computer capacity 2.10 Productivity Application 2.11 Business Application 2.12 System Software
3 Underpinning skills	3.1 Reading and comprehension skills required to interpret work instruction and to interpret basic user manuals. 3.2 Communication skills to identify lines of communication, request advice, follow instructions and receive feedback. 3.3 Technology skills to use equipment safely including keyboard skills.
4 Method of assessment	The assessor may select two of the following assessment methods to objectively assess the candidate: 4.1 Direct Observation and Oral Questioning 4.2 Practical demonstration
5 Resource implication	5.1 Computer hardware with peripherals 5.2 Appropriate software
6 Context of Assessment	6.1 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*** terms are elaborated in the Range of Variables
1. Select measuring instruments	1.1. Object or component to be measured is identified 1.2. Correct specifications are obtained from relevant source 1.3. Measuring tools are selected in line with job requirements
2. Carry out measurements and calculation	2.1. Appropriate ***measuring instrument*** is selected to achieve required outcome 2.2. Accurate measurements are obtained for job 2.3. ***Calculation*** needed to complete work tasks are performed using the four basic process of addition (+), subtraction (-), multiplication (x), and division (/) 2.4. Calculation involving fractions, percentages and mixed numbers are used to complete workplace tasks. 2.5. Numerical computation is self-checked and corrected for accuracy 2.6. Instruments are read to the limit of accuracy of the tool.
3. Maintain measuring instruments	3.1. Measuring instruments are not dropped to avoid damage 3.2. Measuring instruments are cleaned before and after using. 3.3. Proper storage of instruments undertaken according to manufacturer's specifications and standard operating procedures.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Measuring instruments	1.1. Straight edge 1.2. Torque gauge 1.3. Try square 1.4. Protractor 1.5. Combination gauge 1.6. Steel rule
2. Calculation	Kinds of part mensuration includes the following but not limited to 2.1. Volume 2.2. Area 2.3. Displacement 2.4. Inside diameter 2.5. Circumference 2.6. Length 2.7. Thickness 2.8. Outside diameter 2.9. Taper 2.10. Out of roundness

EVIDENCE GUIDE

1. Critical aspect of competency	Assessment 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. Underpinning knowledge	2.1. Types of measuring instruments and their uses 2.2. Safe handling procedures in using measuring instruments 2.3. Four fundamental operation of mathematics 2.4. Formula for volume, area, perimeter and other geometric figures
3. Underpinning skills	3.1. Reading skills required to interpret work instruction 3.2. Communication skills 3.3. Handling measuring instruments 3.4. Performing mathematical calculations using the four fundamental operations 3.5. Visualizing objects and shapes 3.6. Interpreting formulae
4. Method of assessment	Competency in this unit must be assessed through: 4.1. Observation 4.2. Oral questioning
5. Resource implication	5.1. Place of assessment 5.2. Measuring instruments 5.3. Straight edge 5.4. Torque gauge 5.5. Try square 5.6. Protractor 5.7. Combination gauge 5.8. Steel rule
6. Context of Assessment	6.1 Assessment may be conducted in the workplace or in a simulated environment

UNIT TITLE : **PREPARE AND INTERPRET TECHNICAL DRAWING**
UNIT CODE : **ELC311202**
UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes and values needed to prepare/interpret diagrams, engineering abbreviation and drawings, symbols, dimension.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
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
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.
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.
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.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Technical drawings	May 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	May include but not limited to: 2.1. Length 2.2. Width 2.3. Height 2.4. Diameter 2.5. Angles
3. Symbols	May include but not limited to: 3.1. NEC- National Electric Code 3.2. IEC -International Electrotechnical Commission 3.3. ASME - American Society of Mechanical Engineers 3.4. IEEE - Institute of Electrical and Electronics Engineers 3.5. ISA - Instrumentation System and Automation Society
4. Instruments/Equipment	4.1. Components/dividers 4.2. Drawing boards 4.3. Rulers 4.4. T-square 4.5. Calculator

EVIDENCE GUIDE

1. Critical aspect of competencies	Assessment must show 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. Underpinning knowledge	2.1. Drawing conventions 2.2. Symbols 2.3. Dimensioning Conventions 2.4. Mark up/Notation of Drawings 2.5. Mathematics 2.5.1. Four fundamental operations 2.5.2. Percentage **2.5.3. Fraction** 2.5.4. Trigonometric Functions 2.5.5. Algebra 2.5.6. Geometry
3. Underpinning skills	3.1. Reading skills required to interpret work instruction 3.2. Communication skills 3.3. Interpreting electrical/electronic signs and symbols
4. Method of assessment	Competency in this unit must be assessed through: 4.1. Practical tasks involving interpretation of a range of technical drawings 4.2. Oral questioning
5. Resource implication	5.1. Drawings 5.2. Diagrams 5.3. Charts 5.4. Plans
6. Context of Assessment	6.1 Assessment may be conducted in the workplace or in a simulated environment

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*** terms are elaborated in the Range of Variables
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
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
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
4. Maintain hand tools	4.1. Tools are not dropped to avoid damage 4.2. Routine ***maintenance*** of tools undertaken according to standard operational procedures, principles and techniques 4.3. Tools are stored safely in appropriate locations in accordance with manufacturer's specifications or standard operating procedures

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 must show 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. Underpinning knowledge	2.1. Safety 2.1.1. Safety requirements in handling tools 2.2. Tools : 2.2.1. Function, Operation, Common faults 2.3. Processes, Operations, Systems 2.3.1. Maintenance of tools 2.3.2. Storage of Tools
3. Underpinning skills	3.1. Reading skills required to interpret work instruction and numerical skills 3.2. Communication skills 3.3. Problem solving in emergency situation
4. Method of assessment	Competency in this unit must be assessed through: 4.1. Observation 4.2. Oral questioning
5. Resource Implication	5.1. Tools may include the following but not limited to: 5.1.1. screw drivers 5.1.2. pliers 5.1.3. punches 5.1.4. wrenches, files
6. Context of Assessment	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, (and) attitudes and values needed to terminate and connect electrical wiring and electronic circuits

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
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
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. All work undertaken safely in accordance with the workplace and standard procedures 2.3. Appropriate range of ***methods*** in termination/connection are used according to specifications, manufacturer's requirements and safety 2.4. Correct sequence of operation is followed 2.5. ***Accessories*** used are adjusted, if necessary 2.6. Confirm termination/connection undertaken successfully in accordance with job specification
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

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 must show 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. Underpinning knowledge	2.1. Use of tools 2.2. Use of test instruments/equipment 2.3. Electrical theory 2.4. Single phase AC principles 2.5. Wiring techniques 2.6. DC power supplies 2.7. Soldering
3. Underpinning skills	3.1. Reading skills required to interpret work instruction 3.2. Communication skills 3.3. Soldering techniques
4. Method of assessment	4.1. The assessor may select two (2) of the following assessment methods to objectively assess the candidate: 4.1.1. Observation 4.1.2. Oral Questioning 4.1.3. Practical demonstration
5. Resource implication	5.1. Tools for measuring, cutting, drilling, assembling/disassembling, connecting. Tool set includes the following but not limited to: 5.1.1. screw drivers 5.1.2. pliers 5.1.3. cutters
6. Context of Assessment	6.1. 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.

ELEMENTS	PERFORMANCE CRITERIA *(Italicized bold* **terms are elaborated in the range of variables)**
1. Determine criteria for testing electronics components	1.1 Work instructions are obtained and clarified based on job order or client requirements 1.2 ***Responsible person*** is consulted for effective and proper work coordination 1.3 Data sheets/Application notes are obtained and interpreted based on manufacturer's specifications 1.4 ***Testing criteria*** are defined to ensure that components meet technical and quality requirements 1.5 Document and communicate testing criteria to relevant personnel
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 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
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 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
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.

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

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 Required knowledge and attitude	2.1 Mensuration/Mathematics 2.1.1 Conversion of Units 2.1.2 Applied Mathematics 2.2 Safety 2.2.1 Work Safety requirements and economy of materials with durability 2.2.2 Knowledge in 5S application and observation of required timeframe 2.2.3 Knowledge of proper handling and disposal of chemicals 2.3 Materials, tools and equipment uses and specifications 2.3.1 Identification of hand and power tools 2.3.2 Proper care and use of tools 2.4 Systems and Processes 2.4.1 Principles of electrical/electronic circuits 2.4.2 Identifying sources of electricity 2.4.3 Identifying conductors and insulators 2.4.4 Describing resistance and identify resistors 2.4.5 Supplying different voltage using variable power supply 2.4.6 Measuring resistance using VOM 2.4.7 Testing resistors 2.4.8 Measuring current and voltage using VOM 2.4.9 Analyzing simple circuit using ohms and power law 2.4.10 Analyzing series/parallel circuits using ohms and power law 2.4.11 Describing alternating current circuits 2.4.12 Observing waveform using oscilloscope 2.4.13 generating waveform in various frequency using function generator 2.4.14 Measuring frequency using oscilloscope 2.4.15 Measuring capacitance using VOM 2.4.16 Describing capacitance and identifying capacitors 2.4.17 Testing capacitors 2.4.18 Analyzing series/parallel capacitances 2.4.19 Describing inductance and identifying inductors 2.4.20 Testing inductors 2.4.21 analyzing series parallel inductors 2.4.22 describing the characteristic of transformers 2.4.23 describing and identifying semiconductor diode 2.4.24 testing semiconductor diode

	2.4.25 analyzing rectifier circuits 2.4.26 describing and identifying bipolar transistor 2.4.27 testing bipolar transistor 2.4.28 analyzing amplifier circuit 2.4.29 analyzing multi-vibrator circuit 2.4.30 describing and analyzing digital gate 2.4.31 testing logic gates 2.4.32 analyzing logic networks 2.4.33 analyzing sequence circuits
3 Required skills	3.1 Work efficiently & systematically 3.2 Communication skills 3.3 Use and maintenance of tools and equipment 3.4 Skills in testing electronic components 3.5 Work safety practices and time management 3.6 Problem solving skills 3.7 Reading skills
4 Method of assessment	Competency may be assessed through two or more of the following methods: 4.1 Direct observation of application to tasks and questions related to required knowledge 4.2 Demonstration with oral questioning 4.3 Third party report 4.4 Written test 4.5 Portfolio
5 Resource implications	The following resources must be provided: 5.1 Tools and equipment (see range of variables) 5.2 Working area/bench 5.3 Electronic components 5.4 Testing instruments and equipment 5.5 Assessment rating sheet 5.6 Reporting forms
6 Context of assessment	6.1 Assessment maybe conducted in the workplace or in a simulated workplace setting

CORE COMPETENCIES

UNIT TITLE : **INSTALL AND CONFIGURE COMPUTER SYSTEMS**

UNIT CODE : **ELC724331**

UNIT DESCRIPTOR : This unit covers the outcomes required in installing and configuring desktop and workstation computers systems. It consists of competencies to assemble computer hardware, install operating system and drivers for peripherals/devices, and install application software as well as to conduct testing and documentation.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
1 Assemble computer hardware	1.1 Unit assembly is planned and prepared to ensure ***OH&S policies and procedures*** are followed in accordance with systems requirements 1.2 Materials necessary to complete the work are identified and obtained in accordance with established procedures and checked against systems requirements 1.3 ***Tools, equipment*** **and** ***testing devices*** needed to carry out the installation work are obtained in accordance with established procedures and checked for correct operation and safety 1.4 ***Computer hardware*** is assembled in accordance with established procedures and systems requirements 1.5 Basic-input-output-system (BIOS) configuration is performed in accordance with hardware requirements.
2 Prepare installer	2.1 Portable bootable devices are created in accordance with software manufacturer instruction 2.2 Customized installers are prepared in accordance with software utilization guide and end user agreement. 2.3 Installation of portable applications are carried out in accordance with software user guide and software license
3 Install operating system and drivers for peripherals/ devices	3.1 ***Operating system (OS)*** is installed in accordance with ***established installation procedures*** and to comply with end-user requirements 3.2 ***Peripherals/devices*** drivers are installed and configured in accordance with manufacturer's instructions and/or OS installation procedures. 3.3 OS and drivers updates/patches are accessed and installed in accordance with manufacturer's recommendations and requirements 3.4 On-going checks of the quality of the work are undertaken in accordance with established procedures

4 Install application software	4.1 ***Application software*** are installed based on software installation guides, end-user requirements and software license agreement 4.2 Variation to application software installation is carried out in accordance to customer/client requirements 4.3 Software updates are accessed and installed in accordance with manufacturer's recommendations and requirements
5 Conduct testing and documentation	5.1 Devices / systems and/or installation is tested to determine whether it conforms to requirements 5.2 ***Stress test*** is conducted to ensure reliability of equipment in accordance with manufacturer's instructions and system requirements 5.3 5S and 3Rs are followed according to environmental policies 5.4 Documentation in relation to the test is forwarded to appropriate personnel and/or authority in accordance with requirements

RANGE OF VARIABLES

VARIABLE	RANGE	
1. OH&S policies and procedures	1.1 Occupational Health and Safety Laws 1.2 Personal Safety 1.3 Workplace Hazards 1.4 Environment Laws	
2. Tools, equipment and testing devices	2.1 Protective eyewear 2.2 Digital multi-meter 2.3 Wire stripper with bolt cutter 2.4 Pliers (assorted) 2.5 Screw drivers (assorted) 2.6 Soldering iron 2.7 Desoldering tool 2.8 Allen wrench (0.05 – 0.25 inch) 2.9 Flashlight	2.10 IC insertion/extraction tool 2.11 Mirror (inspection) 2.12 RS 232 pin insertion/extraction tool 2.13 Sharp pointed tweezers 2.14 Antistatic wrist wrap 2.15 LAN Tester 2.16 Crimping tools
3. Computer hardware	3.1 Motherboard 3.2 Hard disk 3.3 Video card 3.4 Sound card	3.5 Optical disc drives 3.6 Memory modules 3.7 Power supply 3.8 Cables and cords
4. Operating system	4.1 Windows 4.2 MAC OS X 4.3 Linux	
5. Established installation procedures	5.1 Automatic installation 5.2 Custom installation 5.3 Installation from optical devices 5.4 Installation from portable devices 5.5 Installation via network	
6. Peripherals/devices	6.1 Printer 6.2 Scanner 6.3 Interface cards 6.3.1 TV tuner 6.3.2 video card 6.3.3 sound card	
7. Application software	7.1 Productivity tools 7.2 Utilities 7.2.1 Anti-virus 7.2.2 Virtualization software 7.2.3 Disk management software 7.2.4 Optical disk burning tool 7.3 Games	
8. Stress test	Includes stress test on: 8.1 processor 8.2 video card 8.3 memory 8.4 hard disk	

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment must show that the candidate: 1.1. Assembled computer hardware 1.2. Installed operating system and drivers for peripherals/devices 1.3. Installed application software 1.4. Conducted testing and documentation
2. Underpinning knowledge	2.1. Types and parts of computers 2.2. Computer operating systems • Windows / MAC OS X /Linux 2.3. Peripheral devices 2.4. Computer systems design 2.5. Computer assembly procedures 2.6. Installers preparation and OS installation procedures 2.7. Application and devices/drivers installation procedures 2.8. Desktop PC interface/ hook up procedures 2.9. Power ON self-test and BIOS configuration procedures 2.10. Application packages & use of application programs 2.11. Multimedia systems 2.12. Motherboards 2.13. Multimedia storage devices: 2.14. Video cards 2.15. Sound cards 2.16. Graphical user interface 2.17. Disk management 2.18. Use of utilities/software • Virtualization software • Disk management software • Anti-virus / Diagnostic software • Device drivers 2.19. Drivers/Software update procedures 2.20. Application software license agreements 2.21. Stress testing procedures 2.22. 5S and 3Rs environmental policies
3 Underpinning skills	3.1 Safety handling of computer parts 3.2 Assembling computer hardware 3.3 Troubleshooting skills 3.4 Reading and writing skills
4 Method of assessment	The assessor may select any two of the following assessment methods to objectively assess the candidate: 4.1 Practical Demonstration w/ oral questioning 4.2 Interview 4.3 Portfolio
5 Resource Implications	The following resources MUST be provided: 5.1 Tools and test instruments 5.2 PC or workstation 5.3 Computer peripherals/devices 5.4 Appropriate OS, drivers and software applications/programs
6 Context of Assessment	6.1 Assessment may be conducted in the workplace or in a simulated environment

UNIT TITLE : **SET-UP COMPUTER NETWORKS**

UNIT CODE : **ELC724332**

UNIT DESCRIPTOR : This unit covers the outcomes required in setting-up computers networks for LANs and small-office home-office (SOHO) systems. It consists of competencies to install network cables, set network configuration, set router/Wi-Fi/ wireless access point/repeater configuration as well as to inspect and test the configured computer networks.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** items are elaborated in the range of Variables
1 Install network cables	1.1 Cable routes are determined and planned in accordance with ***network design*** and actual installation site. 1.2 ***Network materials*** necessary to complete the work are identified and obtained in accordance with established procedures and checked against systems requirements 1.3 ***Tools, equipment*** **and** ***testing devices*** needed to carry out the installation work are obtained in accordance with established procedures and checked for correct operation and safety 1.4 ***Appropriate personal protective equipment*** is used and ***OHS policies and procedures*** are followed 1.5 Copper cable ***splicing*** is performed based on Electronic Industries Alliance/Telecommunications Industry Association (EIA/TIA) standards 1.6 ***Network cables*** and ***cable raceway*** are installed in accordance with established procedures and ***installation requirements*** 1.7 Installation work is performed and is checked to ensure no unnecessary damage has occurred and complies with requirements 1.8 OHS standards and 5S principles are followed according to enterprise requirements 1.9 Excess components and materials are disposed of based on WEEE directives and 3Rs waste management program.
2 Set network configuration	2.1 Network connectivity of each terminal is checked in accordance with network design. 2.2 Any fault or problem in the network system is diagnosed and remedied in line with the standard operating procedures. 2.3 Network interface card (NIC) settings are configured in accordance with network design. 2.4 Communication checking between terminals are carried out in accordance with OS network configuration guides 2.5 Unplanned events or conditions are responded to in accordance with established procedures

3	Set router/Wi-Fi/ wireless access point/repeater configuration	3.1 ***Client Device*** systems settings are configured in accordance with manufacturers' instructions and end-user preferences 3.2 Local area network (LAN) port is configured in accordance with manufacturers' instructions and network design 3.3 Wide area network (WAN) port is configured in accordance with manufacturers' instructions and network design 3.4 Wireless settings are configured in accordance manufacturers' instructions, network design and end-user preferences 3.5 Security/Firewall/Advance settings are configured in accordance with manufacturers' instructions and end-user preferences
4	Inspect and test the configured computer networks	4.1 Final inspections are undertaken to ensure that the configuration done on the computer networks conforms with the manufacturer's instruction/manual 4.2 Computer networks are checked to ensure safe operation. 4.3 Reports are prepared/completed according to company requirements.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Network design	May include: 1.1 Network topology 1.2 Distribution terminals
2. Network materials	2.1 Cables 2.1.1 Fiber optics 2.1.2 copper 2.2 terminals 2.3 cable raceway/duct 2.4 clamps 2.5 fasteners 2.6 insulators 2.7 terminal box
3. Tools, equipment and testing devices	3.1 Protective eyewear 3.2 Digital multi-meter 3.3 Wire stripper with bolt cutter 3.4 Pliers (assorted) 3.5 Screw drivers (assorted) 3.6 LAN Tester 3.7 Crimping tools
4. Appropriate personal protective equipment	4.1 Gloves 4.2 Goggles 4.3 Working clothes
5. OH&S policies and procedures	5.1 Occupational Health and Safety Laws 5.2 Personal Safety 5.3 Workplace Hazards 5.4 Environment Laws
6. Splicing	6.1 straight-through 6.2 cross-talk 6.3 roll-over
7. network cables	7.1 copper cable 7.2 fiber optic cable (terminated)
8. Cable raceway	8.1 slotted PVC 8.2 metallic raceway 8.3 flexible conduit
9. Client device	9.1 Laptop 9.2 Desktop 9.3 Network storage 9.4 Network printer
10. installation requirement	10.1 other requirements for fiber optic cable installation

EVIDENCE GUIDE

1. Critical aspect of competency	Assessment must show that the candidate: 1.1. Installed network cables 1.2. Set network configuration 1.3. Set router/Wi-Fi/ wireless access point/repeater configuration 1.4. Inspected and tested the configured computer networks
2. Underpinning knowledge	2.1. Computer network concepts 2.2. Network cable installation 2.3. Copper cable splicing and cable testing 2.4. Fiber optic cables splicing and installation requirements 2.5. network design o addressing o subnetting o topology 2.6. IPV4 and IPV6 2.7. Router/Wi-Fi/ wireless access point/repeater configuration 2.8. Network interface card (NIC) settings 2.9. network cables 2.10. cable raceways/ducts 2.11. Device systems settings configuration 2.12. Local area network (LAN) port configuration 2.13. Wide area network (WAN) port configuration 2.14. Wireless settings configuration 2.15. Security/Firewall/Advance settings configuration 2.16. Cloud computing 2.17. Network connectivity testing 2.18. Philippine Electrical Code relevant to data connection 2.23. OHS standards and 5S principles 2.24. Practicing 3Rs – reduce, re-use, recycle/recover 2.25. 3Rs environmental policies 2.19. Managing waste from electrical and electronic equipment (WEEE)
3. Underpinning skills	3.1. Cable splicing 3.2. Cable troubleshooting 3.3. Setting-up and configuring skills 3.4. Problem solving skills 3.5. Decision making skills 3.6. Documentation skills
4. Method of assessment	The assessor may select any two of the following assessment methods to objectively assess the candidate: 4.1. Practical Demonstration w/ oral questioning 4.2. Interview 4.3. Third Party 4.4. Portfolio
5. Resource Implications	The following resources MUST be provided: 5.1. PC or workstation 5.2. Network cables and materials 5.3. Router/Wi-Fi/ wireless access point/repeater 5.4. Tools and test instruments 5.5. Appropriate software applications/programs 5.6. PPE
6. Context of Assessment	6.1. Assessment may be conducted in the workplace or in a simulated environment

UNIT TITLE : **SET-UP COMPUTER SERVERS**

UNIT CODE : **ELC724333**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes needed to set-up computer servers for LANs and SOHO systems. It consists of competencies to set-up user access and configures network services as well as to perform testing, documentation and pre-deployment procedures.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables
1. Set-up user access	1.1 User folder is created in accordance with network operating system (NOS) features 1.2 User access level is configured based on NOS features and established network access policies/end-user requirements. 1.3 Security check is performed in accordance with established network access policies/end-user requirements.
2. Configure network services	2.1. ***Normal functions of server*** are checked in accordance with manufacturer's instructions 2.2. Required modules /add-ons are installed/updated based on NOS installation procedures 2.3. ***Network services*** to be configured are confirmed based on user/system requirements 2.4. Operation of network services are checked based on user/system requirements 2.5. Unplanned events or conditions are responded to in accordance with established procedures
3. Perform testing, documentation and pre-deployment procedures	3.1. ***Pre-deployment procedures*** is undertaken based on enterprise policies and procedures 3.2. Operation and security check are undertaken based on end-user requirements 3.3. Reports are prepared/completed according to enterprise policies and procedures.

RANGE OF VARIABLES

VARIABLE	RANGE
1. Normal functions of server	1.1 no error on boot sequence 1.2 network connectivity
2. Network services	2.1 remote access 2.2 domain controller 2.3 web services 2.4 database services 2.5 proxy server 2.6 file, printer and other resources sharing
3. pre-deployment procedures	3.1 installation of application 3.2 populating database

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment must show that the candidate: 1.1. Set-up user access 1.2. Configured network services 1.3. Performed testing, documentation and pre-deployment procedures
2. Underpinning knowledge	2.1. Network operating system (NOS) features 2.2. Computer servers and functions 2.3. Types of Network services 2.4. User access level configuration 2.5. Network services configuration 2.5.1. configuring web services 2.5.2. configuring file sharing services 2.5.3. configuring print sharing services 2.6. Web applications/technologies 2.7. Setting-up client/user access and security 2.8. Setting-up and configuring servers 2.9. Installing and configuring modules/add-ons 2.10. Configuration of network services 2.11. Testing procedures 2.12. Pre-deployment procedures and practices 2.13. Enterprise policies and procedures 2.14. End user requirements 2.15. Enterprise policies and procedures 2.16. Documentation and making reports
3. Underpinning skills	3.1. Setting-up and configuring servers 3.2. Problem solving skills 3.3. Decision making skills 3.4. Reading and writing skills
4. Method of assessment	The assessor may select any two of the following assessment methods to objectively assess the candidate: 4.1. Practical Demonstration w/ oral questioning 4.2. Interview 4.3. Portfolio
5. Resource Implications	The following resources MUST be provided: 5.1. PC or workstation network and server 5.2. Network operating system (NOS) 5.3. Network printer 5.4. Tools and test instruments 5.5. Appropriate software applications/programs
6. Context of Assessment	6.1. Assessment may be conducted in the workplace or in a simulated environment

UNIT TITLE : **MAINTAIN AND REPAIR COMPUTER SYSTEMS AND NETWORKS**

UNIT CODE : **ELC724334**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes needed to maintain and service computer systems and networks.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** items are elaborated in the range of Variables
1. Plan and prepare for maintenance and repair	1.1. Maintenance and/or Diagnosis of faults is planned and prepared in line with job requirements. 1.2. ***Tools, equipment*** and ***testing devices*** needed for the maintenance are obtained and checked for correct operation and safety 1.3. ***Materials*** necessary to complete the work are obtained in accordance with established procedures and checked against job requirements. 1.4. ***OHS policies and procedures*** are followed in line with job requirements. 1.5. ***Computer systems and networks*** for maintenance are checked against job/service order or instructions and specifications.
2. Maintain computer systems and networks	2.1. Appropriate ***personal protective equipment*** is used in line with standard procedures. 2.2. Normal function of computer systems and networks are checked in accordance with manufacturer's instructions. 2.3. Scheduled/periodic ***maintenance*** is performed in accordance with manufacturer's requirements. 2.4. Where necessary, needed repairs/replacements are made in accordance with established procedures. 2.5. Unplanned events or conditions are responded to in accordance with established procedures
3. Diagnose faults of computer systems and networks	3.1. Appropriate personal protective equipment is used in line with standard procedures. 3.2. ***Faults or problems*** in the computer systems and networks are diagnosed according to requirements and in line with the standard procedures. 3.3. Contingency measures are managed and implemented in accordance with established procedures 3.4. Unplanned events or conditions are responded to in accordance with established procedures

4. Rectify/correct defects in computer systems and networks	4.1. Appropriate personal protective equipment is used in line with standard procedures. 4.2. Defective components or parts are replaced or corrected without damage to the surrounding environment or services 4.3. Adjustments, if necessary are made in accordance with established procedures 4.4. Unplanned events or conditions are responded to in accordance with established procedures.
5. Inspect and test the computer systems and networks	5.1. Final inspections are undertaken to ensure that the testing conducted on the device conforms with the manufacturer's instruction/manual 5.2. Computer systems and networks are checked/tested to ensure safe operation. 5.3. OHS standards and 5S principles are followed according to enterprise policies 5.4. Work site is cleaned and cleared of all debris and left in safe condition in accordance with company procedures 5.5. Excess components and materials are disposed of based on WEEE directives and 3Rs waste management program. 5.6. Report is prepared and completed according to company requirements

RANGE OF VARIABLES

VARIABLE	RANGE
1. Tools	Tools for: cutting, shaping, drilling, threading, tapping, finishing, dismantling, and assembling. Tool set includes but not limited to: 1.1. Pliers (assorted) 1.2. Screw drivers (assorted) 1.3. Special tools 1.4. Soldering iron/gun 1.5. Wrenches 1.6. Utility knife/stripper 1.7. Hot air soldering station 1.8. LAN Tester 1.9. Crimping tools
2. Equipment and testing devices	2.1. Equipment includes but not limited to: 2.1.1. Maintenance bench 2.1.2. Power supply equipment 2.2. Testing devices include but not limited to: 2.2.1. Multi-meter 2.2.2. Calibrators 2.2.3. Signal generator 2.2.4. Oscilloscope 2.2.5. Appropriate software
3. Materials	Includes but not limited to: 3.1. disks 3.2. Connectors 3.3. Adaptors 3.4. Wires and cables 3.5. Appropriate software 3.6. Computer storage media
4. OH & S policies and procedures	4.1. OH & S guidelines 4.2. Philippine environmental standards
5. Computer systems and networks	Includes but not limited to: 5.1. Servers 5.2. peripherals 5.3. desktop computers 5.4. network devices 5.5. cables and connection
6. Personal protective equipment	Includes but not limited to: 6.1. Goggles/glasses 6.2. Mask 6.3. Gloves 6.4. Anti-static wrist wrap
7. Maintenance	7.1. Software updates 7.2. Hard disk maintenance 7.3. File back-up/Restoration
8. Faults and problems	8.1. Network connectivity 8.2. Software issues 8.3. Hardware issues

EVIDENCE GUIDE

1. Critical aspect of competency	Assessment must show that the candidate: 1.1 Planned and prepared for maintenance and repair. 1.2 Maintained computer systems and networks 1.3 Diagnosed faults of computer systems 1.4 Rectified/corrected defects in computer systems and networks 1.5 Inspected and tested the computer systems and networks
2. Underpinning knowledge	Includes but not limited to: 2.1 Planning and preparing for maintenance 2.2 Computer systems maintenance procedures 2.2.1 PC systems 2.2.2 Computer operations 2.2.3 Electronic fault findings 2.3 Use and operation of tools, instruments and testing devices 2.4 Occupational health and safety policies and procedures 2.5 Job service order forms or checklist 2.6 Problem solving in emergency situation 2.7 Procedures in maintenance scheduling 2.8 Preventive maintenance of computer system and network 2.8.1 Operating system update 2.8.2 Back-up scheduling 2.8.3 Creating restore point 2.8.4 Guarding against virus 2.8.5 Cleaning computer systems and networks 2.9 Diagnostic procedures 2.10 Identifying and isolating faults/problems 2.10.1 Diagnostic software utilities 2.10.2 Gathering of information 2.11 Accomplished forms 2.11.1 Diagnostic reports 2.11.2 Proposal reports 2.12 Defects in computer systems and networks 2.13 Troubleshooting and repair techniques 2.14 Problem solving in emergency situation 2.15 Corrective action 2.15.1 Hardware configuration 2.15.2 Software configuration 2.16 Testing methods and procedures 2.17 Documentation and making reports 2.18 Waste management 2.19 OHS standards and 5S principles 2.20 Practicing 3Rs – reduce, re-use, recycle/recover 2.21 3Rs environmental policies 2.22 Managing waste from electrical and electronic equipment (WEEE)
3. Underpinning skills	3.1 Reading skills required to interpret work instructions 3.2 Communication skills needed to interpret and define work procedures 3.3 Problem solving in emergency situation 3.4 Network Cabling 3.5 Connecting computers to wired and wireless LAN 3.6 Removing viruses from infected machines

4.	Method of assessment	The assessor must select two of the following assessment methods to objectively assess the candidate: 4.1 Observation with oral Questioning 4.2 Interview 4.3 Portfolio
5.	Resource Implication	The following resources MUST be provided: 5.1 Tools 5.2 Computers and peripherals 5.3 Test instruments 5.4 Materials 5.5 PPE 5.6 Technical manuals
6.	Context of Assessment	Assessment may be conducted in the workplace or in a simulated environment

SECTION 3 TRAINING STANDARDS

These guidelines are set to provide the Technical and Vocational Education and Training (TVET) providers with information and other important requirements to consider when designing training programs for Computer Systems Servicing NC II.

3.1. CURRICULUM DESIGN

Course Title: **COMPUTER SYSTEMS SERVICING** NC Level: **NC II**
Training Hours: 40 Hours (Basic)
80 Hours (Common)
160 Hours (CORE)
---
280 Hours – TOTAL

Course Description:

This course is designed to develop & enhance the knowledge, skills, & attitudes of a Computer Systems Service Technician, in accordance with industry standards. It covers the basic and common competencies in addition to the core competencies such as to install and configure computers systems, set-up computer networks and servers and to maintain and repair computer systems and networks.

To obtain this, all units prescribed for this qualification must be achieved:

BASIC COMPETENCIES
(40 hours)

Unit of Competency	Learning Outcomes	Methodology	Assessment Approach
1. Participate in workplace communication	1.1 Obtain and convey workplace information. 1.2 Complete relevant work related documents. 1.3 Participate in workplace meeting and discussion.	Group discussion Interaction	• Demonstration • Observation • Interviews/ questioning
2. Work in a team environment	2.1 Describe and identify team role and responsibility in a team. *2.2* Describe work as a team member.	Discussion Interaction	• Demonstration • Observation • Interviews/ questioning
3. Practice career professionalism	3.1 Integrate personal objectives with organizational goals. 3.2 Set and meet work priorities. 3.3 Maintain professional growth and development.	Discussion Interaction	• Demonstration • Observation • Interviews/ questioning
4. Practice occupational health & safety	4.1 Identify hazards and risks. 4.2 Evaluate hazard and risks 4.3 Control hazards and risks 4.4 Maintain occupational health and safety awareness	Discussion Plant tour Symposium	• Observation • Interview

COMMON COMPETENCIES

(80 hours)

Unit of Competency	Learning Outcomes	Methodology	Assessment Approach
1. Apply Quality Standards	1.1. Assess quality of received materials 1.2. Assess own work 1.3. Engage in quality improvement	▪ Field trip ▪ Symposium ▪ Problem solving ▪ Simulation ▪ Individualize learning ▪ On the job training	▪ Demonstration & questioning ▪ Observation & questioning ▪ Third party report
2. Perform Computer Operation	2.1. Plan and prepare for task to be taken undertaken 2.2. Input data into computer 2.3. Access information using computer 2.4. Produce output/ data using computer system 2.5. Use basic functions of a www-browser to locate information 2.6. Maintain computer equipment and systems	▪ Modular ▪ Film showing ▪ Computer based training (e-learning) ▪ Project method ▪ On the job training	▪ Demonstration & questioning ▪ Observation & questioning ▪ Third party report ▪ Assessment of output product ▪ Portfolio ▪ Computer based assessment
3. Perform Mensuration and Calculation	3.1. Select measuring instruments 3.2. Carry out measurement and calculation 3.3. Maintain measuring instruments	▪ Self- paced/ modular ▪ Demonstration ▪ Small group discussion ▪ Distance learning	▪ Written/Oral examination ▪ Practical demonstration
4. Prepare and Interpret Technical Drawings	4.1. Identify different kinds of technical drawings 4.2. Interpret technical drawing 4.3. Prepare/make changes on electrical/electronic schematic and drawings 4.4. Store technical drawings and equipment/ instruments	▪ Lecture/ demonstration ▪ Dualized training ▪ Distance learning	▪ Written /oral ▪ examinations ▪ Direct ▪ observation ▪ Project method ▪ interview
5. Use Hand Tools	5.1. Plan and prepare for task to be undertaken 5.2. Prepare hand tools 5.3. Use appropriate hand tools and equipment 5.4. Maintain hand tools	▪ Lecture / Demonstration ▪ Distance learning ▪ Film Showing	▪ Written/Oral examination ▪ Practical demonstration ▪ Observation & questioning

6. Terminate and Connect Electrical wiring and Electronic Circuit	6.1 Plan and prepare for termination/connection of electrical wiring/electronic circuits 6.2 Terminate/connect electrical wiring/electronic circuits 6.3 Test termination/ connection of electrical wiring /electronics circuits	▪ Film Viewing ▪ Individualized Learning ▪ Direct Student Laboratory Experience ▪ On-the-Job Training ▪ Project Method	▪ Demonstration and Questioning ▪ Assessment of Output Product
7. Test electronic components	7.1 Determine criteria for testing electronics components 7.2 Plan an approach for component testing 7.3 Test components 7.4 Evaluate the testing process	▪ Film Viewing ▪ Individualized Learning ▪ Direct Student Laboratory Experience ▪ On-the-Job Training ▪ Project Method	▪ Demonstration and Questioning ▪ Assessment of Output Product

CORE COMPETENCIES

(160 hours)

Unit of Competency	Learning Outcome	Methodology	Assessment Approach
1. Install and configure computer systems	1.1. Assemble computer hardware 1.2. Install operating system and drivers for peripherals/ devices. 1.3. Install the computer application software 1.4. Conduct testing and documentation	• Lecture • Discussion • Demonstration • Viewing multimedia	• Written examination • Practical examination
2. Set-up computer networks	2.1. Install network cables 2.2. Set network configuration 2.3. Set router/Wi-Fi/ wireless access point/repeater configuration 2.4. Inspect and test the configured computer networks	• Lecture • Discussion • Demonstration • Viewing multimedia	• Written examination • Practical examination

3. Set-up Computer Servers	3.1. Set-up user access 3.2. Configure network services 3.3. Perform testing, documentation and pre-deployment practices	• Lecture • Discussion • Demonstration • Viewing multimedia	• Written examination • Practical examination
4. Maintain and repair computer systems and networks	4.1. Plan and prepare for maintenance and repair 4.2. Maintain computer systems and networks 4.3. Diagnose faults of computer systems 4.4. Rectify/correct defects in computer systems 4.5. Inspect and test the computer systems and networks	• Lecture • Discussion • Demonstration • Viewing multimedia	• Written examination • Practical examination

3.2. TRAINING DELIVERY

The delivery of training should adhere to the design of the curriculum. Delivery should be guided by the 10 basic principles of the competency-based TVET.

- The training is based on curriculum developed from the competency standards;
- Learning is modular in its structure;
- Training delivery is individualized and self-paced;
- Training is based on work that must be performed;
- Training materials are directly related to the competency standards and the curriculum modules;
- Assessment is based in the collection of evidence of the performance of work to the industry required standard;
- Training is based both on and off-the-job components;
- Allows for recognition of prior learning (RPL) or current competencies;
- Training allows for multiple entry and exit; and
- Approved training programs are nationally accredited.

The competency-based TVET systems 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 may be adopted when designing training programs:

- The dualized mode of training delivery is preferred and recommended. Thus programs would contain both in-school and in-industry training or fieldwork components. Details can be referred to the Dual Training System (DTS) Implementing Rules and Regulations.
- Modular/self-paced learning is a competency-based training modality wherein the trainee is allowed to progress at his own pace. The trainer facilities the training delivery.
- Peer teaching/mentoring is a training modality wherein fast learners are given the opportunity to assist the slow learners.
- Supervised industry training or on-the-job training is an approach in training designed to enhance the knowledge and skills of the trainee through actual experience in the workplace to acquire a specific competencies prescribed in the training regulations.
- Distance learning is a formal education process in which majority of the instruction occurs when the students and instructors are not in the same place. Distance learning may employ correspondence study, or audio, video or computer technologies.

3.3. TRAINEE ENTRY REQUIREMENTS

Trainees or students wishing to gain entry into this course should possess the following requirements:

- Can communicate either oral and written;
- Must pass the trainability/aptitude test.

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

3.4. LIST OF TOOLS, EQUIPMENT AND MATERIALS COMPUTER SYSTEMS SERVICING – NC II

Recommended list of tools, equipment and materials for the training of 25 trainees for Computer Systems Servicing – NC II

QUANTITY *	TOOLS
10 pieces	Screwdriver (standard)
10 pieces	Screwdriver (Philips)
10 pieces	Long nose pliers
10 pieces	Mechanical pliers
10 sets	Allen wrench
10 pieces	Crimping tools
10 pieces	Soldering iron
10 pieces	Solder sucker
5 pieces	Wire stripper
1 unit	Portable electric hand drill
1 set	Drill bit
5 sets	Precision screw drivers
10 pcs	Anti-static devices
5 pcs	Flash light/Head mounted light

* Minimum quantity recommended for a Class size of 25 trainees

QUANTITY *	EQUIPMENT
26 units	Desktop Computer
10	Laptop computer/Netbook
10	Computers for server
10	Server cabinet/Frame
20 pcs	Patch panel (48-ports)
10 sets	Working tables
1 unit	Internet subscription (at least 2 MBPS)
10 units	Uninterruptible Power Supply (UPS)
10 unit	Hub / Switch
2 units	Managed switch
1	Network controller
11	ADSL Router with Wi-Fi
10	Wireless Access Point
1 unit	PC Video camera
2 units	External optical drive
1 unit	USB External HD
1 unit	Network External HD
1 unit	scanner
1 unit	USB printer
1 unit	Network printer
11 pieces	Flash disk / Memory stick
10 units	Electronic tester VOM
5 units	LAN Cable tester

* Minimum quantity recommended for a Class size of 25 trainees

QUANTITY	MATERIALS
400 pcs.	RJ 45
25 pcs.	Modular box (RJ45)
20 pcs.	Raceway or Slotted PVC 1.5” x 1.5” x 48”
1 box	UTP cable
1 can	Contact cleaner
1 piece	Whiteboard
1 lot	Fastener

1 spool	Filler (lead-free)
8 pcs	Fiber optic cable 2 meters (terminated)

QUANTITY	**INSTALLERS / SOFTWARE**
26	Desktop OS (license for proprietary software)
10	Network OS (license for proprietary software)
26	Office productivity software (license for proprietary software)
26	Anti-virus (license for proprietary software)
5	Disk utility software
5	Virtualization software (license for proprietary software)
5	Disk creator software
5	Disk image software

- NOTE: For free Open source systems users - Institutions should own at least one (1) valid license for the following: Desktop OS, Network OS, Office Productivity Software and Antivirus.

QUANTITY	**RESOURCES / MANUALS**
26 pieces	Motherboard's manual and installer
10 pieces	Device driver installer
1 lot	Assorted Computer book, PC Magazines and journals

3.5. TRAINING FACILITIES

The Computer Systems Service Workshop must be in an infrastructure facility that is generally accepted to industry standards and practice. Based on class size of minimum of 25 student/trainees the space requirements for the teaching/ learning and circulation areas are as follows:

TEACHING / LEARNING AREAS	**SIZE** (in METER)	**AREA** (in Sq. Meters)	**TOTAL AREA** (in Sq. Meters)
• **laboratory and/or lecture area**	6 x 8	48	48
• **storage area**	2 x 2	4	4
• **learning resource center**	4 x 5	20	20
• **equipment circulation area**		20	20
Total Workshop Area:			**92**

3.6. TRAINERS QUALIFICATION

COMPUTER SYSTEMS SERVICING – NC II

TRAINERS QUALIFICATION (TQ II)

- Holder of National TVET Trainer's Certificate (NTTC) Level 1
- *Must have at least 2 years relevant job/industry experience

*Optional. Only when required by the hiring institution.

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.

As a matter of policy, graduates of programs registered with TESDA under these training regulations are required to undergo mandatory national competency assessment upon completion of the program.

SECTION 4 NATIONAL ASSESSMENT AND CERTIFICATION ARRANGEMENTS

4.1 To attain the National Qualification of Computer Systems Servicing NC II, the candidate must demonstrate competence in all units listed in Section 1. Successful candidates shall be awarded a National Certificate signed by the TESDA Director General.

4.2 The qualification of **Computer Systems Servicing NC II** may be attained through:

4.2.1 Accumulation of Certificates of Competency (COCs) in all the following units of competencies:

4.2.1.1 Install and configure computer systems
4.2.1.2 Set-up computer networks
4.2.1.3 Set-up computer servers
4.2.1.4 Maintain and Repair Computer Systems and Networks

Successful candidates shall be awarded a **Certificate of Competency (COC)** in each of the core units.

Upon accumulation and submission of all COCs acquired for the relevant units of competency comprising a qualification, an individual shall be issued the corresponding National Certificate.

4.3 For individuals, who already possess National Certificate (NC) or Certificate of Competency (COC) along Computer Hardware Servicing NC II –

4.3.1. Portfolio assessment is applicable for COC #1, COC #2 and COC #4, provided the candidate is already employed and has related experience for the past three (3) years or more along the qualification. However, if the assessor finds the evidences presented inadequate, he may still require the candidate to undergo the practical demonstration or present other evidences in the form of Demonstration, Third Party Report, etc. depending on the need for supplementary evidences.

4.3.2. Candidates are required to take assessment for COC #3 – “Set-up computer servers”.

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

4.5 The following are qualified to apply for assessment and certification:

4.5.1. Graduate of formal, non-formal, and informal including enterprise-based training programs.

4.5.2. Experienced workers (wage employed or self employed)

4.6 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 Qualification and Certification System (PTQCS).

ANNEX A COMPETENCY MAP

BASIC COMPETENCIES

Receive and Respond to workplace communication	Work with Others	Demonstrate Work Values	Participate in Workplace Communication	Work in a Team Environment	Practice Career Professionalism
Practice occupational Health and Safety Procedures	Practice Housekeeping Procedures (5S)	Lead Workplace Communication	Lead Small Team	Develop and Practice Negotiation Skills	Solve Problems Related to Work Activities
Use Mathematical Concepts and Techniques	Use Relevant Technologies	Utilize Specialist Communication skills	Develop Team and Individual	Apply Problem Solving Techniques in the Workplace	Collect, Analyze and Organize Information
Plan and Organize Work	Promote Environmental Protection				

COMMON COMPETENCIES

Apply Quality Standards	Perform Computer Operations	Perform Mensuration and Calculation	Prepare and Interpret Technical Drawing	Use Hand Tools	Terminate and Connect Electrical Wiring and Electronic Circuits
Maintain and Repair Electronic Systems and Components	Test Electronic / Electromechanical Components and Devices				

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 and Control Devices	Start-up and Commissioning Instrumentation and Control Devices	Diagnose and Troubleshoot Instrumentation Control Systems
Install Mechatronic Devices	Calibrate and Configure Mechatronic Devices	Configure and Apply Mechatronic Software Programs	Diagnose and Troubleshoot Mechatronic (Industrial Automation) Systems	Maintain and Repair Mechatronic (Industrial Automation) Systems	Commission Mechatronic (Industrial Automation) Systems	Service and Repair Domestic Appliances
Service and Repair Audio Systems and Products	Service and Repair Consumer Video Systems and Products	Service and Repair Business Machines	Install Computer Systems and Networks	Configure Computer Systems and Networks	Diagnose and Troubleshoot Computer Systems and Networks	Maintain Computer Systems and Networks
Install and Configure Computer Systems	**Set-up Computer Networks**	**Set-up Computer Servers**	**Maintain and Repair Computer Systems and Networks**			

Qualification for CSS NC II

DEFINITION 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 Implications -** refers 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. **Computer System** - The complete computer made up of the CPU, memory and related electronics (main cabinet), all the peripheral devices connected to it and its operating system. Computer systems fall into two broad divisions: clients and servers. Client machines fall into three categories from low to high end: laptop, desktop and workstation. Servers range from small to large: low-end servers, midrange servers and mainframes.
2. **Computer Network**, or simply a **Network**, is a collection of computers and other hardware interconnected by communication channels that allow sharing of resources and information. Where at least one process in one device is able to send/receive data to/from at least one process residing in a remote device, then the two devices are said to be in a network. It is a group of devices connected to each other. Networks may be classified into a wide variety of characteristics, such as the medium

used to transport the data, communications protocol used, scale, topology, benefit, and organizational scope.

3. **Configuration** - The makeup of a system. To "configure" is to choose options in order to create a custom system. "Configurability" is a system's ability to be changed or customized.
4. **Connector** - Any plug and socket that links two devices together. Although taken for granted and rarely in the limelight, connectors are a huge industry, and the quality of these components is more critical than most people would imagine. When not designed or constructed properly, they often become the weakest element in an electronic system.
5. **Display Adapter** - A plug-in card in a desktop computer that converts the images created in the computer to the electronic signals required by the monitor. It determines the maximum resolution, refresh rate and number of colors that can be displayed, which the monitor must also be able to support. On many PC motherboards, the display adapter circuits are built into the chipset, and an AGP or PCI card is not required.
6. **Expansion Board** - A printed circuit board that plugs into an expansion slot and extends the computer's capability to control a peripheral device. All the boards (cards) that plug into a computer's bus are expansion boards, such as display adapters, disk controllers, network adapters and sound cards.
7. **Expansion Bus** - An input/output bus typically comprised of a series of slots on the motherboard. Expansion boards (cards) are plugged into the bus. ISA and PCI are the common expansion buses in a PC.
8. **Graphical User Interface** - A graphics-based user interface that incorporates movable windows, icons and a mouse. The ability to resize application windows and change style and size of fonts are the significant advantages of a GUI vs. a character-based interface. GUIs have become the standard way users interact with a computer, and the major GUIs are the Windows and Mac interfaces along with Motif for Unix and the GNOME and KDE interfaces for Linux.
9. **LAN** - a **local area network (LAN)** is a computer network that interconnects computers in a limited area such as a home, school, computer laboratory, or office building using network media. The defining characteristics of LANs, in contrast to wide area networks (WANs), include their usually higher data-transfer rates, smaller geographic area, and lack of a need for leased telecommunication lines.
10. **Motherboard** - Also called the "system board," it is the main printed circuit board in an electronic device, which contains sockets that accept additional boards. In a desktop computer, the motherboard contains the CPU, chipset, PCI bus slots, AGP slot, memory sockets and controller circuits for the keyboard, mouse, disks and printer. It may also have built-in controllers for modem, sound, display and network, obviating the need to plug in a card.
11. **Network**s – see Computer Network.
12. **Operating System** - The master control program that runs the computer. The first program loaded when the computer is turned on, its main part, the "kernel," resides in memory at all times. The operating system sets the standards for all application programs that run in the computer. The applications "talk to" the operating system for all user interfaces and file management operations.

13. **Peripheral -**Any hardware device connected to a computer, such as a monitor, keyboard, printer, disk, tape, graphics tablet, scanner, joy stick, paddle or mouse
14. **Server -** A computer system in a network that is shared by multiple users. Servers come in all sizes from x86-based PCs to IBM mainframes. A server may have a keyboard, monitor and mouse directly attached, or one keyboard, monitor and mouse may connect to any number of servers via a KVM switch. Servers may be also be accessed only through a network connection as well.
15. **Sound Card** - Also called a "sound board" or "audio adapter," it is a computer expansion board that records and plays back sound, providing inputs from a microphone or other sound source and outputs to speakers or an external amplifier. The de facto standard for sound card compatibility in PCs is Creative Labs' Sound Blaster.
16. **User Interface -** All graphics based today, the user interface includes the windows, menus and method of interaction between you and the computer. Prior to the Mac, Windows and Motif (UNIX) interfaces, all interaction was based on commands entered by the user. Operating systems may support optional interfaces and allow a new shell, or skin, to be used instead.
17. **Virus** - Software used to infect a computer. After the virus code is written, it is buried within an existing program. Once that program is executed, the virus code is activated and attaches copies of itself to other programs in the system. Infected programs copy the virus to other programs.
18. **WAN** - a **Wide Area Network** (WAN) is a network that covers a broad area (i.e., any telecommunications network that links across metropolitan, regional, or national boundaries) using private or public network transports. Business and government entities utilize WANs to relay data among employees, clients, buyers, and suppliers from various geographical locations. In essence, this mode of telecommunication allows a business to effectively carry out its daily function regardless of location
19. **WEEE Directives** - the prevention of waste electrical and electronic equipment (WEEE), and in addition, the reuse, recycling and other forms of recovery of such wastes so as to reduce the disposal of waste. It also seeks to improve the environmental performance of all operators involved in the life cycle of electrical and electronic equipment, e.g. producers, distributors and consumers and in particular those operators directly involved in the treatment of waste electrical and electronic equipment.

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FOR THE REVIEW / REVISION STAGE

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- **THE TESDA BOARD - STANDARDS SETTING AND SYSTEMS DEVELOPMENT COMMITTEE**

- **THE MANAGEMENT AND STAFF OF TESDA SECRETARIAT**

    - Qualifications and Standards Office (QSO)
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