Computer Maintenance & Networking Assistant (CMNA)

Core Qualification File Syllabus:

Theory	Hrs	Practical	Hrs
UNIT 1 **1.1 Introduction to Data Communication & Networking** a) Data Communications: Components, Data representation. b) Basic concepts: Servers, Client, Workstation, Hosts (Definition & Applications). c) Types of computer networks: LAN, MAN and WAN. d) Types network architecture: Peer-to-peer, Client-Server and Distributed. e) Transmission Types: Simplex, Half duplex and Full duplex **1.2 Network Topologies and Networking Devices :** a) Type of Topology - Bus Topology; Ring Topology; Star Topology; Mesh Topology; Tree Topology; Hybrid Topology. b) Network Control Devices -Hubs; Switches; Routers; Bridges; Repeaters; Gateways; Modems. **1.3 Transmission Media :** a) Guided Media -Twisted Pair - UTP, STP; Coaxial Cable; Optical Fiber. Advantages of optical fiber and Disadvantages of optical fiber. b) Un-Guided Media: Wireless Communication-Communication Band; c) Microwave Communication; Satellite Communication.	8+6+6 = 20	1) To study the different expansion slots of a motherboard, set the NIC to expansion slot and to install the driver. 2) To locate MAC address of computer and other networking devices. 3) Identify and Compare Network directing devices i.e. Hub, Switch, Router. 4) To study crimping: RJ-45, RJ-11, Cross-over and straight Cable and Create a Network cable using RJ45 connectors.	17
UNIT 2	10+5+7 = 22	5) To make a peer-to-peer Network System.	24

2.1Standardization of Network Model : a) Basic idea on OSI Reference Model. b) Physical layer; Data link layer; Network layer; Transport layer; Session layer; Presentation layer; Application layer. c) TCP/IP Reference Model. d) Comparison of the OSI and TCP/IP reference models. **2.2 Multiplexing & Switching :** a) FDM, TDM, WDM, ADM. b) Circuit Switching: Time division & space division switch, Packet Switching, Message Switching. **2.3 IP Addressing :** a) IP Address Assignments; b) IP Address Classes; Subnet Masking; c) Registered and unregistered Addresses		6) Implementing a TCP/IP Network configuring. 7) Create LAN using 10 machines(approx.) and practice a) file sharing b) internet sharing c) printer sharing 8) Create LAN using 10 machines (approx.) and then use suitable subnet mask to create two different sub networks with those machines. 9) To run the following application in a network system and get knowledge: (i) FTP, (ii) Telnet, (iii) mail. 10) To use the ping, tracert, arp, rarp, etc. utility in order to understand its use in a troubleshooting environment.	
UNIT 3 **3.1 Brief idea about BIOS :** Typical Motherboard BIOS, BIOS Features, BIOS & Boot Sequences, BIOS Shortcoming & Compatible Issues, BIOS Troubleshooting, BIOS Upgrades. **3.2 Introduction to the Hard Disk :** Introduction, Disk Basics, Disk Performance & Characteristics, Hard Disk Partitioning, Drive Testing & troubleshooting. **3.3 Motherboard & Buses :** Introduction, Motherboard Components, Expansion Slots system Bus Functions & Features. Upgrading & Troubleshooting Motherboard, General Bus Troubleshooting.	5+5+5 = 15	11) Study the motherboard layout of Pentium IV and study the chipset through data books or the Internet. 12) CMOS setup of Pentium. 13) Hard Disk partitioning. 14) Study of HDD: Identify various components of HDD and write their functions. 15) Study and installation of any one display cards: VGA or SVGA display cards.	15

UNIT 4 **4.1 Basic Memory Concepts:** Introduction, Installing Memories, Upgrade Options & Strategies, Replacing Memories with Higher Capacities. Troubleshooting with memory. **4.2 Printers:** Printer Technology, Types of Printer, How Printer Works, Attaching Printer, Installing Printer Drivers. **4.3 Solution of Error Code (s):** Fault findings and Common Printer Problems with Beep Code, Post Code, and Post Reader Card.	5+5+5 = 15	16) Installation of Scanner, Printers and Modems. 17) Study of SMPS (ATX). 18) Assembling and disassembling of Personal Computer. 19) Fault findings: a. Problems related to RAM, b. Problems related to Hard Disk, c. Problems related to CPU, d. Problems related to Motherboard, e. Problems related to monitor, etc. 20) Loading and configuration of Microsoft Windows latest OS (Windows 7/8/10) and Linux OS.	10
UNIT-5 **Project 1: Inserting and Removing a Processor: In this project, you remove and install a processor. As you work, be very careful to not bend pins on the processor socket and protect the processor against ESD. Do the following:** **1.** Verify the computer is working. Turn off the system, unplug it, and open the computer case. Remove the cooler assembly and processor. Be extra careful not to damage the assembly. 2. You are now ready to reinstall the processor and cooler. But first have your instructor check the thermal compound. You might need to install a small amount of compound to account for compound lost when you removed the cooler. 3. Reinstall the processor and cooler. Power up the system and verify all is working. Have your instructor check your work for credit.			10
Project 2a: Inserting and Removing Motherboards: Using your old assigned computer, practice inserting and removing the expansion cards and motherboard. Use manual book to re-connect the wires. Have your instructor check your computer at each step of the process. 1. After removal of expansion cards and motherboard. 2. After the motherboard and expansion cards are re-installed and wires are connected. 3. After case is fastened and computer is power on.			10

Project 2b : Inserting and Removing RAM and CMOS Battery: Using your old assigned computer, practice inserting and removing the RAM and the CMOS Battery. Examine the RAM and determine the size and speed of the modules in your computer. Have your instructor check your computer at each step of the process. 1. After removal of both the battery and RAM. Tell the instructor the size and speed of your modules. 2. After both are reinstalled. 3. After the case is fastened and the computer is powered on.	
Project 3: Understanding Hardware Documentation **1.** Obtain the manual for the motherboard for your PC. (You will need to download it from the motherboard manufacturer's Website.) 2. List at least three functions of jumpers on the board as well as the corresponding jumper settings. 3. List the processors that the board supports. 4. What type of RAM does the motherboard support? 5. Print a copy of the page that shows where wires connect to the Motherboard. Be sure it includes the On/Off Power Switch, Power LED, HD LED and Reset wires.	5

OUTCOMES

Outcomes to be assessed /NOSs to be assessed	Assessment criteria for the outcome
1.1 Explain Data Communication & Networking	1.1.1 Identify various network media needed to make successful LAN and WAN connections and their distinct roles. 1.1.2 Able to explain the basic concepts of Client, Server, Workstation, Hubs and their applications. 1.1.3 Able to explain different types of Network architectures: Peer-to-Peer, Client-Server and Distributed. 1.1.4 Able to explain the basic concepts of Transmission Types : Simplex, Half duplex and Full duplex
1.2. Explain Network Topologies and Networking Devices	1.2.1 Identify different topologies used in networking with their relative advantages and disadvantages. 1.2.2 Able to explain various types of networking devices and media with their usage.
1.3 Illustrate Transmission Media	1.3.1 Able to demonstrate installation of Network card, altering MAC address and revealing original MAC. 1.3.2 Able to specify the advantages and disadvantages of optical fiber. 1.3.3 Able to illustrate making crossover and straight cable. 1.3.4 Able to explain the concept of Wireless and Microwave Communications.

2.1Explain standardization of Network Models such as OSI and TCP/IP	2.1. Able to describe the protocols and services provided by different layers in the OSI and TCP/IP models and describe how these layers operate in various networks. 2.1.2 Able to compare the OSI and TCP/IP reference models.
2.2 Demonstrate Multiplexing & Switching	2.2.1 Able to Set up and configure Networking System using various Computer networking & Sharing devices. 2.2.2 Able to demonstrate Share and control resource and Internet connection through network
2.3 Explain & demonstrate IP addressing	2.3.1 Able to Install and configure a network and configure IP address static and dynamic, DNS, default gateway. 4) Able to design, calculate, and apply subnet masks and addresses to fulfill any organization's requirements
3.1 Explain BIOS, its concept, compatibility issues, troubleshooting issues etc	3.1.1 Able to explain Computer Hardware Fundamentals 3.1.2 Able to explain the concept of BIOS shortcoming and Compatible Issues 3.1.3 Able to demonstrate Working with the BIOS Troubleshooting and BIOS upgradation.
3.2 Demonstrate partitioning, formatting, testing, its set-up, installation etc. of hard disk	3.2.1 Able to Create partitioning of hard disk, formatting, Testing and identifying the bios chip. 3.2.2 Able to Work with CMOS Setup and Installation & Configuration of HDD
3.3 Explain the concept of Motherboard & Buses	3.3.1Able to explain Motherboard Components, Expansion Slots system Bus Functions and Features 3.3.2 Able to illustrate Upgrading & Troubleshooting Motherboard, General Bus Troubleshooting.
4.1 Assemble a computer with all hardware components and install operating system & application software	4.1.1 Able to Work with installing Memories, Upgrade Options & Strategies. 4.1.2 Able to Perform all the functions with Electrical and Electronic Components related to Computer and Networking system following safety precautions. 4.1.3 Able to Assemble and repair Desktop Computers with all its hardware components. 4.1.4 Able to Install different Operating Systems and all other application software.
4.2 Install printer, scanner and troubleshoot their faults	4.2.1 Able to explain the function of Printer, Scanner 4.2.2 Able to explain types of Printers and scanner available in market 4.2.3 Able to Install Printer, Scanner 4.2.4 Able to troubleshoot general problems associated with installation and running of Printer and scanner
4.3 Troubleshoot faults associated with different parts of a computer & networking equipment	4.3.1 Able to identify and Troubleshoot of malfunctioning of RAM/ROM, different slots, CPU, PCI, PCI-EXPRESS, Connector, ATX 24 pin, 4 pin Fan. 4.3.2 Able to identify various kinds of faults, and repair, service, and replace faulty parts.

5.1. Demonstrate insertion and removal of processor, motherboards, RAM and CMOS battery of a computer system.	5.1.1 Able to remove and Insert a Processor in a computer system 5.1.2 Able to remove and Insert Motherboard in a computer system 5.1.3 Able to remove and Insert RAM and CMOS battery 5.1.4 Able to explain details from the manual for the motherboard of a PC.