Republic of Rwanda
Ministry of Education

RTB | RWANDA TVET BOARD

BASICS OF NETWORKING

GENBN401

Perform Basics of Networking

Competence

RQF Level: 4

Learning Hours

40

Credits: 4

Sector: ENERGY

Trade: Renewable Energy

Module Type: General

Curriculum: GENBN401- TVET Certificate IV in Renewable Energy

Issue Date: August 2023

<table>
<tr><td>Purpose statement</td><td colspan="6">This module Describes the skills, Knowledge, and attitude required to Perform basic Networking. This module will prepare students to pursue TVET in Level 4 Renewable Energy. At the end of this module, the students will be able to Establish network media connectivity, Perform Basic Network Configuration, Maintain Network system</td></tr>
<tr><td rowspan="6">Delivery modality</td><td colspan="2">Training delivery</td><td>100%</td><td colspan="2">Assessment</td><td>Total 100%</td></tr>
<tr><td colspan="2">Theoretical content</td><td>30%</td><td rowspan="4">Formative assessment</td><td>20%</td><td rowspan="4">50%</td></tr>
<tr><td colspan="2">Practical work:</td><td rowspan="3">70%</td><td rowspan="3">80%</td></tr>
<tr><td>Group project and presentation</td><td>30%</td></tr>
<tr><td>Individual project /Work</td><td>40%</td></tr>
<tr><td colspan="3"></td><td colspan="2">Summative Assessment</td><td>50%</td></tr>
</table>

Elements of Competency and Performance Criteria

Elements of competency	Performance criteria
1. Establish network media connectivity	1.1. Tools, materials, and equipment are correctly identified based on network requirements.
	1.2. Network cables are perfectly terminated based on cabling types
	1.3. Network media are properly connected based on Network topology
2. Perform Basic Network Configuration	2.1. IP addresses are correctly classified based on their types and versions
	2.2. IP addresses subnet masks are appropriately calculated based on the network topology
	2.3.IP addresses are appropriately assigned according to the network topology.
	2.4. Network devices are correctly configured based on the manufacturers' guide
	2.5. Interconnectivity is correctly tested according to the configured network Functionalities
3. Maintain Network system	3.1 Preventive maintenance is properly checked as per manufacturer's guidelines
	3.2. Corrective Maintenance measures are applied based on problems

	identified.
	3.3. Maintenance report is properly elaborated based on the work done

Course content

Learning outcomes	**At the end of the module the learner will be able to:** 1. Establish network media connectivity 2. Perform Basic Network Configuration 3. Maintain Network system
Learning outcome 1: Establish network media connectivity	**Learning hours: 10**

Indicative content

- **Identifying Network requirements.**

✓ Description of network concepts and technologies

- Definition of network
- Network classifications
- Network benefits
- Advantages and Disadvantages of network
- Application of network
- Network technologies
- Network topology types
- Network components

✓ Materials

- Network Cables (twisted, coaxial, management, and Fiber optic)

- Trunk (Flexible, plastic, timber, and stainless steel)
- Connectors
- Cable Ties
- Cable clips
- Cable Sockets
- Wall plugs

✓ Tools

- Cutting Tools
- Stripping tools
- Drilling Tools
- Fixing Tool
- Patching Tools
- Crimping tools
- Testing tool

✓ Equipment

- Computer
- Inverter
- UPS
- Inverter
- Switch

- Glue gun
- Rack
- Brackets
- Patch panel
- Repeater
- Regenerator

- **Terminating Network cables**

✓ Network cables installation types.

- Open-Wire
- Aerial
- Underground
- Underwater
- Bluit-in
- Semi-bluit in

✓ Network cables Trunking materials

- Plastic
- Wood
- Stainless

✓ Cable termination

- Twisted pair cabling
- Fibber-optic cabling
- Coaxial cabling

- **Connecting Network Media**
  - ✓ Labelling
  - ✓ Patching and Tagging
  - ✓ Provide as build design

Resources required for the learning outcome	
Equipment	Computer, Inverter, Switch, Battery, Firewalls, Rack, UPS
Materials	Internet bundles, Network cables, Electricity
Tools	Networking toolkit, simulation tools.
Facilitation techniques	Demonstration and simulation Individual and group work Practical exercise Individualized Group discussion
Formative assessment methods /(CAT)	Written assessment Performance assessment Oral presentation

Learning outcome 2: Perform Basic Network Configuration	Learning hours: 20

Indicative content

- **Classifying IP Addresses**
  - ✓ Types of IP Addresses
  - ✓ IP address versions
  - ✓ Identification of IP address classes
- **Calculating IP addresses subnet masks**
  - ✓ Introduction to subnet masks
    - Definition of subnet mask
    - Benefits of sub-netting
  - ✓ Binary system
  - ✓ Types of Sub-netting
  - ✓ Logical bitwise and Operation
- **Assigning IP Address**
  - ✓ Static
  - ✓ Dynamic
  - ✓ Automatic
- **Configuring Basics of Network Devices.**
  - ✓ Device Configuration Modes

- ✓ Host name
- ✓ Banner message
- ✓ Reload Device
- ✓ Configure port
- ✓ Configure Device passwords
- ✓ Save configuration

- **Testing network Interconnection**
  - ✓ Physical Testing
  - ✓ Unit Testing
  - ✓ Integration Testing

Resources required for the learning outcome	
Equipment	Computer, inverter, Battery, UPS
Materials	Network cables, Connectors, Flexible PIPE Cables, Cables Ties, Cables clips.
Tools	Networking Toolkit, Drilling Tools, Fixing Tool, Pliers
Facilitation techniques	Demonstration and simulation Individual and group work Practical exercise Individualized Trainer guided Group discussion
Formative assessment methods /(CAT)	Written assessment Oral presentation Performance assessment Product based assessment

Learning outcome 3: Maintain Network system	Learning hours: 10

Indicative content

- **Preforming preventive maintenance.**
  - ✓ Hardware preventive maintenance
    - Schedule regular cleaning
    - Setting of preventive measures
    - Check physical Equipment condition.
    - Check environment condition.
  - ✓ Software preventive maintenance
    - Regular change of network device credentials
    - Network monitoring software Licencing /Application
    - Updating and Upgrading network monitoring software and device firmware
- **Perform corrective maintenance.**
  - ✓ Hardware corrective maintenance
    - Identification of common problem and their causes
    - Repair/Replace damaged equipment.
  - ✓ Software corrective maintenance
    - Troubleshoot network configuration.
    - Check network status
    - Update network configuration
- **Troubleshooting network**
  - ✓ Introduction to troubleshoot
  - ✓ Troubleshoot process
    - Collecting Network System information
    - Analysing current Network Status

- Identification of common problem
- Implementation of solution

- **Elaborating maintenance report**
  - ✓ Ways of reporting
    - Oral
    - Written
    - Video documentation
  - ✓ Report elements
    - Used Tools, materials, and Equipment.
    - Status after maintenance
    - Update as built design.
    - Recommendation

Resources required for the indicative content	
Equipment	Computer, Router. battery, Visual Equipment
Materials	Cables and accessories, Electricity, Internet bundles, Power Extension
Tools	Network Toolkits
Facilitation techniques	Demonstration and simulation Individual and group work Practical exercise Individualized Trainer guided Group discussion
Formative assessment methods /(CAT)	Written assessment Oral presentation Performance assessment Product based assessment

References

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John Wiley & Sons, I. (2017). *Microsoft Technology associate exam 98-366.* Microsoft Corporation.

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M., C. (1984). *Local area networks. British Library.* Library and Information Research Report 19.

Mitchell, B. (2010). *Introduction to Client Server Networks.* from About.com: http://compnetworking.about.com/od/basicnetworkingfaqs/a/client-server.htm.

Glossary

LAN : (Local Area Network) Is a collection of devices connected together in one physical location, such as a building, office, or home.

IOS : (Internetwork operating System) is an operating system developed by Cisco Systems for its line of routers and access servers to provide a standard way to configure these devices.

UPS : Uninterupted Power Supply

site survey : It is a methodology that identifies the data transmission capacity that the network infrastructure supports and what is hindering or obstructing the wireless connection smooth operation.

Device : Is an object that has been made for a particular purpose

Simulation : Is imitative representation of the functioning of one system or process by means of the functioning of another a computer simulation of an industrial process

Connectors : Is a device that terminates a segment of cabling or provides a point of entry for networking devices such as computers, hubs, and routers.

Media

Topology : Is the schematic description of the arrangement of the physical and logical elements of a communication network

IP Address : is a unique address that identifies a device on the internet or a local network**.**

Network Visual Equipment : interconnects devices so that data can be shared between them.

Testing metrics : Is defined as a quantitative measure that helps to estimate the progress and quality of a software testing process.