UNIT OF COMPETENCY : INTRODUCE INFORMATION TECHNOLOGY

MODULE TITLE : INTRODUCING INFORMATION TECHNOLOGY

MODULE DESCRIPTION : This module covers the knowledge, skills and attitude required in basic exposure to personal computers, hardware, and operating systems. Students learn the functionality of various hardware and software components and best practices in maintenance and safety issues.

NOMINAL DURATION : 30 hours

QUALIFICATION LEVEL : None

SUMMARY OF LEARNING OUTCOMES:

After completing this module, the student should be able to:

LO 1. explain Information Technology industry.
LO 2. determine the different hardware components.
LO 3. determine the different software.
LO 1. EXPLAIN INFORMATION TECHNOLOGY INDUSTRY

ASSESSMENT CRITERIA:
1. The importance of information technology in various industries is identified.
2. The names, purpose, characteristics of different IT technician are defined.

CONTENT:
- Identifying the scope and limitations of Information Technology
- Identifying the importance of Information Technology to the economy and industries
- Identifying the function of a technician in an IT industry

CONDITIONS:
The following resources are needed in this learning outcome:
- Instruction manual
- Interactive video

METHODOLOGIES
- Lecture
- Multimedia Presentations

ASSESSMENT METHODS
- Written test (objective type)
- Oral questioning
LO 2. DETERMINE THE DIFFERENT HARDWARE COMPONENTS

ASSESSMENT CRITERIA:
1. The different hardware components are identified.

CONTENT:
- Identifying the different hardware components
- Describing the function of each hardware component

CONDITIONS:
The following resources are needed in this learning outcome:
- Instruction manual
- Interactive video

METHODOLOGIES
- Lecture
- Multimedia Presentations

ASSESSMENT METHODS
- Written test (objective type)
- Oral questioning
LO 3. DETERMINE THE DIFFERENT SOFTWARE

ASSESSMENT CRITERIA:
1. The different applications and computer software are identified.

CONTENT:
- Identifying the different computer softwares
- Determine the function of each computer application

CONDITIONS:
The following resources are needed in this learning outcome:
- Instruction manual
- Interactive video

METHODOLOGIES
- Lecture
- Multimedia Presentations

ASSESSMENT METHODS
- Written test
- Oral questioning
**UNIT OF COMPETENCY** : INTRODUCE BASIC NETWORKING  
**MODULE TITLE** : INTRODUCING BASIC NETWORKING  
**MODULE DESCRIPTION** : This module covers the knowledge, skills and attitude required in the basics of Networking and Internet connectivity.  
**NOMINAL DURATION** : 25 hours  
**QUALIFICATION LEVEL** : None  

**SUMMARY OF LEARNING OUTCOMES:**

At the end of this module the student should be able to:

- **LO 1.** explain the concepts of networking and the benefits of networking.  
- **LO 2.** identify the components needed to connect to the Internet.  
- **LO 3.** examine the different network topologies and its application.
LO 1. EXPLAIN THE CONCEPTS OF NETWORKING AND THE BENEFITS OF NETWORKING

ASSESSMENT CRITERIA:
1. Communication devices in a network environment are identified.
2. Communication between Host and client devices is explained.
3. Local and network applications are identified.

CONTENTS:
- Describing how and where computers are used
- Classifying local and network applications
- Identifying classes of computers

CONDITIONS:
The following resources are needed in this learning outcome:
- Instruction manual
- Interactive video

METHODOLOGIES:
- Simulation
- Group discussion
- Discovery approach
- Lecture with demonstration
- Illustrative laboratory discussion

ASSESSMENT METHODS:
- Question-and-answer method
- Performance test
- Self Assessment
LO 2. IDENTIFY THE COMPONENTS NEEDED TO CONNECT TO INTERNET

ASSESSMENT CRITERIA:
1. Devices needed for an internet connection are identified.
2. Physical and logical connections are identified.
3. Purpose of an ISP is described.

CONTENTS:
- Identifying the physical connection
- Defining logical connections
- Using network applications
- Comparing and contrasting speed with bandwidth
- Identifying network devices

CONDITIONS:
The following resources are needed in this learning outcome:
- Instruction manual
- Interactive video

METHODOLOGIES:
- Simulation
- Group discussion
- Discovery approach
- Lecture with demonstration
- Illustrative laboratory discussion

ASSESSMENT METHODS:
- Pen and paper method
- Question-and-answer method
- Performance test
- Self Assessment
LO 3. EXAMINE THE DIFFERENT NETWORK TOPOLOGIES AND ITS APPLICATION

ASSESSMENT CRITERIA:
1. Physical layout of a local area network is planned.
2. Networking topologies are described.

CONTENTS:
- Illustrating physical topologies of a network
- Identifying logical topologies of a network

CONDITIONS:
The following resources are needed in this learning outcome:
- Instruction manual
- Interactive video

METHODOLOGIES:
- Simulation
- Group discussion
- Discovery approach
- Lecture with demonstration
- Illustrative laboratory discussion

ASSESSMENT METHODS:
- Pen and paper method
- Question-and-answer method
- Performance test
- Self Assessment
UNIT OF COMPETENCY : CONVERT NUMBER SYSTEMS

MODULE TITLE : CONVERTING NUMBER SYSTEMS

MODULE DESCRIPTION : This module covers the knowledge, skills and attitude required in different number systems and the processes used to convert a number from one number system to another which is the basis of network communication.

NOMINAL DURATION : 25 hours

QUALIFICATION LEVEL : None

SUMMARY OF LEARNING OUTCOMES:

At the end of this module the student should be able to:

LO 1. convert binary number to decimal number.
LO 2. convert hexadecimal number to binary number.
LO 1. CONVERT BINARY NUMBER TO DECIMAL NUMBER

ASSESSMENT CRITERIA:
1. Decimal and binary numbers are identified.
2. Decimal number to binary number is converted.

CONTENTS:
- Converting Decimal to Binary Representation of Data
- Representing Information Digitally

CONDITIONS:
The following resources are needed in this learning outcome:
- Instruction manual
- Interactive video

METHODOLOGIES:
- Simulation
- Group discussion
- Discovery approach
- Lecture with demonstration
- Illustrative laboratory discussion

ASSESSMENT METHODS:
- Summative Test
- Question-and-answer method
- Performance test
- Self Assessment
LO 2. CONVERT HEXADECIMAL NUMBER TO BINARY NUMBER

ASSESSMENT CRITERIA:
1. Steps in converting binary number to hexadecimal number are performed.

CONTENTS:
- Converting Hexadecimal number to Binary representation of Data

CONDITIONS:
The following resources are needed in this learning outcome:
- Instruction manual
- Interactive video

METHODOLOGIES:
- Simulation
- Group discussion
- Discovery approach
- Lecture with demonstration
- Illustrative laboratory discussion

ASSESSMENT METHODS:
- Summative Test
- Question-and-answer method
- Performance test
- Self Assessment
INTRODUCTION

IT Essentials (Cisco Certified Networking Associate): This course provides an excellent introduction to the IT industry and in-depth exposure to personal computers, hardware and operating systems. Students learn the functionality of various hardware and software components and best practices in maintenance and safety issues.

IT Essentials provides the following features:

- Offers an excellent introduction to the IT industry
- Provides interactive exposure to personal computers, hardware and operating systems
- Learn by “doing” – hands-on activities and lab-based learning to become familiar with various hardware and software components and discover best practices in maintenance and safety
- Helps develop greater skills and confidence in working with desktop and laptop computers
- Prepares students for entry-level IT positions within various environments
- New topics covered:
  - Laptops and portable devices
  - Wireless connectivity
  - Security
  - Safety and environmental issues
  - Communication skills
- Integrates virtual learning tools to supplement classroom learning and provide an interactive “hands-on” experience
- Intended for students pursuing careers in IT and want practical knowledge of how a computer works
- Aligns with
  - Computing Technology Industry Association (CompTIA) A+ certification
  - Modules 1-3 of EUCIP IT Administrator certification (Europe)
- Approved as “Computing Technology Industry Association (CompTIA) Authorized Quality Curriculum”
IT Essentials: PC Hardware and Software is intended for second year technical-vocational high school students who want to pursue careers in IT and gain working knowledge on how computers work, how to assemble computers, and how to troubleshoot hardware and software issues. It is designed to prepare the students for IT certification on hardware and software.

COURSE DESCRIPTION:

This course covers the knowledge, skills and attitude required in learning the fundamentals of computer hardware and software as well as advanced concepts. Students who complete this course will be able to describe the internal components of a computer, assemble a computer system, install an operating system, and troubleshoot using system tools and diagnostic software. Students will also be able to connect to the Internet and share resources in a network environment. New topics included in this version include laptops and portable devices, wireless connectivity, security, safety and environmental issues, and communication skills.

Hands-on laboratory activities are essential elements of the course. In support of this, virtual learning tools are integrated into the course. The Virtual Laptop and Virtual Desktop are stand-alone tools designed to supplement classroom learning and to provide interactive “hands-on” experience in learning environments with limited physical equipment.
RESOURCES

Following is a list of the resources that shall be required for PC Hardware and Software Version 4.0:

<table>
<thead>
<tr>
<th>LAB PC HARDWARE REQUIREMENTS</th>
<th>LAB PC REPAIR TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• PC Tower Case with 300W power supply</td>
<td>• Phillips screwdriver</td>
<td>• CISCO Interactive Courseware</td>
</tr>
<tr>
<td>• PCI, PCIe, or AGP-compatible motherboard</td>
<td>• Flathead screwdriver</td>
<td>• Software (Operating System &amp; Application)</td>
</tr>
<tr>
<td>• Intel Pentium/Celeron family, AMD K6/Athlon/Duron family, or compatible processor, 300 MHz or faster recommended</td>
<td>• Hex Socket Drivers (various sizes)</td>
<td>• Network OS Software</td>
</tr>
<tr>
<td>• Cooling fan and heat sink</td>
<td>• Safety glasses</td>
<td>• Device drivers/Installers</td>
</tr>
<tr>
<td>• Two 128 MB memory modules (minimum) or two 256 MB memory modules (recommended)</td>
<td>• Needle-nose pliers</td>
<td>• RJ 45 connectors</td>
</tr>
<tr>
<td>• Some labs will require one module of RAM to be uninstalled or the simulation of a faulty module for troubleshooting purposes.</td>
<td>• Thermal compound</td>
<td>• RJ 45 data jacks</td>
</tr>
<tr>
<td>• 128 MB is the minimum requirement to run the full functions of Windows XP Pro</td>
<td>• Electrostatic discharge (ESD) wrist strap and cord</td>
<td>• I/O Ports &amp; connectors</td>
</tr>
<tr>
<td>• Floppy drive</td>
<td>• Electrostatic discharge (ESD) mat with a ground cord</td>
<td>• Category 5/5e wall Plate</td>
</tr>
<tr>
<td>• 15 GB hard drive (minimum); 20 GB or more (recommended)</td>
<td>• Flashlight</td>
<td>• UTP Cat 5/Cat5e cable</td>
</tr>
<tr>
<td>• The system must support a full install of Windows XP and two 5 GB partitions.</td>
<td>• Electronics cleaning solution</td>
<td>• An Ethernet straight through and crossover Cable</td>
</tr>
<tr>
<td>• CD-ROM (minimum) or 24x CD/DVD-ROM (recommended)</td>
<td>• Multi-meter (optional)</td>
<td>• Fiber Optics</td>
</tr>
<tr>
<td>• Ethernet card</td>
<td>• RJ45 connectors</td>
<td>• Compressed air service canister (optional due to globally varying classroom health and safety laws)</td>
</tr>
<tr>
<td>• PCI, PCIe (recommended), or AGP video card</td>
<td>• RJ45 connectors</td>
<td>• LAN Cable Tester</td>
</tr>
<tr>
<td>• Ribbon cables to connect HDD/CD/Floppy</td>
<td>• Cat5e UTP Cable</td>
<td>• CatSe UTP Cable</td>
</tr>
</tbody>
</table>
LAB PC SOFTWARE REQUIREMENTS

PC Hardware and Software v4.0 CONTENTS focuses on Microsoft Windows XP and Windows 2000 operating systems since Vista is not a required subject for either Computing Technology Industry Association (CompTIA) A+ or the EUCIP IT Administrator certification.

- Only Microsoft Windows XP Professional (Media CD) is needed to complete the curriculum labs

ADDITIONAL ITEMS AND RESOURCES

Recommended:

- One Internet connection for each student to conduct Internet searches and download drivers
- One integrated printer/scanner/copier per two Lab PCs
- One Linksys wireless router/switch or equivalent per two Lab PCs, Linksys model WRT 310n preferred
- One Wireless PCI network adapter (compatible with the above wireless router/switch) for each Lab PC; may be USB or PCI adapter
- 3-in-1 device (printer, scanner, fax)

Minimum:

- One Internet connection for Internet searches and driver downloads (this could be the instructor’s workstation)
- One integrated printer/scanner/copier for the class to share
- One Linksys wireless router/switch or equivalent for the class to share, Linksys model WRT 310N preferred
- Two Wireless PCI network adapters (compatible with the above wireless router/switch) for the class to share; may be USB or PCI adapter

COURSE DELIVERY:

- Online/offline self paced learning
- Demonstration
- Lecture
- Group discussion
- Hands on activity
- Laboratory
- Simulation
- Role Playing/Kinesthetic
<table>
<thead>
<tr>
<th>Unit of Competency</th>
<th>UNIT MODULE</th>
<th>Learning Outcome</th>
<th>No. of Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRST GRADING</strong></td>
<td></td>
<td></td>
<td>108 Hrs.</td>
</tr>
</tbody>
</table>
| Introduce IT Certification and Computer System | Introducing IT Certification and the Computer System | LO 1.1. Explain value of IT Certification  
LO 1.2. Determine the different components of a computer  
LO 1.3. Prepare computer Specifications | 8 hrs.  
26 hrs.  
6 hrs. |
| Apply Safety Laboratory Procedures and Use of Tools | Applying Safety Laboratory Procedures and Using of Tools | LO 2.1. Explain the purpose of safe working conditions and procedures  
LO 2.2. Identify tools and software used with personal computer components and their purpose  
LO 2.3. Use proper tools | 4 hrs.  
8 hrs.  
4 hrs. |
| Assemble computer | Assembling Computer | LO 3.1. Disassemble computer parts  
LO 3.2. Assemble computer parts  
LO 3.3. Configure CMOS Utility | 16 hrs.  
22 hrs.  
14 hrs. |
| **SECOND GRADING** |             |                  | 96 Hrs.     |
| Troubleshoot and basic preventive maintenance | Troubleshooting and basic preventive maintenance | LO 4.1. Explain the purpose of preventive maintenance to the client  
LO 4.2. Perform troubleshooting Process | 6 hrs.  
14 hrs. |
<p>| Maintain Laptop and portable devices | Maintaining Laptops and portable devices | LO 5.1. Describe the components of a laptop and other portable devices | 6 hrs. |</p>
<table>
<thead>
<tr>
<th>Unit of Competency</th>
<th>UNIT MODULE</th>
<th>Learning Outcome</th>
<th>No. of Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>SECOND GRADING</td>
<td></td>
<td>LO 5.2. Configure desktop and laptop components</td>
<td>6 hrs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LO 5.3. Perform preventive maintenance techniques for laptops and portable devices</td>
<td>10 hrs.</td>
</tr>
<tr>
<td>Install Printers</td>
<td>Installing</td>
<td>LO 5.4. Troubleshoot laptop and portable devices</td>
<td>10 hrs.</td>
</tr>
<tr>
<td>and Scanners</td>
<td>and Scanners</td>
<td></td>
<td></td>
</tr>
<tr>
<td>THIRD GRADING</td>
<td></td>
<td>LO 6.1. Install and configure Printers and Scanners</td>
<td>10 hrs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LO 6.2. Apply common preventive maintenance techniques for Printers and Scanners</td>
<td>10 hrs.</td>
</tr>
<tr>
<td>Install an</td>
<td>Installing</td>
<td>LO 6.3. Troubleshoot Printers and Scanners</td>
<td>24 hrs.</td>
</tr>
<tr>
<td>Operating System</td>
<td>Operating</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>System</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Network</td>
<td>LO 7.2. Install an Operating System</td>
<td>24 hrs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LO 7.3. Navigate a GUI</td>
<td>6 hrs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LO 7.4. Apply common preventive maintenance technique for Operating System</td>
<td>20 hrs.</td>
</tr>
<tr>
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<tr>
<td></td>
<td>LO 8.1. Explain and describe network</td>
<td>18 hrs.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LO 8.2. Identify network standards and models</td>
<td>12 hrs.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LO 8.3. Describe network technologies</td>
<td>6 hrs.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LO 8.4. Troubleshoot network</td>
<td>10 hrs.</td>
<td></td>
</tr>
<tr>
<td>Unit of Competency</td>
<td>UNIT MODULE</td>
<td>Learning Outcome</td>
<td>No. of Hours</td>
</tr>
<tr>
<td>--------------------</td>
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</tr>
<tr>
<td>FOURTH GRADING</td>
<td></td>
<td></td>
<td>102 Hrs.</td>
</tr>
</tbody>
</table>
| Implement Security Procedures | Implementing Security Procedures | LO 9.1. Describe security threats  
                                    LO 9.2. Determine security threats  
                                    LO 9.3. Perform security procedures  
                                    LO 9.4. Apply preventive maintenance techniques for security | 12 hrs.  
                                    6 hrs.  
                                    20 hrs.  
                                    16 hrs.  |
| Apply communication skills | Applying Communication Skills | LO 10.1 Describe good communication skills and professional behavior  
                                    LO 10.2. Apply good communication skills and professional behavior | 20 hrs.  
                                    20 hrs.  |
UNIT OF COMPETENCY : INTRODUCE IT CERTIFICATION AND THE COMPUTER SYSTEM

MODULE TITLE : INTRODUCING IT CERTIFICATION AND THE COMPUTER SYSTEM

MODULE DESCRIPTION : This module covers the knowledge, skills and needed for the IT Industry Certification.

NOMINALS/SUGGESTED DURATION : 40 hrs.

QUALIFICATION LEVEL : CompTIA A+ Essentials

SUMMARY OF LEARNING OUTCOMES:

After completing this module, the students should be able to:

   LO 1. explain the value of IT certification.
   LO 2. identify the different components of a computer.
   LO 3. prepare computer specifications.
LO 1. EXPLAIN THE VALUE OF IT CERTIFICATION

ASSESSMENT CRITERIA
1. IT certifications (local and international) are explored.
2. The effectiveness of being IT Certified in the IT Industry is identified.

CONTENTS:
- Identifying Educations and Certifications
- Understanding the Computing Technology Industry Association (CompTIA) A+ and EUCIP Certification

CONDITIONS:
The following resources are needed for this learning outcome:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
</table>
| Computer                 | • LCD projector  
|                          | • Projection screen  
|                          | • White board      | • Whiteboard marker/eraser  
|                          |                   | • Modules/ Handouts  
|                          |                   | • Reference books  
|                          |                   | • Video tutorial  
|                          |                   | • Worksheet: Job Opportunities |

METHODOLOGIES:
- Lecture-demonstration with PowerPoint presentation
- Self-paced learning
- Lecture/Group discussion

ASSESSMENT METHOD:
- Practical application
- Interview
LO 2. DETERMINE THE DIFFERENT COMPONENTS OF A COMPUTER

ASSESSMENT CRITERIA

1. Devices are checked according to tasks specifications and requirements.
2. Appropriate hardware components are checked according to the task requirements.
3. Correct type of ports and cables are used in connecting devices.

CONTENTS:

- Describing the Computer System
- Identifying the names, purposes and characteristics of the following:
  a. Cases
  b. Power supplies
  c. Motherboards
  d. Processor/CPUs
  e. Cooling systems
  f. ROM and RAM
  g. Adapter cards
  h. Storage devices
  i. Internal cables
  j. Ports and cables
  k. Input devices
  l. Output devices
- Explaining systems resources and their purposes, IRQ, I/O Address, and DMA

CONDITIONS

The following resources are needed for this learning outcome:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Computer with peripherals such as:</td>
<td>• LCD projector</td>
<td>• Whiteboard marker/eraser</td>
</tr>
<tr>
<td>* Input devices</td>
<td>• Projection screen</td>
<td>• Modules/Handouts</td>
</tr>
<tr>
<td>* Output devices</td>
<td>• White board</td>
<td>• Reference books</td>
</tr>
<tr>
<td>* Storage devices</td>
<td></td>
<td>• Video tutorial</td>
</tr>
</tbody>
</table>

METHODOLOGIES

- Lecture-demonstration with PowerPoint presentation
- Self-paced learning
- Lecture/Group discussion

ASSESSMENT METHOD

- Practical application
- Interview
- Hands-on (Classification of parts)

LO 3. PREPARE COMPUTER SPECIFICATIONS

ASSESSMENT CRITERIA

- Name, purpose and functions of computer parts are identified
- System resources and their purpose, IRQ, I/O Address, and DMA are explained

CONTENTS

- Identifying and describing computer components
- Describing the purpose of system resources

CONDITIONS

The following resources are needed for this learning outcome:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
</table>
| Computer with peripherals such as: | • LCD projector  
* Input devices  
* Output devices  
* Storage devices  
  | • Projection screen  
  | • White board  
  | • Whiteboard marker/eraser  
  | • Modules/ Handouts  
  | • Reference books  
  | • Video tutorial  
  | • Worksheet  
|
METHODOLOGIES

- Lecture-demonstration with PowerPoint presentation
- Self-paced learning
- Lecture/Group discussion

ASSESSMENT METHOD

- Practical application
- Interview
- Hands-on (Classification of parts)
### UNIT OF COMPETENCY
APPLY SAFETY LABORATORY AND USING OF TOOLS

### MODULE TITLE
APPLYING SAFETY LABORATORY AND USING OF TOOL

### MODULE DESCRIPTION
This module covers the knowledge, skills and attitude required in basic safety practices for the workplace, hardware and software tools, and the disposal of hazardous materials.

### NOMINALS/SUGGESTED DURATION
52 hrs.

### QUALIFICATION LEVEL
CompTIA A+ Essentials

### SUMMARY OF LEARNING OUTCOMES:

After completing this module, the students should be able to:

1. **LO 1.** explain the purpose of safe working conditions and procedures.
2. **LO 2.** identify tools and software used with personal computer components and their purposes.
3. **LO 3.** use proper tools.
LO 1. EXPLAIN THE PURPOSE OF SAFE WORKING CONDITIONS AND PROCEDURES

ASSESSMENT CRITERIA:

1. Proper procedures for handling computer equipment are followed to reduce the risk of personal injury, damage to property, and loss of data.
2. Proper disposal or recycling of hazardous computer components is observed and recognized as a global concern.
3. Safety procedures and potential hazards for user and technicians are identified and observed.

CONTENTS:

- Determining safety procedures and potential hazards for users and technicians
- Applying safety procedures to protect equipment from damage and data from loss
- Identifying safety procedures to protect the environment from contamination

CONDITIONS

The following resources are needed for this learning outcome:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gloves</td>
<td>Diagnostic Software</td>
</tr>
<tr>
<td></td>
<td>Hand tools</td>
<td>CISCO Interactive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Courseware</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Instructional Manual</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worksheet</td>
</tr>
</tbody>
</table>

METHODOLOGIES

- Discussions
- Multimedia Presentations

ASSESSMENT METHODS

- Written test (objective type)
- Oral questioning
LO 2. IDENTIFY TOOLS AND SOFTWARE WITH PERSONAL COMPUTER COMPONENTS AND THEIR PURPOSE

ASSESSMENT CRITERIA

1. Correct use of each tool is required and current tasks is emphasized and checked.
2. Diagnosing problems, maintaining hardware and protecting stored data through the use of a range of software is applied.
3. All safety guidelines to prevent injuries are strictly followed.

CONTENTS

- Determining hardware tools and their purpose
- Determining software tools and their purpose
- Identifying organizational tools and their purpose

CONDITIONS

The following resources are needed for this learning outcome:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desktop Computer</td>
<td>Screwdrivers</td>
<td>CISCO Interactive Courseware</td>
</tr>
<tr>
<td></td>
<td>Pliers</td>
<td>Instructional Manual</td>
</tr>
<tr>
<td></td>
<td>Long nose</td>
<td>Window software and Drivers</td>
</tr>
<tr>
<td></td>
<td>Other hand tools</td>
<td></td>
</tr>
</tbody>
</table>

METHODOLOGIES

- Discussions
- Multimedia Presentations
- Practical Demonstration

ASSESSMENT METHODS

- Written test (objective type)
- Oral questioning
LO 3. USE PROPER TOOLS

ASSESSMENT CRITERIA

1. Appropriate hand tools are identified according to the task requirements.
2. Selection of tools is checked according to the task requirements.

CONTENTS

- Identify tools and software used with personal computer components and know their purpose
- Demonstrating proper use of an antistatic wrist strap and antistatic mat
- Identifying types of hand tools
- Implement proper tool use
- Demonstrating proper use of cleaning materials

CONDITIONS

The following resources are needed for this learning outcome:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desktop Computer</td>
<td>Anti-static wrist strap</td>
<td>CISCO Interactive Courseware</td>
</tr>
<tr>
<td></td>
<td>Anti-static mat</td>
<td>Instructional Manual</td>
</tr>
<tr>
<td></td>
<td>Screwdrivers</td>
<td>Window software and drivers</td>
</tr>
<tr>
<td></td>
<td>Pliers</td>
<td></td>
</tr>
</tbody>
</table>

METHODOLOGIES

- Group Discussion
- Multimedia Presentations
- Practical Demonstration

ASSESSMENT METHODS

- Written test (objective type)
- Oral questioning
- Demonstration
UNIT OF COMPETENCY  :  ASSEMBLE COMPUTER

MODULE TITLE       :  ASSEMBLING COMPUTER

MODULE DESCRIPTION :  This module covers the knowledge, skills and attitude to assemble a computer and to boot the system for the first time

NOMINALS/SUGGESTED DURATION  :  52 hrs.

QUALIFICATION LEVEL  :  CompTIA A+ Essentials

SUMMARY OF LEARNING OUTCOMES:

After completing this module, the students should be able to:

LO 1. disassemble computer parts.
LO 2. assemble computer parts.
LO 3. boot computer for the first time.
LO 1. DISASSEMBLE COMPUTER PARTS

ASSESSMENT CRITERIA

1. Screws and lock knots are removed safely.
2. Data and power cables are removed without breaking any pin.

CONTENTS

• Removing and handling of the side panel properly
• Identifying screws and lock used to hold the motherboard in place
• Removing of data and power cable

CONDITIONS

The following resources are needed for this learning outcome:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desktop Computer</td>
<td>Hand tools</td>
<td>Instructional Manual</td>
</tr>
<tr>
<td></td>
<td>Screw drivers</td>
<td>Interactive Video</td>
</tr>
<tr>
<td></td>
<td>Twister</td>
<td>Worksheet: Computer Disassembly</td>
</tr>
<tr>
<td></td>
<td>Antistatic strap</td>
<td></td>
</tr>
</tbody>
</table>

METHODOLOGIES

• Discussions
• Multimedia Presentations
• Demonstration

ASSESSMENT METHODS

• Written test (objective type)
• Practical Examination
LO 2. ASSEMBLE COMPUTER PARTS

ASSESSMENT CRITERIA

1. Assembly of the devices/ systems is carried out in consonance with the unit of specification.
2. Standard procedures in installing devices/systems are followed.

CONTENTS

- Attaching the components to the motherboard and install the motherboard
- Installing internal drives
- Connecting all internal cables
- Re-attaching the side panels and connect external cables to the computer

CONDITIONS

The following resources are needed for this learning outcome:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
</table>
| Desktop Computer        | Hand tools  
|                         | Screw drivers  
|                         | Twister  
|                         | Antistatic strap | Virtual Desktop Software (for Simulation-if available)  
|                         |                   | Instructional Manual  
|                         |                   | Interactive Video  
|                         |                   | Worksheet |

METHODOLOGIES

- Discussions
- Multimedia Presentations
- Demonstration

ASSESSMENT METHODS

- Written test (objective type)
- Practical Examination
LO 3. CONFIGURE CMOS UTILITY

ASSESSMENT CRITERIA

1. Beep codes and errors computers produce are familiarized.
2. Modifications are done during the configuration of the BIOS setup.
3. Configuration plan is organized and prepared based on the job requirements.

CONTENTS

- Booting the computer for the first time
- Identifying beep codes
- Describing BIOS setup
- Evaluating BIOS Problem
- Implementing solution

CONDITIONS

The following resources are needed for this learning outcome:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desktop Computer</td>
<td></td>
<td>Interactive Video Instructional Manual Reference Textbooks</td>
</tr>
</tbody>
</table>

METHODOLOGIES

- Discussions
- Multimedia Presentations
- Practical Demonstration

ASSESSMENT METHODS

- Written test (objective type)
- Oral questioning
- Practical Examination
<table>
<thead>
<tr>
<th>UNIT OF COMPETENCY</th>
<th>TROUBLESHOOT AND BASIC PREVENTIVE MAINTENANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODULE TITLE</td>
<td>TROUBLESHOOTING AND BASIC PREVENTIVE MAINTENANCE</td>
</tr>
<tr>
<td>MODULE DESCRIPTION</td>
<td>This module covers the knowledge, skills and attitude in maintenance and the troubleshooting process. A systematic inspection and replacement of worn parts and system. This module also prevents failure of parts, material and systems.</td>
</tr>
<tr>
<td>NOMINALS/SUGGESTED DURATION</td>
<td>20 hrs.</td>
</tr>
<tr>
<td>QUALIFICATION LEVEL</td>
<td>CompTIA A+ Essentials</td>
</tr>
</tbody>
</table>

**SUMMARY OF LEARNING OUTCOMES:**

After completing this module, the students should be able to:

- LO 1. explain the purpose of preventive maintenance to the client.
- LO 2. perform troubleshooting process.
LO 1. EXPLAIN THE PURPOSE OF PREVENTIVE MAINTENANCE TO THE CLIENT

ASSESSMENT CRITERIA

1. The purpose of preventive maintenance to the client is well explained.

CONTENTS

- Explaining the purpose data protection
- Determining the benefits of regular maintenance

CONDITIONS

The following resources are needed in this learning outcome:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desktop computers</td>
<td></td>
<td>Instructional Manual Interactive Videos Worksheet Software utilities</td>
</tr>
</tbody>
</table>

METHODOLOGIES

- Discussions
- Multimedia Presentations

ASSESSMENT METHODS

- Oral questioning
- Written Exam
- Multimedia Presentations
LO 2. PERFORM TROUBLESHOOTING PROCESS

ASSESSMENT CRITERIA

1. Inspection of hardware is systematized and properly observed.
2. Computer hardware problems and errors are identified.

CONTENTS

- Identifying the steps of the troubleshooting process
- Explaining the purpose of data protection
- Gathering data from the customer
- Gathering data from the computer

CONDITIONS

The following resources are needed in this learning outcome:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desktop computers</td>
<td></td>
<td>Instructional Manual</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Interactive Videos</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worksheet</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Software utilities</td>
</tr>
</tbody>
</table>

METHODOLOGIES

- Discussions
- Multimedia Presentations

ASSESSMENT METHODS

- Oral questioning
- Written Exam
UNIT OF COMPETENCY : MAINTAIN LAPTOPS AND PORTABLE DEVICES

MODULE TITLE : MAINTAINING LAPTOPS AND PORTABLE DEVICES

MODULE DESCRIPTION : This module covers the knowledge, skills and attitude to discuss the features of laptops, portable devices (PDAs) and Smartphones. This module details some troubleshooting procedures for such devices

NOMINALS/SUGGESTED DURATION : 32 hrs.

QUALIFICATION LEVEL : CompTIA A+ Essentials

SUMMARY OF LEARNING OUTCOMES:

After completing this module, the students should be able to:

LO 1. describe the components of a laptop and other portable devices.

LO 2. configure desktop and laptop components.

LO 3. perform preventive maintenance techniques for laptops and portable devices.

LO 4. troubleshoot laptop and portable devices.
LO 1. DESCRIBE THE COMPONENTS OF A LAPTOP AND PORTABLE DEVICES

ASSESSMENT CRITERIA

1. Components found on the outside and inside of the laptop are properly described.
2. Tasks to be undertaken are properly identified.

CONTENTS:

- Identifying common uses of laptops, PDAs and Smartphones
- Identifying and describing components of a laptop and its docking station
- Determining the use of laptops
- Describing common uses of PDAs and Smartphones
- Compare and contrast desktop and laptop components

CONDITIONS

The following resources are needed for this learning outcome:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laptop Computer</td>
<td></td>
<td>Interactive Video</td>
</tr>
<tr>
<td>PDA’s</td>
<td></td>
<td>Instruction Manual</td>
</tr>
<tr>
<td>Desktop Computer</td>
<td></td>
<td>Virtual Laptop Software</td>
</tr>
</tbody>
</table>

METHODOLOGIES

- Discussions
- Multimedia Presentations
- Interactive demonstration

ASSESSMENT METHODS

- Written test (objective type)
- Oral questioning
- Practical examination
LO 2. CONFIGURE DESKTOP AND LAPTOP COMPONENTS

ASSESSMENT CRITERIA

1. Instructional Manual is followed for normal system operation.
2. Safe installation and removal of laptop components is assured and guaranteed.

CONTENTS

- Explaining how to configure laptop
- Configuring power settings
- Describing the safe installation and removal of laptop components
- Following safe installation and removal of laptop components

CONDITIONS

The following resources are needed for this learning outcome:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laptop Computer</td>
<td></td>
<td>Interactive Video</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Instruction Manual</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Virtual Laptop Software</td>
</tr>
</tbody>
</table>

METHODOLOGIES

- Discussions
- Multimedia Presentations
- Demonstration

ASSESSMENT METHODS

- Written test (objective type)
- Oral questioning
- Practical Examination
LO 3. PERFORM PREVENTIVE MAINTENANCE TECHNIQUES FOR LAPTOPS AND PORTABLE DEVICES.

ASSESSMENT CRITERIA

1. Correct sequence of cleaning is followed as per SOP.
2. All work is in accordance with the workplace and standard procedures.
3. Safety procedures in handling the laptop are properly observed at all times.

CONTENTS:

- Identifying appropriate cleaning procedures
- Identifying optimal operating environments
- Cleaning Laptop Keyboard Procedures
- Ventilation Cleaning Procedures
- LCD Cleaning Procedures
- Touch Pad Cleaning Procedures

CONDITIONS

The following resources are needed for this learning outcome:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laptop Computer</td>
<td>Tweezers</td>
<td>Instructional Manual</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lint-free cloth</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mild Non corrosive cleaning solution</td>
</tr>
</tbody>
</table>

METHODOLOGIES

- Discussions
- Demonstration

ASSESSMENT METHODS

- Practical
- Oral questioning
LO 4. TROUBLESHOOT LAPTOP AND PORTABLE DEVICE

ASSESSMENT CRITERIA

1. Correct sequence of troubleshooting is followed as per SOP.
2. Safety procedures in handling the laptop are properly observed at all times.

CONTENTS

- Reviewing troubleshooting process
- Identifying common problems and solutions

CONDITIONS

The following resources are needed for this learning outcome:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laptop Computer</td>
<td></td>
<td>Instructional Manual</td>
</tr>
<tr>
<td>Portable Devices</td>
<td></td>
<td>Interactive Videos</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worksheet</td>
</tr>
</tbody>
</table>

METHODOLOGIES

- Discussions
- Demonstration
- Multimedia Presentations

ASSESSMENT METHODS

- Practical Demonstration
- Oral questioning
- Written Exam
<table>
<thead>
<tr>
<th>UNIT OF COMPETENCY</th>
<th>INSTALL PRINTERS AND SCANNERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODULE TITLE</td>
<td>INSTALLING OF PRINTERS AND SCANNERS</td>
</tr>
<tr>
<td>MODULE DESCRIPTION</td>
<td>This module covers the knowledge, skills and attitude needed in for the IT Essentials specialization. It covers the competencies such as: types of printers and scanners are currently available; the process of installation and configuration for printers and scanners; apply common preventive maintenance techniques to printers and scanners; and troubleshoot printers and scanners</td>
</tr>
<tr>
<td>NOMINALS/SUGGESTED DURATION</td>
<td>44 hrs.</td>
</tr>
<tr>
<td>QUALIFICATION LEVEL</td>
<td>CompTIA A+ Essentials</td>
</tr>
</tbody>
</table>

**SUMMARY OF LEARNING OUTCOMES:**

After completing this module, the students should be able to:

- **LO 1.** install and configure printer and scanner.
- **LO 2.** apply common preventive maintenance techniques for printer and scanner.
- **LO 3.** troubleshoot printers and scanners.
LO 1. INSTALL AND CONFIGURE PRINTER AND SCANNER

ASSESSMENT CRITERIA

1. Printer is added or installed and correct configurations are ensured.
2. Default printer is assigned accordingly.
3. Printer is tested whether it is working.

CONTENTS

- Determining the types of Printers and Scanners currently available
- Describing the characteristics and capabilities of printers and scanners:

<table>
<thead>
<tr>
<th>PRINTERS</th>
<th>SCANNERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laser printers</td>
<td>All-in-one devices</td>
</tr>
<tr>
<td>Impact printers</td>
<td>Flatbed scanners</td>
</tr>
<tr>
<td>Inkjet printers</td>
<td>Handheld scanners</td>
</tr>
<tr>
<td>Solid Ink printers</td>
<td>Drum scanners</td>
</tr>
<tr>
<td>Other printer types</td>
<td></td>
</tr>
</tbody>
</table>

- Demonstrating Printers-to-Computer interface
- Installing and configuring the printers and scanners

CONDITIONS

The following resources are needed in this learning outcome:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>One (1) set Personal Computer with licensed Windows OS and MS Office</td>
<td>LCD projector</td>
<td>Organization work procedures</td>
</tr>
<tr>
<td>Printers</td>
<td>Projection screen</td>
<td>Forms/worksheet</td>
</tr>
<tr>
<td>Scanners</td>
<td>White board</td>
<td>Video tutorial (if available)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Whiteboard marker/eraser</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Modules/Handouts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reference books</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Papers</td>
</tr>
</tbody>
</table>
METHODOLOGIES

- Lecture-demonstration (Hands-on) with PowerPoint presentation
- Self-paced learning
- Lecture/Group discussion
- Tutorial

ASSESSMENT METHOD

- Observation
- Performance Test (Hands-on)
- Practical application
- Interview

LO 2. APPLY COMMON PREVENTIVE MAINTENANCE TECHNIQUES FOR PRINTER AND SCANNER.

ASSESSMENT CRITERIA

1. Printer and scanner handled properly to avoid damage.
2. Routine maintenance of printers and scanners are undertaken according to standard operational procedures, principles and techniques that can be found in the manual or on the manufacturer’s website.
3. Guidelines from the manufacturer for cleaning the printers and scanners are observed.

CONTENTS:

- Identifying and applying common preventive maintenance techniques for printers and scanners
- Describing printer and scanner maintenance
CONDITIONS

The following resources are needed in this learning outcome:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
</table>
| • One (1) set Personal Computer with licensed Windows OS and MS Office  
  • Printers  
  • Scanners | • LCD projector  
  • Projection screen  
  • White board | • Organization work procedures  
  • Forms/worksheet  
  • Video tutorial (if available)  
  • Whiteboard marker/eraser  
  • Modules/Handouts  
  • Reference books  
  • Papers |

METHODOLOGIES

• Lecture-demonstration (Hands-on) with PowerPoint presentation  
• Self-paced learning  
• Lecture/Group discussion  
• Tutorial

ASSESSMENT METHOD

• Observation  
• Performance Test (Hands-on)  
• Practical application  
• Interview  
• Written Test
LO 3. TROUBLESHOOT PRINTERS AND SCANNERS

ASSESSMENT CRITERIA

1. Problem and cause of error of the printers and scanners are properly identified.
2. Printers and scanners problems are repaired.
3. Problem and cause of error of the printers and scanners and the corresponding solution are identified and well documented.

CONTENTS

- Troubleshooting printers and scanners
- Reviewing the troubleshooting process
- Identifying common problems and solutions

CONDITIONS

The following resources are needed in this learning outcome:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>- One (1) set Personal Computer with licensed Windows OS and MS Office</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Printers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Scanners</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• LCD projector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Projection screen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• White board</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Organization work procedures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Forms/worksheet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Video tutorial (if available)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Whiteboard marker/eraser</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Modules/Handouts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Reference books</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

METHODOLOGIES

- Lecture-demonstration (Hands-on) with PowerPoint presentation
- Self-paced learning
- Lecture/Group discussion
- Tutorial

ASSESSMENT METHOD:

- Observation
- Performance Test (Hands-on)
- Practical application
- Interview
UNIT OF COMPETENCY : INSTALL OPERATING SYSTEM

MODULE TITLE : INSTALLING OPERATING SYSTEM

MODULE DESCRIPTION : This module covers the knowledge, skills and attitudes needed in a workplace. The module includes the purpose of operating system, comparison of different operating system according to their purpose, limitations and compatibilities. Determine the appropriate operating system based on customer’s need. Install an operating system. Navigate within an operating system GUI. It also covers common preventive maintenance technique of operating system.

NOMINAL DURATION : 56 hrs.

QUALIFICATION LEVEL : CompTIA A+ Essentials

SUMMARY OF LEARNING OUTCOMES:

Upon completion of this module, the student should be able to:

LO 1. plan and prepare operating system installation.

LO 2. install an operating system.

LO 3. navigate a GUI.

LO 4. apply common preventive maintenance techniques for operating system.
LO 1. PLAN AND PREPARE OPERATING SYSTEM INSTALLATION

ASSESSMENT CRITERIA

1. Installation of operating system is well planned and prepared.

CONTENTS

- Describing characteristics of modern operating system
- Explaining operating system concept
- Describing desktop and network operating system
- Identifying application and environment that are compatible with an operating system
- Determining minimum hardware requirements and compatibility with the operating system platform

CONDITIONS

The following resources are needed in this learning outcome:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>One (1) set Personal Computer</td>
<td>LCD projector</td>
<td>Organization work procedures</td>
</tr>
<tr>
<td></td>
<td>Projection screen</td>
<td>Forms/worksheet</td>
</tr>
<tr>
<td></td>
<td>White board</td>
<td>Video tutorial (if available)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Whiteboard marker/eraser</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Modules/Handouts, PC magazines and journals</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reference books</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Windows OS</td>
</tr>
</tbody>
</table>
METHODOLOGIES

• Interaction
• Multimedia presentation
• Lecture/viewing multimedia presentation (presentation software, instructional video materials)
• Lecture with demonstration
• Illustrative laboratory discussion
• Group discussion

ASSESSMENT METHODS

• Written examination
• Oral questioning
• Observation
• Practical demonstration
LO 2. INSTALL AN OPERATING SYSTEM

ASSESSMENT CRITERIA

1. An application is installed, navigated and uninstalled.
2. Program applet is added and removed and hard drive set up is identified.
3. Default setting to install an operating system is used.
4. Boot sequence files and registry files are identified and followed.
5. An operating system is manipulated.
6. Directory structures are described.

CONTENTS

- Identifying hard drive set up procedures
- Preparing hard drive
- Installing the operating system using default setting
- Creating an account
- Completing the installation of operating system
- Describing custom installation options
- Identifying the boot sequence files and registry files
- Describing the proper way to manipulate an operating system
- Describing directory structure

CONDITIONS

The following resources are needed:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
</table>
| One (1) set Personal Computer |       | • Organization work procedures  
|                          |       | • Forms/worksheet  
|                          |       | • Video tutorial (if available)  
|                          |       | • VMware (for Simulation)  
|                          |       | • Windows OS  
|                          |       | • Reference books |

COMPUTER NETWORKING TECHNOLOGY
The Strengthened Technical-Vocational Education Program
METHODOLOGIES

- Lecture/viewing multimedia presentation (presentation software, instructional video materials)
- Lecture with demonstration
- Illustrative laboratory discussion
- Group discussion
- Interaction

ASSESSMENT METHODS

- Hands-on
- Written examination
- Oral questioning
- Observation
- Practical demonstration observation

LO 3. NAVIGATE A GUI (GEOGRAPHICAL USER INTERFACE)

ASSESSMENT CRITERIA

1. GUI is navigated.

CONTENTS

- Manipulating items on the desktop such as desktop properties, desktop items, start menu, my computer launching applications, and my network
- Exploring control panel applications and display settings
- Exploring administrative tools like device and task manager, event viewer, remote desktop and performance setting
- Installing, navigating and uninstalling an application
- Adding an application
- Describing the process of upgrading an operating system
CONDITIONS
The following resources are needed:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>One (1) set Personal Computer with license Windows OS</td>
<td></td>
<td>Worksheet</td>
</tr>
</tbody>
</table>

METHODOLOGIES

- Interaction
- Lecture/viewing multimedia presentation (presentation software, instructional video materials)
- Lecture with demonstration
- Illustrative laboratory discussion

ASSESSMENT METHODS

- Interaction
- Lecture/viewing multimedia presentation (presentation software, instructional video materials)
- Lecture with demonstration
- Illustrative laboratory discussion

LO 4. APPLY COMMON PREVENTIVE MAINTENANCE TECHNIQUES FOR OPERATING SYSTEM

ASSESSMENT CRITERIA

1. Common preventive maintenance techniques for operating system is identified and applied.

CONTENTS

- Identifying and applying common preventive maintenance technique for operating system
- Creating a preventive maintenance plan
- Scheduling a task

COMPUTER NETWORKING TECHNOLOGY
The Strengthened Technical Vocational Education Program
• Identifying different types of back up are:
  ➢ Normal back up
  ➢ Copy back up
  ➢ Incremental back up
  ➢ Differential back up
  ➢ Daily back up
  ➢ Media back up

CONDITIONS

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
</table>
| One (1) set Personal Computer with license Windows OS |                        | Interactive Video
                                                      | Worksheet
                                                      | Instructional Manual

METHODOLOGIES

• Interaction
• Multimedia presentation
• Lecture/viewing multimedia presentation (presentation software, instructional video materials)
• Lecture with demonstration
• Illustrative laboratory discussion
• Group discussion

ASSESSMENT METHODS

• Written examination
• Oral questioning
• Observation
• Demonstration
UNIT OF COMPETENCY : CONFIGURE NETWORK

MODULE TITLE : CONFIGURING NETWORK

MODULE DESCRIPTION : This module covers the knowledge, skills and attitude in network principles, standards, and purpose. The different types of network topologies, protocols and logical models as well as the hardware needed to create a network.

NOMINALS/SUGGESTED DURATION : 46 hrs.

QUALIFICATION LEVEL : CompTIA A+ Essentials

SUMMARY OF LEARNING OUTCOMES:

After completing this module, the students should be able to:

LO 1. explain and describe network.
LO 2. identify network standard and model.
LO 3. describe network technologies.
LO 4. troubleshooting a network.
LO 1. EXPLAIN AND DESCRIBE NETWORK

ASSESSMENT CRITERIA

1. Principles of networking are identified.
2. Different types of network are characterized and compared.
3. Appropriate topology and architecture in a given scenario is determined.

CONTENTS

- Explaining the principles of networking
- Describing types of network
- Describing basic networking concepts and technologies
- Determining the physical components of a network
- Describing the LAN topologies and architecture

CONDITIONS

The following resources are needed for this learning outcome:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desktop computers</td>
<td></td>
<td>Instructional Manual Interactive Videos Worksheet</td>
</tr>
</tbody>
</table>

METHODOLOGIES

- Discussions
- Multimedia Presentations

ASSESSMENT METHODS

- Oral questioning
- Written Exam
LO 2. IDENTIFY NETWORK STANDARD AND MODELS

ASSESSMENT CRITERIA

1. Appropriate materials for the task are used in accordance with the standard procedures.
2. Relationship between OSI and TCP/IP models is determined.
3. Cabled Ethernet standards and wireless Ethernet standards are differentiated and compared.

CONTENTS:

- Identifying standard organizations
- Identifying Ethernet standards
- Explaining OSI and TCP/IP data models
- Explaining bandwidth and data transmission
- Explaining IP address
- Defining DHCP

CONDITIONS

The following resources are needed for this learning outcome:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desktop computers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NIC and modem</td>
<td></td>
<td>Instructional Manual</td>
</tr>
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<td></td>
<td>Interactive Videos</td>
</tr>
</tbody>
</table>

METHODOLOGIES

- Discussions
- Multimedia Presentations

ASSESSMENT METHODS

- Observation
- Oral questioning
- Written Exam
LO 3. DESCRIBE NETWORK TECHNOLOGIES

ASSESSMENT CRITERIA

1. Performance of system configuration is validated along with its specifications.
2. Relationship between NIC and modem in transmitting signal is identified.

CONTENTS

- Configuring a NIC and a modem
- Identifying names, purpose and characteristics of other technologies
- Establishing connectivity
- Updating NIC driver
- Attaching computer to existing network
- Defining telephone technologies

CONDITIONS

The following resources are needed for this learning outcome:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
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<th>MATERIALS</th>
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</thead>
<tbody>
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<td>Instructional Manual</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Interactive Videos</td>
</tr>
</tbody>
</table>

METHODOLOGIES

- Discussions
- Multimedia Presentations

ASSESSMENT METHODS

- Observation
- Oral questioning
- Written Exam
LO 4. TROUBLESHOOT THE NETWORK

ASSESSMENT CRITERIA

1. Inspection and test following the specified instruction is carried out.
2. Safe operation of the computer network and system is assured and guaranteed.

CONTENTS

- Identifying common network problems and solutions
- Applying preventive maintenance techniques for network
- Troubleshooting the network

CONDITIONS

The following resources are needed for this learning outcome:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desktop computers</td>
<td>Crimping tool</td>
<td>Instructional Manual</td>
</tr>
<tr>
<td>NIC and modem</td>
<td>Wire stripper</td>
<td>Interactive Videos</td>
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<tr>
<td></td>
<td>LAN tester</td>
<td>UTP cable</td>
</tr>
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<td></td>
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<td>RJ45 Connectors</td>
</tr>
</tbody>
</table>

METHODOLOGIES

- Discussions
- Multimedia Presentations
- Demonstration

ASSESSMENT METHODS

- Oral questioning
- Written Exam
- Practical Examination
UNIT OF COMPETENCY : IMPLEMENT SECURITY PROCEDURE

MODULE TITLE : IMPLEMENTING SECURITY PROCEDURE

MODULE DESCRIPTION : This module covers the knowledge, skills and attitude on how important system security is to the network and computer itself. The module also discusses security threats and preventive measures techniques. The module likewise presents troubleshooting technique.

NOMINALS/SUGGESTED DURATION : 54 hrs.

QUALIFICATION LEVEL : CompTIA A+ Essentials

SUMMARY OF LEARNING OUTCOMES:

After completing this module, the students should be able to:

1. describe security threats.
2. determine security threats.
3. perform security procedures.
4. apply preventive maintenance techniques for security.
LO 1. DESCRIBE SECURITY THREATS

ASSESSMENT CRITERIA

1. Security threats are properly described.
2. Effects of spam and popup windows are identified.
3. Difference between Web security and TCP/IP attacks are well explained and recognized.

CONTENTSS:
- Defining viruses, worms and trojans
- Describing spam and popup windows
- Explaining web security
- Explaining TCP/IP attacks

CONDITIONS

The following resources are needed in this learning outcome:

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<td>Instructional Manual</td>
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<td>Interactive Videos</td>
</tr>
</tbody>
</table>

METHODOLOGIES

- Discussions
- Multimedia Presentations

ASSESSMENT METHODS

- Oral questioning
- Written Exam
LO 2. DETERMINE SECURITY THREATS

ASSESSMENT CRITERIA
1. Desired network settings to eliminate traffic are identified.
2. Updating security software automatically is configured.
3. Social engineer attacks and operations are identified and documented.

CONTENTS
- Explaining adware, spyware, and grayware
- Explaining denial of service
- Explaining social engineering
- Identifying security procedures

CONDITIONS
The following resources are needed in this learning outcome:

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<td>Anti-Virus</td>
</tr>
</tbody>
</table>

METHODOLOGIES
- Discussions
- Multimedia Presentations

ASSESSMENT METHODS
- Observation & Oral questioning
- Written Exam
LO 3. PERFORM SECURITY PROCEDURES

ASSESSMENT CRITERIA

1. Security procedures of data and equipment are properly implemented.
2. Antivirus and antispyware is installed.

CONTENTS

- Explaining what is required in a basic local security policy
- Explaining the task required to protect physical equipment
- Describing ways to protect data

CONDITIONS

The following resources are needed in this learning outcome:

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<td>Antivirus</td>
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<td>Antispyware</td>
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<td></td>
<td>Firewall</td>
</tr>
</tbody>
</table>

METHODOLOGIES

- Discussions
- Multimedia Presentations
- Demonstration

ASSESSMENT METHODS

- Oral questioning
- Written Exam
- Practical
LO 4. APPLY PREVENTIVE MAINTENANCE TECHNIQUES FOR SECURITY

ASSESSMENT CRITERIA

1. Common Preventive maintenance techniques for security is applied.
2. Signature files for antivirus and antispyware and new patches to fix flaws and vulnerabilities are regularly updated.
3. Regular backing up data to protect against data loss is executed.

CONTENTS

- Identifying preventive maintenance techniques for security
- Installing operating system service packs and security patches
- Troubleshooting security
- Reviewing problems and solution

CONDITIONS

The following resources are needed in this learning outcome:

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<td></td>
<td>Firewall</td>
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METHODOLOGIES

- Discussions
- Multimedia Presentations
- Demonstration

ASSESSMENT METHODS

- Oral questioning
- Written Exam
- Practical
UNIT OF COMPETENCY : APPLY COMMUNICATION SKILLS

MODULE TITLE : APPLYING COMMUNICATION SKILLS

MODULE DESCRIPTION : This module covers the knowledge, skills and attitude in the proper way of communicating to customers as well as how to act professional in times when certain situation arises. The module explains ethics and legal aspects of working with computer technology.

NOMINALS/SUGGESTED DURATION : 48 hrs.

QUALIFICATION LEVEL : CompTIA A+ Essentials

SUMMARY OF LEARNING OUTCOMES:

After completing this module, the students should be able to:

LO 1. describe good communication skills and professional behavior.

LO 2. apply good communication skills and professional behavior.
LO 1. DESCRIBE GOOD COMMUNICATION SKILLS AND PROFESSIONAL BEHAVIOR

ASSESSMENT CRITERIA

1. Good communication skills and professional behavior is identified, observed and applied.
2. Proper etiquette and customer care is identified, observed and applied.

CONTENTS

• Explaining the importance of good communication in IT industry
• Explaining the relationship between communication and troubleshooting
• Describing good communication skills and professional behavior
• Determining the Customer’s Computer Problem
• Displaying professional behavior with the customer
• Focusing the customer on the problem during the call
• Using Proper Netiquette

CONDITIONS

The following resources are needed in this learning outcome:

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</tr>
</tbody>
</table>

METHODOLOGIES

• Discussions
• Multimedia Presentations
• Demonstration

ASSESSMENT METHODS

• Observation
• Oral questioning
• Written Exam
• Practical Demonstration
LO 2. APPLY GOOD COMMUNICATION SKILLS AND PROFESSIONAL BEHAVIOR

ASSESSMENT CRITERIA

1. Professional behavior in the work place is monitored and followed
2. Proper communication with the customer is implemented based on the SOP given on the instruction manual

CONTENT

- Following Standard of Procedures written on the instructional manual
- Identifying proper approach to different customer and their needs
- Implementing Workstation Ergonomics and Time-and-Stress-Management Techniques
- Observing Service Level Agreements (SLA)
- Following Business Policies
- Explaining Ethics and Legal Aspects of Working with Computer Technology
- Describing the Call Center Environment and Technician Responsibilities

CONDITION

The following resources are needed in this learning outcome:

<table>
<thead>
<tr>
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</tr>
</tbody>
</table>
<pre><code>                         |       | Interactive Videos  |
                         |       | Worksheet           |
</code></pre>

METHODOLOGIES

- Discussions
- Multimedia Presentations
- Demonstration

ASSESSMENT METHODS

- Observation
- Oral questioning
- Written Exam
- Practical Examination
<table>
<thead>
<tr>
<th>Unit of Competency</th>
<th>Module Title</th>
<th>Learning Outcome</th>
<th>No. of Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRST GRADING</strong></td>
<td></td>
<td></td>
<td>104 hours</td>
</tr>
<tr>
<td>Assemble personal computer hardware</td>
<td>Assembling personal computer hardware components</td>
<td>LO1: Evaluate the different types of computers and the types of applications used.</td>
<td>5 hours</td>
</tr>
<tr>
<td>components and peripherals</td>
<td>components and peripherals</td>
<td>LO 2. Determine standard computer components and peripheral devices to meet requirements.</td>
<td>9 hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LO 3. Install, verify and upgrade computer components and peripherals.</td>
<td>4 hours</td>
</tr>
<tr>
<td>Install an operating system</td>
<td>Installing an operating system</td>
<td>DO 1. Describe the function of an operating system and the operating system used.</td>
<td>6 hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LO 2. Prepare an operating system for participation in a network.</td>
<td>16 hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LO 3. Explain the purpose of operating system patches.</td>
<td>6 hours</td>
</tr>
<tr>
<td>Connecting to the network</td>
<td>Connecting to the network</td>
<td>LO 1. Explain the basic concepts of networking.</td>
<td>7 hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LO 2. Describe how communication occurs across an Ethernet network.</td>
<td>29 hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LO 3. Describe the planning and implementation of a local network.</td>
<td>14 hours</td>
</tr>
<tr>
<td>SECOND GRADING</td>
<td>96 hours</td>
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</tr>
<tr>
<td>Connecting to the internet through an ISP</td>
<td>Connecting to the internet through an ISP</td>
<td><strong>LO 1.</strong> Explain how information is sent to and through an ISP. <strong>LO 2.</strong> Compare the components and environment of an ISP with those of a home network. <strong>LO 3.</strong> Terminate and implement appropriately twisted pair cables in an Ethernet LAN.</td>
<td></td>
</tr>
<tr>
<td>14 hours</td>
<td>6 hours</td>
<td>38 hours</td>
<td></td>
</tr>
<tr>
<td>Implement network addresses</td>
<td>Implementing network addresses</td>
<td><strong>LO 1.</strong> Apply the hierarchical addressing of devices to support communication between networks. <strong>LO 2.</strong> Configure, and verify the methods of obtaining an IP address. <strong>LO 3.</strong> Examine NAT settings on a home or small business network.</td>
<td></td>
</tr>
<tr>
<td>18 hours</td>
<td>18 hours</td>
<td>2 hours</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>THIRD GRADING</th>
<th>92 HOURS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use network services to share resources between server and client</td>
<td>Using network services to share resources between server and client</td>
</tr>
<tr>
<td>2 hours</td>
<td>34 hours</td>
</tr>
<tr>
<td>Plan, design and install wireless network technology</td>
<td>Planning, designing and installing wireless network technology</td>
</tr>
<tr>
<td>6 hours</td>
<td>24 hours</td>
</tr>
<tr>
<td>Activity</td>
<td>Duration</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Secure the network environment</td>
<td>14 hours</td>
</tr>
<tr>
<td>Securing the network environment</td>
<td>24 hours</td>
</tr>
<tr>
<td>LO 3. Implement attack mitigation strategies.</td>
<td>10 hours</td>
</tr>
<tr>
<td>Troubleshoot network related issues</td>
<td>6 hours</td>
</tr>
<tr>
<td>Troubleshooting network related issues</td>
<td>20 hours</td>
</tr>
<tr>
<td>LO 3. investigate common practices when interacting with a helpdesk.</td>
<td>22 hours</td>
</tr>
</tbody>
</table>
**UNIT OF COMPETENCY** : ASSEMBLE PERSONAL COMPUTER HARDWARE COMPONENTS AND PERIPHERALS

**MODULE TITLE** : ASSEMBLING PERSONAL COMPUTER HARDWARE COMPONENTS AND PERIPHERALS

**MODULE DESCRIPTION** : This module covers the knowledge, skills and attitude required in assembling personal computer hardware components and peripherals.

**NOMINAL DURATION** : 18 hours

**QUALIFICATION LEVEL** : CCENT (CISCO CERTIFIED ENTRY NETWORKING TECHNICIAN)

**SUMMARY OF LEARNING OUTCOMES:**

At the end of this module the students should be able to:

- **LO 1.** evaluate the different types of computers and the types of applications used.
- **LO 2.** determine standard computer components and peripheral devices to meet requirements.
- **LO 3.** install, verify and upgrade computer components and peripherals.
LO 1. EVALUATE THE DIFFERENT TYPES OF COMPUTERS AND THE TYPES OF APPLICATIONS USED

ASSESSMENT CRITERIA:
1. Common uses of computers in different environments are identified.
2. Local applications and network applications are compared.
3. Industry standard type of computing device to use for a given scenario is determined.

CONTENTS:
• Explaining how and where computers are used
• Identifying Local and Network Applications
• Identifying and describing types of computers
• Categorizing servers, desktops and workstations
• Classifying and differentiating portable devices

CONDITIONS:
The following resources are needed in this learning outcome:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TESTING DEVICES/ TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Server</td>
<td>• CISCO Interactive Courseware (CCNA Discovery1)</td>
<td></td>
</tr>
<tr>
<td>• Computer peripherals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Desktop computer</td>
<td></td>
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</tr>
</tbody>
</table>

METHODOLOGIES:
• Simulation
• Group discussion
• Discovery approach
• Lecture with demonstration
• Illustrative laboratory discussion

ASSESSMENT METHODS:
• Online Test
• Question-and-answer method
• Performance test
• Self Assessment
LO 2. DETERMINE STANDARD COMPUTER COMPONENTS AND PERIPHERAL DEVICES TO MEET REQUIREMENTS

ASSESSMENT CRITERIA:
1. Common storage capacities are described and determined.
2. Speed, resolution, and frequency as it relates to PCs are differentiated and current PC resolution is determined.
3. Standard internal computer components to use in a given scenario are observed.
4. Purpose of common PC adapters is described.
5. Purpose of storage devices is described and storage requirements are met.
6. Current PC storage capacities are determined.
7. Appropriate computer peripheral to use given a scenario is determined.
8. Appropriate power protection to be used in a given scenario is observed.
9. Computer ports and peripherals being attached to the ports are identified.

CONTENTS:
- Representing information digitally
- Measuring data storage capacity
- Measuring Speed, Resolution and Frequency
- Understanding the application and purpose of the following:
  a. Computer System
  b. Motherboard, CPU and RAM
  c. Adapter cards
  d. Storage devices
  e. Peripheral devices
  f. Cases and power supplies

CONDITIONS:
The following resources are needed in this learning outcome:

<table>
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</thead>
<tbody>
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<td>Server</td>
<td></td>
<td>CISCO Interactive Courseware (CCNA Discovery1)</td>
</tr>
<tr>
<td>Computer peripherals</td>
<td></td>
<td>Actual sample of computer components and peripherals for demonstration (e.g. motherboard, CPU, RAM etc.)</td>
</tr>
<tr>
<td>Desktop computer</td>
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</tbody>
</table>
METHODOLOGIES:
- Simulation
- Group discussion
- Discovery approach
- Lecture with demonstration
- Illustrative laboratory discussion

ASSESSMENT METHODS:
- Pen and paper method
- Online Test
- Question-and-answer method
- Performance test
- Self Assessment

LO 3. INSTALL, VERIFY AND UPGRADE COMPUTER COMPONENTS AND PERIPHERALS

ASSESSMENT CRITERIA:
1. Computer support and safety best practices are described.
2. Computer components are installed/upgraded and operation is verified.
3. Safety precautions are observed at all times.

CONTENTS:
- Recognizing Safety and Best Practices
- Installing and Upgrading Components and Verifying Operation
- Installing and Upgrading Peripherals and Verifying Operation

CONDITIONS:
The following resources are needed in this learning outcome:

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METHODOLOGIES:
- Simulation
- Group discussion
- Discovery approach
- Lecture with demonstration
- Illustrative laboratory discussion

ASSESSMENT METHODS:
- Pen and paper method
- Online Test
- Question-and-answer method
- Performance test
- Self Assessment
UNIT OF COMPETENCY : INSTALL AN OPERATING SYSTEM

MODULE TITLE : INSTALLING AN OPERATING SYSTEM

MODULE DESCRIPTION : This module covers the knowledge, skills, and attitude required to install an operating system.

NOMINAL DURATION : 28 hours

QUALIFICATION LEVEL : CCENT (CISCO CERTIFIED ENTRY NETWORKING TECHNICIAN)

SUMMARY OF LEARNING OUTCOMES:

At the end of this module, the student should be able to:

   LO 1. describe the function of an operating system and the operating system used.
   LO 2. prepare an operating system for participation in a network.
   LO 3. explain the purpose of operating system patches.
LO 1. DESCRIBE THE FUNCTION OF AN OPERATING SYSTEM AND THE OPERATING SYSTEM SELECTION PROCESS

ASSESSMENT CRITERIA:
1. Modes of an operating system are described.
2. Common operating systems are described.
3. General requirements for selecting an operating system are identified.
4. An installation method for an operating system is described and selected.

CONTENTS:
- Describing the Purposes of an Operating System
- Identifying the Requirements of an Operating System
- Describing the Operating System Selection

CONDITIONS:
The following resources are needed in this learning module:

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</tbody>
</table>

METHODOLOGIES:
- Simulation
- Group discussion
- Discovery approach
- Lecture with demonstration
- Illustrative laboratory discussion

ASSESSMENT METHODS:
- Pen and paper method
- Online Test
- Question-and-answer method
- Performance test
- Self Assessment
LO 2. PREPARE AN OPERATING SYSTEM FOR PARTICIPATION IN A NETWORK

ASSESSMENT CRITERIA:
1. Pre-installation steps for an operating system are described.
2. Requirements for a computer to participate in the network are described.

CONTENTS:
- Describing OS Installation Methods
- Preparing for OS Installation
- Configuring a Computer for the Network
- Configuring Computer Name
- Planning the Network Name and Network Address

CONDITIONS:
The following resources are needed in this learning outcome:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer peripherals</td>
<td></td>
<td>CISCO Interactive Courseware (CCNA Discovery1)</td>
</tr>
<tr>
<td>Desktop computer</td>
<td></td>
<td>Operating System installer.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Installation Demonstration Software (VM Ware)</td>
</tr>
</tbody>
</table>

METHODOLOGIES:
- Simulation
- Group discussion
- Discovery approach
- Lecture with demonstration
- Illustrative laboratory discussion

ASSESSMENT METHODS:
- Pen and paper method
- Online Test
- Question-and-answer method
- Performance test
- Self Assessment
LO 3. EXPLAIN THE PURPOSE OF OPERATING SYSTEM PATCHES

ASSESSMENT CRITERIA:
1. Methods of downloading and installing updating operating systems are described.
2. Purpose of an operating system/application patch/update is explained and described.
3. Current operating system or application version is identified and updated.

CONTENTS:
- Explaining Why and When to Apply Patches
- Applying OS Patches
- Applying Application Patches and Updates

CONDITIONS:
The following resources are needed in this learning outcome:

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<td>• Desktop computer</td>
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<td>• Operating System installer.</td>
</tr>
</tbody>
</table>

METHODOLOGIES:
- Simulation
- Group discussion
- Discovery approach
- Lecture with demonstration
- Illustrative laboratory discussion

ASSESSMENT METHODS:
- Pen and paper method
- Online Test
- Question-and-answer method
- Performance test
- Self Assessment
UNIT OF COMPETENCY : CONNECT TO THE NETWORK

MODULE TITLE : CONNECTING TO THE NETWORK

MODULE DESCRIPTION : This module covers the knowledge, skills and attitude required to connect to the Network.

NOMINAL DURATION : 58 hours

QUALIFICATION LEVEL : CCENT (CISCO CERTIFIED ENTRY NETWORKING TECHNICIAN)

SUMMARY OF LEARNING OUTCOMES:

At the end of this module, the student should be able to:

   LO 1. explain the basic concepts of networking.
   LO 2. describe how communication occurs across an Ethernet network.
   LO 3. describe the planning and implementation of a local network.
LO 1. EXPLAIN THE BASIC CONCEPTS OF NETWORKING

ASSESSMENT CRITERIA:
1. Roles of the basic components in an information network are described.
2. Roles of computers on a network are described.
3. Characteristics of a peer-to-peer network are described.
4. Topologies between logical and physical are differentiated.

CONTENTS:
- Defining what a Network is
- Enumerating the Benefits of Networking
- Describing and characterizing the Basic Network Components
- Explaining Computer Roles in a Network
- Describing and differentiating Network Topologies

CONDITIONS:
The following resources are needed in this learning outcome:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TOOLS</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Computer with Network Interface Card (NIC)</td>
<td>RJ 45 Crimping tools</td>
<td>CISCO Interactive Courseware</td>
</tr>
<tr>
<td>Linksys WRT310N</td>
<td>UTP Cable stripper/cutters</td>
<td>RJ 45 Connectors</td>
</tr>
<tr>
<td>Wireless USB NIC and associated driver</td>
<td>Ethernet cable tester with (TDR) Time Domain Reflector</td>
<td>RJ-45 data jacks</td>
</tr>
<tr>
<td>Switches and Hubs</td>
<td></td>
<td>UTP Cat 5/Cat5e cable</td>
</tr>
</tbody>
</table>

METHODOLOGIES:
- Simulation
- Group discussion
- Discovery approach
- Lecture with demonstration
- Illustrative laboratory discussion

ASSESSMENT METHODS:
- Pen and paper method
- Online Test
- Question-and-answer method
- Performance test
- Self Assessment
LO 2. DESCRIBE HOW COMMUNICATION OCCURS ACROSS AN ETHERNET NETWORK

ASSESSMENT CRITERIA:
1. Source, destination and channel in an Ethernet network are identified.
2. Basic characteristics of Ethernet communications are described.
3. Purpose of a logical network address is explained.
4. Function of a hub and switch and how it affects collision domains is described.
5. Operation of a hub is described.
6. Switch that forwards a frame given a specific source MAC address, destination MAC
   address and switch table is determined.
7. Function of ARP is described.
8. Function of a router is described.
9. Concept of the default gateway is explained.

CONTENTS:
• Recognizing the Source, Channel, and Destination as elements of Communication
• Identifying the Rules of Communication
• Describing and illustrating the following:
  a. Message Encoding
  b. Message Formatting
  c. Message Size
  d. Message Timing
• Comparing Message Patterns
• Describing Protocol Use in Communication
• Emphasizing Importance of Protocols
• Understanding the Standardization of Protocols
• Determining Physical Addressing
• Understanding Ethernet Communication
• Understanding and Identifying Hierarchical Design of Ethernet Networks
• Identifying Logical Addresses
• Differentiating Access and Distribution Layers and Devices
• Identifying Access Layer
• Enumerating the Function of Hubs and Switches
• Describing Broadcast Messaging
• Determining Switch Behavior
• Comparing MAC and IP Addresses
• Describing Address Resolution Protocol (ARP)
• Identifying Distribution Layer
• Enumerating Function of Routers
• Identifying Default Gateway
• Analyzing Tables Maintained by Routers
CONDITIONS:
The following resources are needed in this learning outcome:

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<td>• Linksys WRT310N</td>
<td>• UTP Cable stripper/cutters</td>
<td>• RJ 45 Connectors</td>
</tr>
<tr>
<td>• Wireless USB NIC and associated driver</td>
<td>• Ethernet cable tester with (TDR) Time Domain Reflector</td>
<td>• RJ-45 data jacks</td>
</tr>
<tr>
<td>• Switches</td>
<td>• UTP Cat 5/Cat5e cable</td>
<td>• An Ethernet straight through and crossover cable</td>
</tr>
<tr>
<td>• Hubs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

METHODOLOGIES:
• Simulation
• Group discussion
• Discovery approach
• Lecture with demonstration
• Illustrative laboratory discussion

ASSESSMENT METHODS:
• Pen and paper method
• Online Test
• Question-and-answer method
• Performance test
• Self Assessment
LO 3. DESCRIBE THE PLANNING AND IMPLEMENTATION OF A LOCAL NETWORK

ASSESSMENT CRITERIA:
1. A prototype of a small home or small business network using Packet Tracer is built.
2. LinkSys router connection is described.
3. A PC host is connected; an IP address is configured, NetBIOS is named and configuration is verified.
4. A shared network resource is described; a network drive to share files is mapped.
5. A computer's MAC and IP address are identified.
6. A default gateway to a network device is assigned.

CONTENT:
- Describing Local Area Network (LAN)
- Adding Hosts to Local and Remote Networks
- Using the Packet Tracer
- Planning and Documenting an Ethernet network
- Creating Prototypes
- Identifying Multi-function Device
- Connecting the Linksys Router
- Sharing Resources

CONDITIONS:
The following resources are needed in this learning outcome:

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<td>UTP Cat 5/Cat5e cable</td>
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<td>Hubs</td>
<td></td>
<td>An Ethernet straight through and crossover cable</td>
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METHODOLOGIES:
- Simulation
- Group discussion
- Discovery approach
- Lecture with demonstration
- Illustrative laboratory discussion
ASSESSMENT METHODS:

- Pen and paper method
- Online Test
- Question-and-answer method
- Performance test
- Self Assessment
UNIT OF COMPETENCY : CONNECT TO THE INTERNET THROUGH AN ISP

MODULE TITLE : CONNECTING TO THE INTERNET THROUGH AN ISP

MODULE DESCRIPTION : This module covers the knowledge, skills and attitude required to Connect to the Internet through an ISP.

NOMINAL DURATION : 58 hours

QUALIFICATION LEVEL : CCENT (CISCO CERTIFIED ENTRY NETWORKING TECHNICIAN)

SUMMARY OF LEARNING OUTCOMES:

At the end of this module, the student should be able to:

  LO 1. explain how information is sent to and through an ISP.
  LO 2. compare the components and environment of an ISP with those of a home network.
  LO 3. terminate and implement appropriately twisted pair cables in an Ethernet LAN.
LO 1. EXPLAIN HOW INFORMATION IS SENT TO AND THROUGH AN ISP

ASSESSMENT CRITERIA:
1. Different ISP connection options are identified and described.
2. The levels of services offered by an ISP are identified and described.
3. Common utilities to identify data travel across the Internet are used.

CONTENT:
• Describing the meaning Internet
• Explaining and describing Internet Service Providers (ISPs)
• Relating the ISPs Relationship with the Internet
• Determining the options for Connecting to the ISP
• Identifying ISP Levels of Service
• Describing the importance of the Internet Protocol (IP)
• Identifying role of ISPs in handling Packets
• Forwarding Packets Across the Internet

CONDITIONS:
The following resources are needed in this learning outcome:

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<th>MATERIALS</th>
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</thead>
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<tr>
<td>Computer with installed and functional Network Interface Card (NIC)</td>
<td></td>
<td>CISCO Interactive Courseware</td>
</tr>
</tbody>
</table>

METHODOLOGIES:
• Simulation
• Group discussion
• Discovery approach
• Lecture with demonstration
• Illustrative laboratory discussion

ASSESSMENT METHODS:
• Pen and paper method
• Online Test
• Question-and-answer method
• Performance test
• Self Assessment
LO 2. COMPARE THE COMPONENTS AND ENVIRONMENT OF AN ISP WITH THOSE OF A HOME NETWORK

ASSESSMENT CRITERIA:
1. Devices in a home network are described.
2. Devices in an ISP environment are described.
3. Factors that should be considered when setting up an ISP or business network are described.
4. Cabling requirements of home and ISP networks are described.

CONTENT:
- Describing the Internet Cloud
- Identifying the devices in Internet Cloud
- Comparing the Physical and Environmental Requirements of an ISP and a Home Network

CONDITIONS:
The following resources are needed in this learning outcome:

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</thead>
<tbody>
<tr>
<td>Computer with installed and functional Network Interface Card (NIC)</td>
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<td>CISCO Interactive Courseware</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Packet Tracer Software</td>
</tr>
</tbody>
</table>

METHODOLOGIES:
- Simulation
- Group discussion
- Discovery approach
- Lecture with demonstration
- Illustrative laboratory discussion

ASSESSMENT METHODS:
- Pen and paper method
- Online Test
- Question-and-answer method
- Performance test
- Self Assessment
LO 3. TERMINATE AND IMPLEMENT APPROPRIATELY TWISTED PAIR CABLES IN AN ETHERNET LAN

ASSESSMENT CRITERIA:
1. Principle types of cables used in networks are described.
2. Categories of UTP cables used in Ethernet networks are identified.
3. Common uses of coax cable are identified and the common cable terminations are used.
4. Optical fiber cables, their common terminations, and its preferred usage as compared to copper are described.
5. Cable pinouts and color codes for Ethernet UTP cross-over and straight through cables are identified.
6. UTP cabling best practices and installation procedures are demonstrated.
7. Straight-through and crossover UTP cables are demonstrated.
8. Punch down wires at the patch panel and wall jacks are properly demonstrated and terminated.
9. Ethernet UTP cables are tested and common cabling faults are identified.

CONTENT:
- Categorizing Common Network Cables
- Describing Twisted Pair Cables
- Describing Coaxial Cable
- Describing Fiber Optic Cables
- Identifying Cabling Standards
- Describing UTP Cables
- Describing UTP Cable Termination
- Terminating UTP at Patch Panels and Wall Jacks
- Testing Networking Cables
- Demonstrating Cabling Best Practices
CONDITIONS:
The following resources are needed in this learning outcome:

<table>
<thead>
<tr>
<th>EQUIPMENT &amp; ACCESSORIES</th>
<th>TOOLS</th>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Computer with installed and functional Network Interface Card (NIC)</td>
<td>• Screwdriver (standard)</td>
<td>• CISCO Interactive Courseware</td>
</tr>
<tr>
<td>• Patch panel</td>
<td>• Screwdriver (Philips)</td>
<td>• RJ 45 Connectors</td>
</tr>
<tr>
<td>• Linksys WRT310N</td>
<td>• Long nose pliers</td>
<td>• RJ-45 data jacks</td>
</tr>
<tr>
<td>• Wireless USB NIC and associated driver</td>
<td>• Mechanical pliers</td>
<td>• I/O Ports and connectors</td>
</tr>
<tr>
<td>• Router 1841</td>
<td>• Allen wrench</td>
<td>• Category 5/5e wall plate</td>
</tr>
<tr>
<td>• Switches</td>
<td>• RJ 45 Crimping tools</td>
<td>• UTP Cat 5/Cat5e cable</td>
</tr>
<tr>
<td>• Hubs</td>
<td>• UTP Cable stripper/cutters</td>
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</tr>
</tbody>
</table>

METHODOLOGIES:
• Simulation
• Group discussion
• Discovery approach
• Lecture with demonstration
• Illustrative laboratory discussion

ASSESSMENT METHODS:
• Pen and paper method
• Online Test
• Question-and-answer method
• Performance test
• Self Assessment
IMPLEMENTING NETWORK ADDRESSES

UNITE OF COMPETENCY : IMPPLEMENT NETWORK ADDRESSES

MODULE TITLE : IMPLEMENTING NETWORK ADDRESSES

MODULE DESCRIPTION : This module covers the knowledge, skills and attitude required to implement IP address in network.

NOMINAL DURATION : 38 hours

QUALIFICATION LEVEL : CCENT (CISCO CERTIFIED ENTRY NETWORKING TECHNICIAN)

SUMMARY OF LEARNING OUTCOMES:

At the end of this module the student should be able to:

LO 1. apply the hierarchical addressing of devices to support communication between networks.
LO 2. configure, and verify the methods of obtaining an IP address.
LO 3. examine NAT settings on a home or small business network.
LO 1. APPLY THE HIERARCHICAL ADDRESSING OF DEVICES

ASSESSMENT CRITERIA:
1. Structure of an IPv4 address is described.
2. Bits to decimal and decimal to binary are converted.
3. Parts of the IP address and their purpose are described.
4. Subnet mask and its purpose are described.
5. Number of hosts from a given IP address and subnet mask is calculated.
6. Private and public addressing is being used and described.
7. Unicast, broadcast, multicast addresses and messaging are differentiated.

CONTENTS:
• Examining the purposes of IP Address
• Describing IP Address Structure
• Investigating parts of an IP Address
• Relating how IP Address and Subnet Mask Interact
• Differentiating IP Address Classes and Default Subnet Masks
• Classifying Public and Private IP Addresses
• Identifying Unicast, Broadcast and Multicast Address

CONDITIONS:
The following resources are needed in this learning outcome:
• PC with Windows XP installed
• Packet Tracer
• Windows Calculator (for checking)
• CISCO Interactive Courseware (CCNA Discovery 1)
• Work Sheet Lab 5.1.4 Using the Windows Calculator with Network Addresses

METHODOLOGIES:
• Simulation
• Group discussion
• Discovery approach
• Lecture with demonstration
• Illustrative laboratory discussion

ASSESSMENT METHODS:
• Online/offline Tests
• Question-and-answer method (oral defense)
• Performance test
• Self Assessment
• Laboratory Worksheets
LO 2. CONFIGURE AND VERIFY THE METHODS OF OBTAINING AN IP ADDRESS

ASSESSMENT CRITERIA:
1. Methods of assigning an IP address are described.
2. DHCP services are located and described.
3. DHCP operation on the GUI-based home multi-function device is described, configured and verified.

CONTENTS:
- Assigning Static and Dynamic Addresses
- Configuring DHCP and DHCP Servers
- Identifying Network Boundaries and Address Space
- Assigning Addresses

CONDITIONS:
The following resources are needed in this learning outcome:
- PC with Windows XP installed
- Packet Tracer
- Windows Calculator (for checking)
- CISCO Interactive Courseware (CCNA Discovery 1)

METHODOLOGIES:
- Simulation
- Discovery approach
- Peer group tutoring
- Lecture with demonstration
- Illustrative laboratory discussion

ASSESSMENT METHODS:
- Online/offline Tests
- Question-and-answer method (oral defense)
- Performance test
- Self Assessment
- Laboratory Worksheets
LO 3. EXAMINE NAT SETTINGS ON A HOME OR SMALL BUSINESS NETWORK

ASSESSMENT CRITERIA:
1. Purpose and function of NAT are described.
2. Scenarios where NAT is required are identified.
3. Settings for a router to configure NAT are applied.

CONTENTS:
- Translating Network Addresses

CONDITIONS:
The following resources are needed in this learning outcome:
- PC with Windows XP installed
- Packet Tracer
- Windows Calculator (for checking)
- CISCO Interactive Courseware (CCNA Discovery 1)

METHODOLOGIES:
- Group discussion
- Discovery approach
- Peer group tutoring
- Lecture with demonstration
- Illustrative laboratory discussion

ASSESSMENT METHODS:
- Online/Offline Tests
- Laboratory Worksheets
- Question-and-answer method (oral defense)
- Performance test
UNIT OF COMPETENCY : USE NETWORK SERVICES TO SHARE RESOURCES BETWEEN SERVER AND CLIENT

MODULE TITLE : USING NETWORK SERVICES TO SHARE RESOURCES BETWEEN SERVER AND CLIENT

MODULE DESCRIPTION : This module covers the knowledge, skills and attitude required to establish shared resources between server and client networks.

NOMINAL DURATION : 48 hours

QUALIFICATION LEVEL : CCENT (CISCO CERTIFIED ENTRY NETWORKING TECHNICIAN)

SUMMARY OF LEARNING OUTCOMES:

At the end of this module the student should be able to:

LO 1. establish client server network relationship.
LO 2. examine the role of protocols in supporting communication between server and client processes.
LO 3. apply the purpose of the layered model.
LO 1. ESTABLISH CLIENT SERVER NETWORK RELATIONSHIP

ASSESSMENT CRITERIA:
1. Services provided by a server are described.
2. Common services provided in the client/server environment are identified.
3. Request/response processes in client server transactions are described.

CONTENTS:
- Describing Client/Servers and their Interactions
- Creating Client Server Relationship

CONDITIONS:
The following resources are needed in this learning outcome:
- Windows-based computer with Internet connectivity
  - Access to the Run command
- Lab 6.2.1 Observing DNS Name Resolution

METHODOLOGIES:
- Simulation
- Group discussion
- Discovery approach
- Lecture with demonstration
- Illustrative laboratory discussion

ASSESSMENT METHODS:
- Online Test
- Question-and-answer method (oral defense)
- Performance test
- Self Assessment
LO 2. EXAMINE THE ROLE OF PROTOCOLS IN SUPPORTING COMMUNICATION BETWEEN SERVER AND CLIENT PROCESSES

ASSESSMENT CRITERIA:
1. Protocols are described as they relate to network services provided.
2. Operation of communications using TCP and communication using UDP is compared.
3. Function of a port is described.
4. Well-known port numbers are identified.
5. Purpose and operation of Internet applications are described.

CONTENTS:
• Describing the Role of Protocols in Client Server Communication
• Using TCP and UDP Transport Protocols
• Using TCP/IP Port Numbers
• Using Domain Name Services (DNS)
• Configuring Web Clients and Servers
• Configuring FTP Client and Servers
• Configuring Email Clients and Servers
• Configuring IM Clients and Servers
• Configuring Voice Clients and Servers
• Using assigned Port Numbers

CONDITIONS:
The following resources are needed in this learning outcome:
• Windows-based computer with an FTP client
  - FTP server (Existing FTP server, downloaded freeware, or use Live CD)
• Windows-based computer with Internet connectivity
  - Microsoft Outlook or other email client software

METHODOLOGIES:
• Simulation
• Discovery approach
• Lecture with demonstration
• Illustrative laboratory discussion

ASSESSMENT METHODS:
• Online /Offline Test
• Question-and-answer method (oral defense)
• Performance test
• Self Assessment
• Laboratory Worksheets
LO 3. APPLY THE PURPOSE OF A LAYERED MODEL

ASSESSMENT CRITERIA:
1. Different protocols that define the processes interacting on a host are described.
2. Encapsulation/de-encapsulation processes in network communication are described.
3. Structure and purpose of the OSI model are described.
4. Purpose and structure of addressing at the different OSI layers are delineated.
5. OSI model is used to describe network communication.

CONTENTS:
- Explaining the Layered model and Protocols
- Relating Protocol Interaction
- Simulating Protocol Operation of Sending and Receiving a Message
- Applying the Open Systems Interconnect Model

CONDITIONS:
The following resources are needed in this learning outcome:
- Packet Tracer

METHODOLOGIES:
- Simulation
- Group discussion
- Discovery approach
- Lecture with demonstration
- Illustrative laboratory discussion

ASSESSMENT METHODS:
- Online Test
- Question-and-answer method (oral defense)
- Performance test
- Self Assessment
UNIT OF COMPETENCY : PLAN, DESIGN AND INSTALL A WIRELESS NETWORK

MODULE TITLE : PLANNING, DESIGNING AND INSTALLING WIRELESS NETWORK TECHNOLOGY

MODULE DESCRIPTION : This module covers the knowledge, skills and attitude required to plan, design an install a wireless network.

NOMINAL DURATION : 48 hours

QUALIFICATION LEVEL : CCENT (CISCO CERTIFIED ENTRY NETWORKING TECHNICIAN)

SUMMARY OF LEARNING OUTCOMES:

At the end of this module the student should be able to:

  LO 1. evaluate characteristics of wireless networks.
  LO 2. design setup of devices and operation of WLANs.
  LO 3. solve wireless security issues and apply mitigation strategies.
LO 1. EVALUATE CHARACTERISTICS OF WIRELESS NETWORKS

ASSESSMENT CRITERIA:
1. Benefits and shortcomings of wireless networks are described.
2. Major categories of wireless networks are described.

CONTENTS:
- Classifying Wireless Technology Devices
- Analyzing the Benefits and Limitations of Wireless Technology
- Identifying the types of Wireless Networks and Their Boundaries

CONDITIONS:
The following resources are needed in this learning outcome:
- Windows XP based computer that is cabled to the multi-function device
  Linksys WRT310N (for simulation)
- Lab 7.2.5 Configuring a Wireless Access Point

METHODOLOGIES:
- Simulation
- Group discussion
- Discovery approach
- Lecture with demonstration
- Illustrative laboratory discussion

ASSESSMENT METHODS:
- Online Test
- Question-and-answer method (oral defense)
- Performance test
- Self Assessment
LO 2. DESIGN SETUP OF DEVICES AND OPERATION OF WLANS

ASSESSMENT CRITERIA:
1. Common wireless LAN components are identified and described.
2. Infrastructure and ad-hoc modes are compared.
3. SSID in WLANs is used.

CONTENTS:
- Applying Wireless LAN Standards
- Identifying Wireless LAN Components
- Authenticating WLANS and the SSID
- Setting the Wireless Channels
- Configuring the Access Point
- Configuring the Wireless Client
- Setting security considerations why people attack WLANs
- Limiting Access to WLAN
- Encrypting on a WLAN
- Filtering Traffic on a WLAN

CONDITIONS:
The following resources are needed in this learning outcome:
- Windows XP based computer that is cabled to the multi-function device Linksys WRT310N
- Windows XP-based computer with an available USB port Wireless USB NIC and associated driver Administrator rights to install the driver Linksys WRT310N with wireless access configured from previous lab
- Lab 7.2.6 Configuring a Wireless Client

METHODOLOGIES:
- Simulation
- Group discussion
- Discovery approach
- Lecture with demonstration
- Illustrative laboratory discussion

ASSESSMENT METHODS:
- Online Test
- Question-and-answer method (oral defense)
- Performance test
- Self Assessment
LO 3. SOLVE WIRELESS SECURITY ISSUES AND APPLY MITIGATION STRATEGIES

ASSESSMENT CRITERIA:
1. Wireless LAN attacker and how they attack is described.
2. General methods used to secure a WLAN are described.
3. Methods of authentication used to secure a WLAN are compared.
4. Methods of encryption, used to secure a WLAN are compared.

CONTENTS:
• Planning the WLAN
• Installing and Securing the AP
• Backing Up and Restoring Configuration Files
• Updating the Firmware

CONDITIONS:
The following resources are needed in this learning outcome:
• Windows-based computer
• Linksys WRT310N
• Straight-through Ethernet cable
• Lab 7.3.5 Configuring Wireless Security

METHODOLOGIES:
• Simulation
• Group discussion
• Discovery approach
• Lecture with demonstration
• Illustrative laboratory discussion

ASSESSMENT METHODS:
• Online Test
• Question-and-answer method (oral defense)
• Performance test
• Self Assessment
UNIT OF COMPETENCY : SECURE THE NETWORK ENVIRONMENT

MODULE TITLE : SECURING THE NETWORK ENVIRONMENT

MODULE DESCRIPTION : This module covers the knowledge, skills and attitude required to secure the network environment.

NOMINAL DURATION : 48 hours

QUALIFICATION LEVEL : CCENT (CISCO CERTIFIED ENTRY NETWORKING TECHNICIAN)

SUMMARY OF LEARNING OUTCOMES:

At the end of this module the student should be able to:

- **LO 1.** identify various networking threats and attacks.
- **LO 2.** apply/use common security applications and products.
- **LO 3.** implement attack mitigation strategies.
LO 1. IDENTIFY VARIOUS NETWORKING THREATS AND ATTACKS

ASSESSMENT CRITERIA:
1. Risks and sources of network intrusion are described and identified.
2. Social engineering and phishing are described.
3. Virus, worms, and trojan horses are compared and contrasted.
4. Denial of service and brute force attacks are described.
5. Spyware, tracking cookies, adware, pop-ups, pop-unders, and spam are described.

CONTENTS:
- Determining the risks of Network Intrusion
- Locating the sources of Network Intrusions
- Describing Social Engineering and Phishing
- Identifying Virus, Worms, and Trojan Horses
- Protecting against Denial of Service and Brute Force Attacks
- Eliminating Spyware, Tracking Cookies, Adware and Pop-ups
- Avoiding Spam

CONDITIONS:
The following resources are needed in this learning outcome:
- Linksys WRT310N or other multi-function device with the default configuration
- Windows XP Professional computer
- Internal PC to act as a server in the DMZ with HTTP and Telnet servers installed (preconfigured or Discovery Live CD server)
- External server to represent the ISP and Internet (with preconfigured DHCP, HTTP, and Telnet servers running (real server with services installed or Discovery Live CD server)
- Cabling to connect the PC hosts, Linksys WRT300N or multi-function device, and switches
- Lab 8.4.2 Configuring Access Policies and DMZ Settings

METHODOLOGIES:
- Simulation
- Group discussion
- Discovery approach
- Lecture with demonstration
- Illustrative laboratory discussion

ASSESSMENT METHODS:
- Online Test
- Question-and-answer method (oral defense)
- Performance test
- Self Assessment
LO 2. APPLY/USE COMMON SECURITY APPLICATIONS AND PRODUCTS

ASSESSMENT CRITERIA:
1. Common network security procedures and symptoms are defined.
2. Software commonly used to prevent spam, spyware, and adware is described.
3. Types of firewalls and how they are used are described.
4. Firewalls are described where they are normally placed.

CONTENTS:
- Applying common security measures
- Using Updates and Patches
- Using Anti-virus software
- Using Anti-Spam
- Using Firewall

CONDITIONS:
The following resources are needed in this learning outcome:
- Windows XP Professional computer with Internet access
- Computer must be attached to the integrated router switch or a standalone hub or switch.
- Optionally, you can have a server running a combination of DHCP, HTTP, FTP, and Telnet (preconfigured).
- Lab 8.4.3 Performing a Vulnerability Analysis

METHODOLOGIES:
- Simulation
- Group discussion
- Discovery approach
- Lecture with demonstration
- Illustrative laboratory discussion

ASSESSMENT METHODS:
- Online Test
- Question-and-answer method (oral defense)
- Performance test
- Self Assessment
LO 3. IMPLEMENT ATTACK MITIGATION STRATEGIES

ASSESSMENT CRITERIA:
1. A network security vulnerability analysis is performed.
2. Wired and wireless security best practices are implemented.
3. Firewall functions on a router are configured.

CONTENTS:
- Performing vulnerability analysis
- Testing/applying best practices

CONDITIONS:
The following resources are needed in this learning outcome:
- Lab 8.4.3 Performing a Vulnerability Analysis
- Windows XP Professional computer with Internet access
- Computer must be attached to the integrated router switch or a standalone hub or switch.
- Optionally, you can have a server running a combination of DHCP, HTTP, FTP, and Telnet (*preconfigured*)

METHODOLOGIES:
- Simulation
- Group discussion
- Discovery approach
- Lecture with demonstration
- Illustrative laboratory discussion

ASSESSMENT METHODS:
- Online Test
- Question-and-answer method (oral defense)
- Performance test
- Self Assessment
UNIT OF COMPETENCY : TROUBLESHOOT NETWORK RELATED ISSUES

MODULE TITLE : TROUBLESHOOTING NETWORK RELATED ISSUES

MODULE DESCRIPTION : This module covers the knowledge, skills and attitude required to troubleshoot network related issues.

NOMINAL DURATION : 48 hours

QUALIFICATION LEVEL : CCENT (CISCO CERTIFIED ENTRY NETWORKING TECHNICIAN)

SUMMARY OF LEARNING OUTCOMES:

At the end of this module the student should be able to:

LO 1. apply troubleshooting process standards.
LO 2. identify, describe, and correct common network problems.
LO 3. investigate common practices when interacting with a helpdesk.
LO 1. APPLY TROUBLESHOOTING PROCESS STANDARDS

ASSESSMENT CRITERIA:
1. Information about a problem is gathered.
2. Troubleshooting methodologies are compared and contrasted.
3. Use of human senses in the network troubleshooting process is described.

CONTENTS:
- Troubleshooting using network utilities
- Gathering Information
- Applying varied approaches to troubleshooting

CONDITIONS:
The following resources are needed in this learning outcome:
- Windows XP Professional computer with Web, FTP, and Telnet clients (CLI or GUI).
- Server running a combination of DNS, HTTP, FTP, and Telnet services (preconfigured) or a server running the Discovery Live CD.
- Integrated router configured as a DHCP server and client (default configuration).
- Router with two Ethernet interfaces configured as a DHCP server to integrated router (preconfigured).
- Ethernet Cat-5 (minimum) straight and crossover cabling to connect hosts and network devices.
- Lab 9.2.7 Troubleshooting Using Network Utilities

METHODOLOGIES:
- Simulation
- Group discussion
- Discovery approach
- Lecture with demonstration
- Illustrative laboratory discussion

ASSESSMENT METHODS:
- Online Test
- Question-and-answer method (oral defense)
- Performance test
- Self Assessment
LO 2. IDENTIFY, DESCRIBE AND CORRECT COMMON NETWORK PROBLEMS

ASSESSMENT CRITERIA:
1. Common software utilities and use in troubleshooting network problems are described.
2. Common physical problems and recommended solution are identified.
3. Cabling and connection issues are described and troubleshooted.
4. Reasons why a wireless hosts cannot connect to the AP are described.
5. Association and authentication issues within a wireless network are identified.
6. DHCP issues on a wired or wireless network are identified.
7. Connectivity between the home-based network router and the ISP are tested.
8. Importance of having and creating network documentation as a part of the troubleshooting process is described.

CONTENTS:
- Detecting physical problems
- Using software utilities for troubleshooting connectivity
- Troubleshooting using the following:
  a. IPconfig
  b. Ping
  c. Tracert
  d. Netstat
  e. Troubleshooting using Nslookup

CONDITIONS:
The following resources are needed in this learning outcome:
- PC with Windows XP Professional Server (preconfigured)
- Integrated router configured as a DHCP server and client (default configuration)
- Router with two Ethernet interfaces configured as the DHCP server to integrated router (preconfigured)
- Mix of Ethernet Cat-5 (minimum) straight-through and crossover cabling, both good and bad, to connect hosts and network devices
- Basic Cat-5 Ethernet cable tester (RJ-45 pin-to-pin continuity checker)
- Advanced cable tester (optional), such as Fluke 620 (or similar)
- Lab 9.3.3 Troubleshooting Physical Connectivity

METHODOLOGIES:
- Simulation
- Group discussion
- Discovery approach
- Lecture with demonstration
- Illustrative laboratory discussion
ASSESSMENT METHODS:
- Online Test
- Question-and-answer method (oral defense)
- Performance test
- Self Assessment

LO 3. INVESTIGATE COMMON PRACTICES WHEN INTERACTING WITH A HELPDESK

ASSESSMENT CRITERIA:
1. Benefits and common contents of documentation and preparation for dealing with a helpdesk are described.
2. Common sources of help are described.

CONTENTS:
- Addressing Common Issues
- Identifying Connectivity Issues
- Understanding LED indicators
- Solving Connectivity problems
- Troubleshooting Radio Problems in WLAN
- Troubleshooting Association & Authentication on a WLAN
- Analyzing DHCP issues
- Troubleshooting the ISR to ISP Connection
- Troubleshooting and the Helpdesk
- Performing the documentation
- Using Outside Sources for Help
- Using the Helpdesk

CONDITIONS:
The following resources are needed in this learning outcome:
- PC with Windows XP Professional Server (preconfigured)
- Integrated router configured as a DHCP server and client (default configuration)
- Router with two Ethernet interfaces configured as the DHCP server to integrated router (preconfigured)
- Mix of Ethernet Cat-5 (minimum) straight-through and crossover cabling, both good and bad, to connect hosts and network devices
- Basic Cat-5 Ethernet cable tester (RJ-45 pin-to-pin continuity checker)
- Advanced cable tester (optional), such as Fluke 620 (or similar)"
METHODOLOGIES:
- Simulation
- Group discussion
- Discovery approach
- Lecture with demonstration
- Illustrative laboratory discussion

ASSESSMENT METHODS:
- Online Test
- Question-and-answer method (oral defense)
- Performance test
- Self Assessment
## COURSE STRUCTURE (FOURTH YEAR)

<table>
<thead>
<tr>
<th>Unit of Competency</th>
<th>Module Title</th>
<th>Learning Outcome</th>
<th>No. of Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRST GRADING</td>
<td></td>
<td></td>
<td>108 hours</td>
</tr>
<tr>
<td>Explore the Internet</td>
<td>Exploring the Internet</td>
<td><strong>LO1:</strong> Describe the Internet and the means by which it serves the needs of individuals and organizations.</td>
<td>4 hours</td>
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<tr>
<td></td>
<td></td>
<td><strong>LO2:</strong> Describe the basic structure of the Internet and the way in which Internet users gain access to Internet services.</td>
<td>12 hours</td>
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<tr>
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<td></td>
<td><strong>LO3:</strong> Describe the technological resources, roles, and responsibilities of the ISP.</td>
<td>4 hours</td>
</tr>
<tr>
<td>Perform Help Desk Duties</td>
<td>Performing Help Desks Duties</td>
<td><strong>LO1:</strong> Describe the various roles of help desk and installation technicians.</td>
<td>6 hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>LO2:</strong> Use the OSI model to troubleshoot basic network issues.</td>
<td>18 hours</td>
</tr>
<tr>
<td>Plan a Network Upgrade</td>
<td>Planning a Network Upgrade</td>
<td><strong>LO1:</strong> Describe the role of the ISP or managed service provider in planning and designing the upgrade of a client's network.</td>
<td>10 hours</td>
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<td></td>
<td><strong>LO2:</strong> Evaluate cabling and facilities for network upgrades</td>
<td>16 hours</td>
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<td><strong>LO3:</strong> Recommend networking equipment to fulfill customer requirements.</td>
<td>12 hours</td>
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<tr>
<td>SECOND GRADING</td>
<td>96 hours</td>
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<tr>
<td>Plan the Addressing Structure</td>
<td>Planning the Addressing Structure</td>
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<td>LO1: Implement an IPv4 addressing scheme to meet network requirements.</td>
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<td>LO2: Explain how Network Address Translation (NAT and PAT) are used in a network.</td>
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<td>28 hours</td>
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<td>16 hours</td>
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<tr>
<td>Configure Network Devices</td>
<td>Configuring Network Devices</td>
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<td>LO1: Install a Cisco Integrated Services Router (ISR).</td>
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<td>LO2: Explain different methods of configuring Cisco devices.</td>
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<td>LO3: Configure an ISR using SDM Express and SDM.</td>
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<td>LO4: Complete an initial router configuration using Cisco IOS.</td>
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<td>LO5: Configure a Cisco router for LAN connectivity, Internet connectivity and NAT using the Cisco IOS CLI of the Cisco IOS software.</td>
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<td>8 hours</td>
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<td>10 hours</td>
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<table>
<thead>
<tr>
<th>THIRD GRADING</th>
<th>102 HOURS</th>
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</thead>
<tbody>
<tr>
<td>Configure Static and Dynamic Routing</td>
<td>Configuring Static and Dynamic Routing</td>
</tr>
<tr>
<td></td>
<td>LO1: Describe the purpose and function of routing and the protocols used to implement it.</td>
</tr>
<tr>
<td></td>
<td>LO2: Configure static and dynamic routing.</td>
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<td>24 hours</td>
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<td>16 hours</td>
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</table>
## Use Internet Service Provider (ISP) Services

**LO1:** Describe the network services provided by an ISP.

**LO2:** Describe the purpose and function of the protocols that support the network services provided by an ISP.

**LO3:** Describe the implementation of ISP and enterprise DNS.

**LO4:** Explain the common application layer services and protocols supported by the ISP.

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Use Internet Service Provider (ISP) Services</td>
<td>Using ISP Services</td>
<td>LO1: Describe the network services provided by an ISP.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LO2: Describe the purpose and function of the protocols that support the network services provided by an ISP.</td>
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<td>LO3: Describe the implementation of ISP and enterprise DNS.</td>
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<td>LO4: Explain the common application layer services and protocols supported by the ISP.</td>
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<td>14 hours</td>
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### FOURTH GRADING

**102 HOURS**

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<tbody>
<tr>
<td>Maintain ISP Responsibility</td>
<td>Maintaining ISP Responsibility</td>
<td>LO1: Describe ISP security policies and procedures.</td>
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<tr>
<td></td>
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<td>LO2: Describe security tools commonly used by ISPs.</td>
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<td>LO3: Describe the monitoring and management responsibilities of the ISP.</td>
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<td>LO4: Explain proper disaster recovery and server backup procedures</td>
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<td>6 hours</td>
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<td>8 hours</td>
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<tr>
<td>Troubleshoot a Network</td>
<td>Troubleshooting a Network</td>
<td>LO1: Describe how to troubleshoot using the OSI Model</td>
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<tr>
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<td>LO2: Describe, Identify and Correct issues that occur at Layer 1 and Layer 2 of the OSI Reference Model</td>
<td>12 hours</td>
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<td></td>
<td>LO3: Describe, Identify and Correct IP addressing issues that occur at Layer 3 of the OSI Reference Model</td>
<td>10 hours</td>
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<td>LO4: Describe, Identify and Correct routing issues that occur at Layer 3 of the OSI Reference Model</td>
<td>6 hours</td>
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<tr>
<td></td>
<td>LO5: Describe, Identify and Correct issues that occur in the Transport and upper layers of the OSI Reference Model</td>
<td>8 hours</td>
</tr>
</tbody>
</table>
UNIT OF COMPETENCY : EXPLORE THE INTERNET

MODULE TITLE : EXPLORING THE INTERNET

MODULE DESCRIPTION : This module covers the knowledge, skills and attitude required in exploring the internet in a workplace. The module also includes enhancement of skills and knowledge about the internet applications and internet connectivity.

NOMINAL DURATION : 28 hours

QUALIFICATION LEVEL : CCENT (CISCO CERTIFIED ENTRY-LEVEL NETWORKING TECHNICIAN)

SUMMARY OF LEARNING OUTCOMES:

At the end of this module, the student should be able to:

LO1: describe the Internet and the means by which it serves the needs of individuals and organizations.

LO2: describe the basic structure of the Internet and the way in which Internet users gain access to Internet services.

LO3: describe the technological resources, roles, and responsibilities of the ISP.
LO1: DESCRIBE THE INTERNET AND THE MEANS BY WHICH IT SERVES THE NEEDS OF INDIVIDUALS AND ORGANIZATIONS

ASSESSMENT CRITERIA:
1. Detailed examples of ways in which individuals and organizations utilize the Internet are provided.
2. The "internet standard" is defined.
3. Examples of how standards facilitate Internet communication are provided.
4. The use of standards that enable individuals and organizations to share information, resources, and service is explained.

CONTENTS:
- Using the internet
- Surfing the Internet and identifying its Standards
- Connecting to ISP and ISP Services

CONDITIONS:
The following resources are needed in this learning outcome:
- Host computer with the Windows operating system
- Access to the command prompt
- Internet connection
- Routes Traced worksheet for each destination URL. The worksheet is attached to this lab. Each student completes their own worksheets and gives them to the instructor.
- Global Connectivity Map, which is attached at the end of this lab
- Access to the PC command prompt

METHODOLOGIES:
- Group discussion
- Interaction
- Simulations

ASSESSMENT METHODS:
- Interview/question and answer
- Observation
- Summative test
- Online Examination
LO2: DESCRIBE THE BASIC STRUCTURE OF THE INTERNET AND THE WAY IN WHICH INTERNET USERS GAIN ACCESS TO INTERNET SERVICES

ASSESSMENT CRITERIA:
1. ISP and the services it provides to Internet users are described.
2. Common ways in which home users, small offices, and large organizations connect to an ISP are explained.
3. Internet hierarchy, its major components, and its interconnections are described.
4. Ping and trace route commands are used to reveal the structure of the Internet given a series of destination URLs.

CONTENTS:
- Connecting to ISP’s
- Delivering Internet Services to End Users
- Identifying Internet Hierarchy
- Using Tools to Map the Internet

CONDITIONS:
The following resources are needed in this learning outcome:
- Host computer with the Windows operating system
- Access to the command prompt
- Internet connection
- Routes Traced worksheet for each destination URL. The worksheet is attached to this lab. Each student completes their own worksheets and gives them to the instructor.
- Global Connectivity Map, which is attached at the end of this lab
- Access to the PC command prompt

METHODOLOGIES:
- Group discussion
- Interaction
- Simulations

ASSESSMENT METHODS:
- Interview/question and answer
- Observation
- Summative test
- On line Examination
LO3: DESCRIBE THE TECHNOLOGICAL RESOURCES, ROLES, AND RESPONSIBILITIES OF THE ISP

ASSESSMENT CRITERIA:
1. Fundamental technologies essential to a functioning ISP are described.
2. Importance of scalability to an ISP and simple strategy for achieving it is explained.
3. Common roles an ISP may perform in providing Internet access to customers are described.
4. Responsibilities associated with each role of an ISP are explained.

CONTENTS:
- Using ISP Connectivity
- Providing ISP Requirements
- Identifying Roles and Responsibilities within an ISP

CONDITIONS:
The following resources are needed in this learning outcome:
- Host computer with the Windows operating system
- Access to the command prompt
- Internet connection
- Routes Traced worksheet for each destination URL. The worksheet is attached to this lab. Each student completes their own worksheets and gives them to the instructor.
- Global Connectivity Map, which is attached at the end of this lab
- Access to the PC command prompt

METHODOLOGIES:
- Group discussion
- Interaction
- Simulations

ASSESSMENT METHODS:
- Interview/question and answer
- Observation
- Summative test
- Online Examination
UNIT OF COMPETENCY : PERFORM HELP DUTIES

MODULE TITLE : PERFORMING HELP DESK DUTIES

MODULE DESCRIPTION : This module covers the knowledge, skills and attitude in providing standard procedure of helpdesk technical support.

NOMINAL DURATION : 30 hours

QUALIFICATION LEVEL : CCENT (CISCO CERTIFIED ENTRY-LEVEL NETWORKING TECHNICIAN)

SUMMARY OF LEARNING OUTCOMES:

At the end of this module, the student should be able to:

LO1: describe the various roles of help desk and installation technicians.

LO2: use the OSI model to troubleshoot basic network issues.
LO1: DESCRIPTIVE THE VARIOUS ROLES OF HELP DESK AND INSTALLATION TECHNICIANS

ASSESSMENT CRITERIA:
1. Functions of the help desk technician and the way in which these functions are organized at the ISP are described.
2. Sound interpersonal, customer service, and incident management procedures performed by help desk technicians are described.
3. Help desk records and incident management tools and the process of problem escalation are described.
4. Steps required to complete a successful onsite customer service visit are listed.

CONTENTS:
- Describing the Role of Help Desk Technicians
- Connecting to ISP Help Desk Organization
- Performing the Roles of ISP Tech
- Interacting with Customers

CONDITIONS:
The following resources are needed in this learning outcome:
- Host computer with the Windows operating system
- Access to the command prompt
- Internet connection
- Routes Traced worksheet for each destination URL. The worksheet is attached to this lab. Each student completes their own worksheets and gives them to the instructor.
- Global Connectivity Map, which is attached at the end of this lab
- Access to the PC command prompt

METHODOLOGIES:
- Group discussion
- Interaction
- Simulations

ASSESSMENT METHODS:
- Online Examination
- Interview/question and answer
- Observation
LO2: USE THE OSI MODEL TO TROUBLESHOOT BASIC NETWORK ISSUES

ASSESSMENT CRITERIA:
1. Purpose and structure of the OSI model as it relates to networking are described.
2. Devices, protocols and applications are placed at the appropriate layer of the model.
3. Process of encapsulation including the PDU at each layer is explained.
4. Common network problems are troubleshooted.
5. Common network user problems encountered by ISP help desk technicians, their common causes, and potential solutions are named.

CONTENTS:
• Describing the OSI Model
• Using the OSI Model
• Creating OSI Model Protocols and Technologies
• Troubleshooting using the OSI Model
• Troubleshooting ISP
• Performing Help Desk Troubleshooting Scenarios
• Creating and Using Help Desk Records
• Conducting Customer Site Procedures

CONDITIONS:
The following resources are needed in this learning outcome:
• Host computer with the Windows operating system
• Access to the command prompt
• Internet connection
• Routes Traced worksheet for each destination URL. The worksheet is attached to this lab. Each student completes their own worksheets and gives them to the instructor.
• Global Connectivity Map, which is attached at the end of this lab
• Access to the PC command prompt

METHODOLOGIES:
• Group discussion
• Interaction
• Simulations

ASSESSMENT METHODS:
• On line Examination
• Interview/question and answer
• Observation
UNIT OF COMPETENCY : PLAN A NETWORK UPGRADE

MODULE TITLE : PLANNING A NETWORK UPGRADE

MODULE DESCRIPTION : This module covers the knowledge, skills and attitude required in documenting existing network, planning for a new network, purchasing and maintaining network equipments.

NOMINAL DURATION : 60 hours

QUALIFICATION LEVEL : CCENT (CISCO CERTIFIED ENTRY-LEVEL NETWORKING TECHNICIAN)

SUMMARY OF LEARNING OUTCOMES:

At the end of this module, the student should be able to:

LO1: describe the role of the ISP or managed service provider in planning and designing the upgrade of a client’s network.
LO2: evaluate cabling and facilities for network upgrades.
LO3: recommend networking equipment to fulfill customer requirements.
LO1: DESCRIBE THE ROLE OF THE ISP OR MANAGED SERVICE PROVIDER IN PLANNING AND DESIGNING THE UPGRADE OF A CLIENT’S NETWORK

ASSESSMENT CRITERIA:
1. Information that should be gathered during a site survey of a customer network is listed.
2. Physical and logical network topologies are compared and contrasted.
3. Network inventory and logical diagram are created.
4. Importance of planning when beginning a network upgrade is described.

CONTENTS:
• Documenting the Existing Network
• Performing Site Survey
• Creating a Physical and Logical Topologies
• Identifying Network Requirements Documentation

CONDITIONS:
The following resources are needed in this learning outcome:
• Host computer with the Windows operating system
• Access to the command prompt
• Internet connection
• Routes Traced worksheet for each destination URL. The worksheet is attached to this lab. Each student completes their own worksheets and gives them to the instructor.
• Global Connectivity Map, which is attached at the end of this lab
• Access to the PC command prompt
• Existing Floor Plan (provided in lab)

METHODOLOGIES:
• Group discussion
• Interaction
• Simulations

ASSESSMENT METHODS:
• Interview/question and answer
• Observation
• Summative test
• Online Examination
LO2: EVALUATE CABELING AND FACILITIES FOR NETWORK UPGRADES

ASSESSMENT CRITERIA:
1. Four common types of network cabling are described.
2. Three types of twisted pair cables are described.
3. Components of structured cabling are described.
4. Telecommunications distribution facilities or wiring closets are described.

CONTENTS:
- Planning a Network
- Performing Network Upgrade Planning Phases
- Identifying Physical Environment
- Cabling Considerations
- Using Structured Cable

CONDITIONS:
The following resources are needed in this learning outcome:
- Host computer with the Windows operating system
- Access to the command prompt
- Internet connection
- Routes Traced worksheet for each destination URL. The worksheet is attached to this lab. Each student completes their own worksheets and gives them to the instructor.
- Global Connectivity Map, which is attached at the end of this lab
- Access to the PC command prompt
- Existing Floor Plan (provided in lab)

METHODOLOGIES:
- Group discussion
- Interaction
- Simulations

ASSESSMENT METHODS:
- On-line Examination
- Interview/question and answer
- Observation
- Summative test
LO3: RECOMMEND NETWORKING EQUIPMENT TO FULFILL CUSTOMER REQUIREMENTS

ASSESSMENT CRITERIA:
1. Managed and in-house network services and maintenance arrangements are compared and contrasted.
2. LAN switches are evaluated to fulfill user requirements.
3. Routers are evaluated to fulfill user requirements.
4. Catalyst 2960 family of network switches is described.
5. Reliability and Availability in the context of networking is defined.
6. Methods of providing fault tolerance to a network are described.
7. Examples of network devices that require IP addresses are given.

CONTENTS:
- Purchasing and Maintaining Equipment
- Purchasing Equipment
- Selecting Network Devices
- Selecting LAN Devices
- Selecting Internetworking Devices
- Networking Equipment Upgrades
- Designing Considerations

CONDITIONS:
The following resources are needed in this learning outcome:
- Host computer with the Windows operating system
- Access to the command prompt
- Internet connection
- Routes Traced worksheet for each destination URL. The worksheet is attached to this lab. Each student completes their own worksheets and gives them to the instructor.
- Global Connectivity Map, which is attached at the end of this lab
- Access to the PC command prompt
- Existing Floor Plan (provided in lab)

METHODOLOGIES:
- Group discussion
- Interaction
- Simulations

ASSESSMENT METHODS:
- Interview/question and answer
- Summative test
- Online Examination
UNIT OF COMPETENCY : PLAN THE ADDRESSING STRUCTURE

MODULE TITLE : PLANNING THE ADDRESSING STRUCTURE

MODULE DESCRIPTION : This module covers the knowledge, skills and attitude required to determine and configure the network addresses.

NOMINAL DURATION : 44 hours

QUALIFICATION LEVEL : CCENT (CISCO CERTIFIED ENTRY-LEVEL NETWORKING TECHNICIAN)

SUMMARY OF LEARNING OUTCOMES:

At the end of this module, the student should be able to:

- **LO1**: implement an IPv4 addressing scheme to meet network requirements.
- **LO2**: explain how Network Address Translation (NAT and PAT) are used in a network.
LO1: IMPLEMENT AN IPV4 ADDRESSING SCHEME TO MEET NETWORK REQUIREMENTS

ASSESSMENT CRITERIA:
1. IPv4 network and host addresses are described.
2. Custom classful subnet masks given a network address and user requirements are created.
3. Requirements for enabling hosts on different subnets to communicate are explained.
4. Addressing design is created and applied.
5. Common problems associated with IP addressing and host configurations are identified and corrected.

CONTENTS:
• IP Addressing in the LAN
• Reviewing of IP Addresses
• Subnetting a Network
• Customing Subnet Masks
• Making VLSM and Classless Inter-Domain Routing (CIDR)
• Communicating Between Subnets

CONDITIONS:
The following resources are needed in this learning outcome:
• Computer running Windows XP Professional
• Connection to a gateway router or an ISR using PAT
• Internet connection
• Access to the PC command prompt.

METHODOLOGIES:
• Group discussion
• Interaction
• Simulations

ASSESSMENT METHODS:
• Interview/question and answer
• Observation
• Summative test
LO2: EXPLAIN HOW NETWORK ADDRESS TRANSLATION (NAT AND PAT) ARE USED IN A NETWORK

ASSESSMENT CRITERIA:
1. Advantages and disadvantages of NAT are explained.
2. NAT address types are identified.
3. Operation of NAT and PAT is explained.
4. IPv6 addresses and how they solve issues involving NAT are described.

CONTENTS:
• Explaining NAT and PAT
• Performing Basic Network Address Translation (NAT)
• Using IP NAT Terms
• Configuring Static and Dynamic NAT
• Describing Port-based Network Address Translation (PAT)
• Identifying IP NAT Issues

CONDITIONS:
The following resources are needed in this learning outcome:
• Computer running Windows XP Professional
• Connection to a gateway router or an ISR using PAT
• Internet connection
• Access to the PC command prompt.

METHODOLOGIES:
• Group discussion
• Interaction
• Simulations

ASSESSMENT METHODS:
• Interview/question and answer
• Observation
• Summative test
• Online Examination
UNIT OF COMPETENCY : CONFIGURE NETWORK DEVICES

MODULE TITLE : CONFIGURING NETWORK DEVICES

MODULE DESCRIPTION : This module covers the knowledge, skills and attitude required to configure network devices.

NOMINAL DURATION : 52 hours

QUALIFICATION LEVEL : CCENT (CISCO CERTIFIED ENTRY-LEVEL NETWORKING TECHNICIAN)

SUMMARY OF LEARNING OUTCOMES:

At the end of this module, the student should be able to:

**LO1:** install a Cisco Integrated Services Router (ISR).
**LO2:** explain different methods of configuring Cisco devices.
**LO3:** configure an ISR using SDM Express and SDM.
**LO4:** complete an initial router configuration using Cisco IOS.
**LO5:** configure a Cisco router for LAN connectivity, Internet connectivity and NAT using the Cisco IOS CLI of the Cisco IOS software.
LO1: INSTALL A CISCO INTEGRATED SERVICES ROUTER (ISR)

ASSESSMENT CRITERIA:
1. ISR is defined.
2. Major external features of an ISR are described.
3. Cisco IOS software and optional features are defined.
4. Items that are included with a new ISR are described.
5. Resources required to install new ISR are described.
6. Cisco ISR is physically set up and powered up.
7. Boot up of a Cisco ISR are monitored and checked for errors.

CONTENTS:
• Performing Initial ISR Router Configuration
• Defining ISR
• Connecting Physical Setup of the ISR
• Performing Bootup Process
• Connecting Cisco IOS Programs

CONDITIONS:
The following resources are needed in this learning outcome:
• Cisco 1841 ISR router with SDM version 2.4 or later installed and with basic configuration completed
• (Optional) Other Cisco router model with SDM installed
• Windows XP computer with Internet Explorer 5.5 or later and Sun Java Runtime Environment (JRE) version 1.4.2_05 or later (or Java Virtual Machine (JVM) 5.0.0.3810)
• Straight-through or crossover Category 5 Ethernet cable
• Access to PC network TCP/IP configuration

METHODOLOGIES:
• Group discussion
• Interaction
• Simulations

ASSESSMENT METHODS:
• Interview/question and answer
• Observation
• Summative test
• Online Examination
LO2: EXPLAIN DIFFERENT METHODS OF CONFIGURING CISCO DEVICES

ASSESSMENT CRITERIA:
1. In-band and out-of-band device managements are compared and contrasted.
2. Cisco IOS and Cisco SDM are compared and contrasted.
3. Device configuration files are displayed, described and erased.
4. Importance of documenting device configurations is explained.

CONTENTS:
- Using Cisco SDM Express and SDM
- Constructing Cisco SDM Express
- Performing SDM Express Configuration Options
- Configuring WAN Connections Using SDM Express
- Configuring NAT Using Cisco SDM

CONDITIONS:
The following resources are needed in this learning outcome:
- Cisco 1841 ISR router with SDM version 2.4 or later installed and with basic configuration completed
- (Optional) Other Cisco router model with SDM installed
- Windows XP computer with Internet Explorer 5.5 or later and Sun Java Runtime Environment (JRE) version 1.4.2_05 or later (or Java Virtual Machine (JVM) 5.0.0.3810)
- Straight-through or crossover Category 5 Ethernet cable
- Access to PC network TCP/IP configuration

METHODOLOGIES:
- Group discussion
- Interaction
- Simulations

ASSESSMENT METHODS:
- Interview/question and answer
- Observation
- Summative test
- Online Examination
LO3: CONFIGURE AN ISR USING SDM EXPRESS AND SDM

ASSESSMENT CRITERIA:
1. SDM and SDM Express are compared and contrasted.
2. Configuration functions available with SDM Express are explained.
3. SDM Express is started.
4. Basic configuration tasks using SDM Express are completed.
5. LAN interface with SDM Express is configured.
6. WAN interface with SDM Express is configured.
7. Default route using SDM Express is created.
8. NAT using SDM Express is enabled.
9. Basic security options using SDM Express are configured.
10. SDM Express configuration to the router is reviewed and delivered.
11. Router and start SDM are connected.
12. SDM interface is navigated.
13. Basic dynamic NAT configuration choices using SDM are made.
14. SDM developed configuration prior to delivery is reviewed.
15. Telnet and SSH are compared and contrasted.
16. A route to accept terminal sessions over SSH, using SDM is configured.

CONTENTS:
- Configuring a Router Using IOS CLI
- Identifying Command Line Interface Modes
- Using the Cisco IOS CLI
- Using Show Commands
- Performing Basic Configuration
- Configuring An Interface
- Configuring a Default Route
- Configuring DHCP Services
- Configuring Static NAT using Cisco IOS CLI
- Backing up a Cisco Router Configuration

CONDITIONS:
The following resources are needed in this learning outcome:
- Cisco 1841 ISR router with SDM version 2.4 or later installed and with basic configuration completed
- (Optional) Other Cisco router model with SDM installed
- Windows XP computer with Internet Explorer 5.5 or later and Sun Java Runtime Environment (JRE) version 1.4.2_05 or later (or Java Virtual Machine (JVM) 5.0.0.3810)
- Straight-through or crossover Category 5 Ethernet cable
- Access to PC network TCP/IP configuration
METHODOLOGIES:
- Group discussion
- Interaction
- Field trips
- Simulations
- On-the-job training

ASSESSMENT METHODS:
- Interview/question and answer
- Observation
- Summative test
LO4: COMPLETE AN INITIAL ROUTER CONFIGURATION USING CISCO IOS

ASSESSMENT CRITERIA:
1. Operation of Cisco routers (router bootup process, POST, router components) is described.
2. Router modes and how to move between them are explained.
3. IOS help and ? commands are used to learn about router commands.
4. Command history, shortcut keys, and shorthand commands are used.
5. Basic show commands to check router status are used.
6. Initial router configuration using Cisco IOS is created and saved.

CONTENTS:
- Connecting the CPE to the ISP
- Installing the CPE
- Making a Customer Connections over a WAN
- Choosing a WAN Connection
- Configuring WAN Connections

CONDITIONS:
The following resources are needed in this learning outcome:
- Cisco 1841 ISR router with SDM version 2.4 or later installed and with basic configuration completed
- (Optional) Other Cisco router model with SDM installed
- Windows XP computer with Internet Explorer 5.5 or later and Sun Java Runtime Environment (JRE) version 1.4.2_05 or later (or Java Virtual Machine (JVM) 5.0.0.3810)
- Straight-through or crossover Category 5 Ethernet cable
- Access to PC network TCP/IP configuration

METHODOLOGIES:
- Group discussion
- Interaction
- Simulations

ASSESSMENT METHODS:
- Interview/question and answer
- Observation
- Summative test
LO5: CONFIGURE A CISCO ROUTER FOR LAN CONNECTIVITY, INTERNET CONNECTIVITY AND NAT USING THE CISCO IOS CLI OF THE CISCO IOS SOFTWARE

ASSESSMENT CRITERIA:
1. WAN DCE and DTE devices and the role of the CSU/DSU are described.
2. Three common types of WAN connections are described.
3. LAN and WAN interfaces for basic connectivity are configured and verified.
4. Default route is defined, configured and verified.
5. A router as a DHCP server using IOS CLI and verify DHCP functionality is configured.
6. Static NAT on a router using IOS CLI is configured and verified.
7. PAT on a router using IOS CLI is configured and verified.
8. Configuration to a TFTP server is backed up and restored.
9. Router using SSH is configured.

CONTENTS:
• Performing Initial Cisco 2960 Switch Configuration
• Configure a Standalone Switches
• Using Power Up the Cisco 2960 Switch
• Performing Initial Switch Configuration
• Connecting the LAN Switch to the Router
• Identifying Cisco Discovery Protocol

CONDITIONS:
The following resources are needed in this learning outcome:
• Cisco 1841 ISR router with SDM version 2.4 or later installed and with basic configuration completed
• (Optional) Other Cisco router model with SDM installed
• Windows XP computer with Internet Explorer 5.5 or later and Sun Java Runtime Environment (JRE) version 1.4.2_05 or later (or Java Virtual Machine (JVM) 5.0.0.3810)
• Straight-through or crossover Category 5 Ethernet cable
• Access to PC network TCP/IP configuration

METHODOLOGIES:
• Group discussion
• Interaction
• Simulations

ASSESSMENT METHODS:
• Interview/question and answer
• Observation
UNIT OF COMPETENCY : CONFIGURE STATIC AND DYNAMIC ROUTING

MODULE TITLE : CONFIGURING STATIC AND DYNAMIC ROUTING

MODULE DESCRIPTION : This module covers the knowledge, skills and attitude required in determining and configuring the routing protocols.

NOMINAL DURATION : 40 hours

QUALIFICATION LEVEL : CCENT (CISCO CERTIFIED ENTRY-LEVEL NETWORKING TECHNICIAN)

SUMMARY OF LEARNING OUTCOMES:

At the end of this module, the student should be able to:

   **LO1:** describe the purpose and function of routing and the protocols used to implement it.
   **LO2:** configure static and dynamic routing.
LO1: DESCRIBE THE PURPOSE AND FUNCTION OF ROUTING AND THE PROTOCOLS USED TO IMPLEMENT IT

ASSESSMENT CRITERIA:
1. Routing is defined.
2. Routing process is described.
3. Four general types of routes are defined.
4. Purpose of dynamic routing protocols is described.
5. Distance vector and link state routing algorithms are compared and described.
6. Common interior routing protocols are compared and contrasted.
7. Appropriate routing protocol for a given organization is selected.
8. Purpose and function of exterior routing protocols are described.

CONTENTS:
- Enabling Routing Protocols
- Routing Basics
- Routing Protocols
- Identifying Common Interior Routing Protocols
- Routing Within an Organization
- Configuring and Verifying RIP

CONDITIONS:
The following resources are needed in this learning outcome:
- Two routers, each with an Ethernet and serial interface. These should be non-SDM routers, if possible, because the required SDM startup configuration is deleted when the startup-configuration is erased.
- Two Windows XP computers
- Two straight-through Category 5 Ethernet cables (H1 to switch and switch to R1)
- Crossover Category 5 Ethernet cable (H2 to router R2)
- Null serial cable
- Console cables (from H1 and H2 to routers R1 and R2)
- Access to the H1 and H2 command prompt
- Access to the H1 and H2 network TCP/IP configuration

METHODOLOGIES:
- Group discussion
- Interaction
- Simulations

ASSESSMENT METHODS:
- Interview/question and answer
- Observation
LO2:  CONFIGURE STATIC AND DYNAMIC ROUTING

ASSESSMENT CRITERIA:
1. Default and static routing are configured.
2. RIPv2 is configured and verified.
3. BGP is configured and verified.

CONTENTS:
• Configuring Exterior Routing Protocols
• Using Autonomous Systems
• Routing Across the Internet
• Configuring Exterior Routing Protocols and the ISP
• Configuring and Verifying BGP

CONDITIONS:
The following resources are needed in this learning outcome:
• Two routers, each with an Ethernet and serial interface. These should be non-SDM routers, if possible, because the required SDM startup configuration is deleted when the startup-configuration is erased.
• Two Windows XP computers
• Two straight-through Category 5 Ethernet cables (H1 to switch and switch to R1)
• Crossover Category 5 Ethernet cable (H2 to router R2)
• Null serial cable
• Console cables (from H1 and H2 to routers R1 and R2)
• Access to the H1 and H2 command prompt
• Access to the H1 and H2 network TCP/IP configuration

METHODOLOGIES:
• Group discussion
• Interaction
• Simulations

ASSESSMENT METHODS:
• Interview/question and answer
• Observation
• Summative test
UNIT OF COMPETENCY : USING INTERNET SERVICE PROVIDER (ISP) SERVICES

MODULE TITLE : USING INTERNET SERVICE PROVIDER (ISP) SERVICES

MODULE DESCRIPTION : This module covers the knowledge, skills and attitude required in a workplace. The module includes enhancement of skills and knowledge about the ISP services and Domain Name System.

NOMINAL DURATION : 62 hours

QUALIFICATION LEVEL : CCENT (CISCO CERTIFIED ENTRY-LEVEL NETWORKING TECHNICIAN)

SUMMARY OF LEARNING OUTCOMES:

At the end of this module, the student should be able to:

- **LO1:** describe the network services provided by an ISP.
- **LO2:** describe the purpose and function of the protocols that support the network services provided by an ISP.
- **LO3:** describe the implementation of ISP and enterprise DNS.
- **LO4:** explain the common application layer services and protocols supported by the ISP.
LO1: DESCRIBE THE NETWORK SERVICES PROVIDED BY AN ISP

ASSESSMENT CRITERIA:
1. Services commonly provided by an ISP are listed.
2. Purpose of the Service Level Agreement is explained.

CONTENTS:
- Introducing ISP Services
- Knowing Customer Requirements
- Experiencing Reliability and Availability

CONDITIONS:
The following resources are needed in this learning outcome:
- Two Windows 2003 Servers with DNS running
- Administrative access to servers
- Internet connectivity

METHODOLOGIES:
- Group discussion
- Interaction
- Simulations

ASSESSMENT METHODS:
- Interview/question and answer
- Observation
- Summative test
- Online Examination
LO2: DESCRIBE THE PURPOSE AND FUNCTION OF THE PROTOCOLS THAT SUPPORT THE NETWORK SERVICES PROVIDED BY AN ISP

ASSESSMENT CRITERIA:
1. TCP/IP application layer protocols that are commonly supported by ISPs are described.
2. OSI model and the layered TCP model are compared and contrasted.
3. TCP and UDP and their functions in the data communication process are compared and contrasted.
4. Transport Layer that allows network devices to maintain multiple simultaneous data conversations are explained.

CONTENTS:
• Determining Protocols that Support ISP Services
• Reviewing TCP/IP Protocols
• Transport Layer Protocols
• Differences Between TCP and UDP
• Supporting Multiple Services

CONDITIONS:
The following resources are needed in this learning outcome:
• Two Windows 2003 Servers with DNS running
• Administrative access to servers
• Internet connectivity

METHODOLOGIES:
• Group discussion
• Interaction
• Simulations

ASSESSMENT METHODS:
• Interview/question and answer
• Observation
• Summative test
• Online Examination
LO3: DESCRIBE THE IMPLEMENTATION OF ISP AND ENTERPRISE DNS

ASSESSMENT CRITERIA:
1. TCP/IP host name and host name resolution are defined.
2. Components and structure of the DNS are described.
3. DNS name resolution process is explained.
4. ISP and local DNS servers and the importance of DNS service reliability are compared and contrasted.

CONTENTS:
- Defining Domain Name System
- Describing TCP/IP Host Name
- Identifying DNS Hierarchy
- Identifying DNS Name Resolution
- Implementing DNS Solutions

CONDITIONS:
The following resources are needed in this learning outcome:
- Two Windows 2003 Servers with DNS running
- Administrative access to servers
- Internet connectivity

METHODOLOGIES:
- Group discussion
- Interaction
- Simulations

ASSESSMENT METHODS:
- Interview/question and answer
- Observation
- Summative test
- Online Examination
LO4: EXPLAIN THE COMMON APPLICATION LAYER SERVICES AND PROTOCOLS SUPPORTED BY THE ISP

ASSESSMENT CRITERIA:
1. Common network services, and the associated application layer, protocols supported by ISPs are described.
2. A web server that delivers a web page to users is described.
3. Use of http protocol (including https) and the ports necessary is explained.
4. Purpose and operation of ftp are described.
5. Email server that sends and receives email is described.
6. Use of smtp, pop and imap protocols in a client/server environment is explained.

CONTENTS:
- Describing Services and Protocols
- Using ISP Services
- Comparing HTTP and HTTPS
- Using FTP
- Comparing SMTP, POP3, and IMAP4

CONDITIONS:
The following resources are needed in this learning outcome:
- Two Windows 2003 Servers with DNS running
- Administrative access to servers
- Internet connectivity

METHODOLOGIES:
- Group discussion
- Interaction
- Simulations

ASSESSMENT METHODS:
- Interview/question and answer
- Observation
- Summative test
UNIT OF COMPETENCY : MAINTAIN INTERNET SERVICE PROVIDER (ISP) RESPONSIBILITY

MODULE TITLE : MAINTAINING ISP RESPONSIBILITY

MODULE DESCRIPTION : This module covers the knowledge, skills and attitude required in a workplace. The module includes enhancement of skills and knowledge about the securing, monitoring and managing Internet Service Provider.

NOMINAL DURATION : 32 hours

QUALIFICATION LEVEL : CCENT (CISCO CERTIFIED ENTRY-LEVEL NETWORKING TECHNICIAN)

SUMMARY OF LEARNING OUTCOMES:

At the end of this module, the student should be able to:

LO1: describe ISP security policies and procedures.
LO2: describe security tools commonly used by ISPs.
LO3: describe the monitoring and management responsibilities of the ISP.
LO4: explain proper disaster recovery and server backup procedures.
LO1: DESCRIBE ISP SECURITY POLICIES AND PROCEDURES

ASSESSMENT CRITERIA:
1. Ways the ISP provides network security to its customers are explained.
2. Network security best practices are described.
3. Describe data encryption and its use with common application services.
4. Secure HTTP channels and examine website certificates are identified.
5. Three types of denial of service attacks and two ways of countering these threats are described.
6. Placement of ACLs given communication and security requirements is planned.

CONTENTS:
- Identifying ISP Security Considerations
- Using ISP Security Services
- Conducting Security Practices
- Performing Data Encryption

CONDITIONS:
The following resources are needed in this learning outcome:
- Windows XP Professional computer with administrative access
- NTFS File System on the computer and Simple File Sharing turned off (under the Folder Options of Windows Explorer.)
- User accounts preconfigured for users Bob and Joe
- Internet connectivity

METHODOLOGIES:
- Group discussion
- Interaction
- Simulations

ASSESSMENT METHODS:
- Interview/question and answer
- Observation
- Summative test
- Online Examination
LO2: DESCRIBE SECURITY TOOLS COMMONLY USED BY ISPS

ASSESSMENT CRITERIA:
1. Purpose and function of firewalls are described.
2. Purpose and function IPS and IDS devices are compared and contrasted.
3. Common wireless security measures are described.
4. WEP on a wireless router and client and verify connectivity is configured.
5. Ways in which host-based firewalls can protect ISP servers are described.
6. Anti-X software and its use on host computers are described.

CONTENTS:
• Using Security Tools
• Using Access Control Lists and Port Filtering
• Activating Firewalls
• Comparing IDS and IPS
• Configuring Wireless Security
• Applying Host Security

CONDITIONS:
The following resources are needed in this learning outcome:
• Windows XP Professional computer with administrative access
• NTFS File System on the computer and Simple File Sharing turned off (under the Folder Options of Windows Explorer.)
• User accounts preconfigured for users Bob and Joe
• Internet connectivity

METHODOLOGIES:
• Group discussion
• Interaction
• Simulations

ASSESSMENT METHODS:
• Interview/question and answer
• Observation
• Summative test
• Online Examination
LO3: DESCRIBE THE MONITORING AND MANAGEMENT RESPONSIBILITIES OF THE ISP

ASSESSMENT CRITERIA:
1. Purpose and common features of a SLA are described.
2. Role of the ISP in monitoring network performance is described.
3. In-band and out-of-band network monitoring tools are described.
4. Route to accept terminal sessions over SSH and Telnet is configured.
5. Utilize network monitoring software to monitor network performance is utilized.

CONTENTS:
- Monitoring and Managing the ISP
- Understanding Service Level Agreements
- Monitoring Network Link Performance
- Performing Device Management Using In-band Tools
- Using SNMP and Syslog

CONDITIONS:
The following resources are needed in this learning outcome:
- Windows XP Professional computer with administrative access
- NTFS File System on the computer and Simple File Sharing turned off (under the Folder Options of Windows Explorer.)
- User accounts preconfigured for users Bob and Joe
- Internet connectivity

METHODOLOGIES:
- Group discussion
- Interaction
- Simulations

ASSESSMENT METHODS:
- Interview/question and answer
- Observation
- Summative test
- Online Examination
LO4: EXPLAIN PROPER DISASTER RECOVERY AND SERVER BACKUP PROCEDURES

ASSESSMENT CRITERIA:
1. Responsibilities of the ISP with regard to service and equipment maintenance and data recovery are described.
2. Evaluate different methods of server backup are evaluated.
3. Backup procedures for servers, network device IOS and configuration files are described.
4. IOS backups and recovery are described.
5. Server backup plan is created.
6. Best practices for disaster recovery are explained.

CONTENTS:
- Performing Backups and Disaster Recovery
- Applying Backup Media
- Identifying Methods of File Backup
- Performing Cisco IOS Software Backup and Recovery
- Explaining Disaster Recovery Plan

CONDITIONS:
The following resources are needed in this learning outcome:
- Windows XP Professional computer with administrative access
- NTFS File System on the computer and Simple File Sharing turned off (under the Folder Options of Windows Explorer.)
- User accounts preconfigured for users Bob and Joe
- Internet connectivity

METHODOLOGIES:
- Group discussion
- Interaction
- Simulations

ASSESSMENT METHODS:
- Interview/question and answer
- Observation
UNIT OF COMPETENCY : TROUBLESHOOT A NETWORK

MODULE TITLE : TROUBLESHOOTING A NETWORK

MODULE DESCRIPTION : This module covers the knowledge, skills and attitude required to diagnose and troubleshoot computer systems.

NOMINAL DURATION : 70 hours

QUALIFICATION LEVEL : CCENT (CISCO CERTIFIED ENTRY-LEVEL NETWORKING TECHNICIAN)

SUMMARY OF LEARNING OUTCOMES:

At the end of this module, the student should be able to:

**LO1:** describe how to troubleshoot using the OSI Model.

**LO2:** describe, Identify and Correct issues that occur at Layer 1 and Layer 2 of the OSI Reference Model.

**LO3:** describe, Identify and Correct IP addressing issues that occur at Layer 3 of the OSI Reference Model.

**LO4:** describe, Identify and Correct routing issues that occur at Layer 3 of the OSI Reference Model.

**LO5:** describe, Identify and Correct issues that occur in the Transport and upper layers of the OSI Reference Model.
LO1: DESCRIBE HOW TO TROUBLESHOOT USING THE OSI MODEL

ASSESSMENT CRITERIA:
1. Methods used to troubleshoot on a network are described.
2. Problems that occur on various layers of the OSI reference model are described.
3. Troubleshooting tools and how they can be used are described.

CONTENTS:
- Troubleshooting Methodologies and Tools
- The OSI Model and Troubleshooting
- Troubleshooting Methodologies
- Troubleshooting Tools are used
- Performing Certification Study Guide

CONDITIONS:
The following resources are needed in this learning outcome:
- One 1841 router or other router with two Fast Ethernet interfaces
- One 2960 switch or comparable switch with Fast Ethernet interfaces
- Two Windows XP computers
- Two straight-through Category 5 Ethernet cables
- One crossover Category 5 Ethernet cable
- One RJ-45 rollover console cable
- Access to the command prompts for each host
- Access to the network TCP/IP configuration host

METHODOLOGIES:
- Group discussion
- Interaction
- Simulations

ASSESSMENT METHODS:
- Interview/question and answer
- Observation
- Summative test
- Online Examination
LO2: DESCRIBE, IDENTIFY AND CORRECT ISSUES THAT OCCUR AT LAYER 1 AND LAYER 2 OF THE OSI REFERENCE MODEL

ASSESSMENT CRITERIA:
1. Symptoms and issues related to Layer 1 and Layer 2 are described.
2. Bootup and hardware issues are identified and corrected.
3. Cable and device port errors are identified and corrected.
4. Identify and correct LAN connectivity issues are identified and corrected.
5. WAN connectivity issues are identified and corrected.

CONTENTS:
• Troubleshooting Layer 1 and Layer 2 Issues
• Identifying Layer 1 and 2 Problems
• Troubleshooting Device Hardware and Boot Errors
• Troubleshooting Cable and Device Port Errors
• Troubleshooting LAN Connectivity Issues
• Troubleshooting WAN Connectivity Issues
• Performing Certification Study Guide

CONDITIONS:
The following resources are needed in this learning outcome:
• One 1841 router or other router with two Fast Ethernet interfaces
• One 2960 switch or comparable switch with Fast Ethernet interfaces
• Two Windows XP computers
• Two straight-through Category 5 Ethernet cables
• One crossover Category 5 Ethernet cable
• One RJ-45 rollover console cable
• Access to the command prompts for each host
• Access to the network TCP/IP configuration host

METHODOLOGIES:
• Group discussion
• Interaction
• Simulations

ASSESSMENT METHODS:
• Interview/question and answer
• Observation
• Summative test
• Online Examination
LO3: DESCRIBE, IDENTIFY AND CORRECT IP ADDRESSING ISSUES THAT OCCUR AT LAYER 3 OF THE OSI REFERENCE MODEL

ASSESSMENT CRITERIA:
1. IP addressing at Layer 3 of the OSI reference model is described.
2. How to recognize and correct IP address design issues are described.
3. DHCP and NAT issues are described and corrected.

CONTENTS:
- Troubleshooting Layer 3 IP Addressing Issues
- Reviewing of Layer 3 Functionality and IP Addressing
- Performing IP Design and Configuration Issues
- Performing IP Address Planning and Allocation Issues
- Identifying DHCP and NAT Issues
- Performing Certification Study Guide

CONDITIONS:
The following resources are needed in this learning outcome:
- One 1841 router or other router with two Fast Ethernet interfaces
- One 2960 switch or comparable switch with Fast Ethernet interfaces
- Two Windows XP computers
- Two straight-through Category 5 Ethernet cables
- One crossover Category 5 Ethernet cable
- One RJ-45 rollover console cable
- Access to the command prompts for each host
- Access to the network TCP/IP configuration host

METHODOLOGIES:
- Group discussion
- Interaction
- Simulations

ASSESSMENT METHODS:
- Interview/question and answer
- Observation
- Summative test
- Online Examination
LO4: DESCRIBE, IDENTIFY AND CORRECT ROUTING ISSUES THAT OCCUR AT LAYER 3 OF THE OSI REFERENCE MODEL

ASSESSMENT CRITERIA:
1. Layer 3 Routing Issues are identified and corrected.
2. Routing table update issues are identified and corrected.

CONTENTS:
• Troubleshooting Layer 3 Routing Issues
• Identifying Layer 3 Routing Issues
• Identifying Dynamic Routing Errors
• Performing Certification Study Guide

CONDITIONS:
The following resources are needed in this learning outcome:
▪ One 1841 router or other router with two Fast Ethernet interfaces
▪ One 2960 switch or comparable switch with Fast Ethernet interfaces
▪ Two Windows XP computers
▪ Two straight-through Category 5 Ethernet cables
▪ One crossover Category 5 Ethernet cable
▪ One RJ-45 rollover console cable
▪ Access to the command prompts for each host
▪ Access to the network TCP/IP configuration host

METHODOLOGIES:
• Group discussion
• Interaction
• Simulations

ASSESSMENT METHODS:
• Interview/question and answer
• Observation
• Summative test
• Online Examination
LOS: DESCRIBE, IDENTIFY AND CORRECT ISSUES THAT OCCUR IN THE TRANSPORT AND UPPER LAYERS OF THE OSI REFERENCE MODEL

ASSESSMENT CRITERIA:
1. Traffic filtering errors are identified and corrected.
2. Upper layer issues are identified and corrected.

CONTENTS:
- Troubleshooting Layer 4 and Upper Layer Issues
- Identifying Layer 4 Traffic Filtering Errors
- Troubleshooting Upper Layer Problems
- Using Telnet to Check Upper Layer Connectivity
- Performing Certification Study Guide

CONDITIONS:
The following resources are needed in this learning outcome:
- One 1841 router or other router with two Fast Ethernet interfaces
- One 2960 switch or comparable switch with Fast Ethernet interfaces
- Two Windows XP computers
- Two straight-through Category 5 Ethernet cables
- One crossover Category 5 Ethernet cable
- One RJ-45 rollover console cable
- Access to the command prompts for each host
- Access to the network TCP/IP configuration host

METHODOLOGIES:
- Group discussion
- Interaction
- Simulations

ASSESSMENT METHODS:
- Interview/question and answer
- On line examination
- Observation
- Summative test