GIRIJANANDA CHOWDHURY UNIVERSITY

6 Month Certificate Course

In

COMPUTER HARDWARE &
NETWORK MAINTENANCE

Department of Electronics and Communication Engineering

6 month Certificate Course in **COMPUTER HARDWARE & NETWORK MAINTENANCE**

1) Course Title: 6 month Certificate in **COMPUTER HARDWARE & NETWORK MAINTENANCE**
2) Department: ECE (GCU)
3) Duration: 6 month
4) Eligibility: 12th pass in science stream / ITI / Diploma / Graduate
5) Timing: Weekdays
6) Mode: **Offline**
7) Fee structure: ₹15000

Course Objectives:

• To provide students with the knowledge of computer systems, desktops and peripherals
• To impart knowledge of installing, diagnosing, repairing and upgrading all hardware equipments.
• To introduce students with the setup and maintain of LAN with internet connection.

Course outcome:
Upon the completion of this course

• Students will understand the basics of computer systems along with peripherals
• Students will be able to do troubleshooting of different computer related issues
• Students will learn to determine and installing appropriate security measures
• Students will be able to provide the technical support on-site
• Students will troubleshoot software and hardware problems related to internet applications.

6-month certificate in Computer Hardware & Network Maintenance

Course structure

Course Code	Course Name	Hours/ week	Credits No. of	Internal Assess.	Theory	Practical	marks Max.
CCHN-1	Basics of Electrical and Electronics Components	4	4	30	70	-	100
CCHN-2	Introduction to computer and peripherals	4	4	30	70	-	100
CCHN-3	Computer networks	4	4	30	70		100
CCHN-4	Basics of Electrical and Electronics Lab	4	2	20	-	30	50
CCHN-5	Introduction to computer and peripherals Lab	4	2	20	-	30	50
CCHN-6	Computer networks Lab	4	2	20	-	30	50
Total		24	18	150	140	90	450

Course Code: CCHN-1
Course name: Basics of Electrical and Electronics Components
Credits: 4
No of contact hours: 4 hrs /week

Module 1 : Basic concepts of Electricity

Concept of current and voltage. AC, DC Supply. Different types of Fuses and their applications. Different types of connectors used in electrical and electronic applications. Use of voltmeters and ammeters. AC and DC meters. Measuring instruments, MC, MI type, Ammeter, Voltmeter, Multimeter for measuring voltage and current. Construction, characteristics/ features and specification. Digital Multimeter, Meaning of Circuit and basic electrical circuits. Meaning of resistance, continuity and continuity testers. Concept of Power and measurement using V& I meter and Power meter.

Module 2: Resistors, Soldering and De-soldering.

Classification, characteristics and application of different types of resistors. Colour coding of resistors. Calculating measuring resistance value and its tolerance value. Wattage of resistors, specific resistance and their importance. Resistors in series and parallel. Temperature dependent resistors and their applications. (PTC and NTC). Voltage dependent resistor (VDR), Photoelectric effect, Light Dependent resistors. Variable resistors, pots, presets, types and application. Log and Linear resistor, Ohms law and Kirchhoff's Laws. Soft soldering and precautions to be taken for making a good solder joint. Types of solder and need of soldering paste. Printed circuit boards and its application. De-soldering tools.

Module 3: Inductance

Definition of inductance. Properties. Types of inductors and their application. Inductive reactance, measuring inductance and inductive reactance. Meaning of lead, lag. Effect of inductor on power factor. Frequency dependence of inductive reactance. Self and Mutual inductance. Coefficient of coupling. Transformers. Turns ratio. Transformer winding. Winding machines. Transformer losses and efficiency. Uses, losses, efficiency type of cores and uses for LF, HF, VHF transformer, Transformers used in high frequency applications

Module 4: Capacitance and Resonance circuits.

Working principle of capacitors. Electrostatic action, dielectric constant. Unit of capacitance and capacitive reactance. Types of Capacitors-electrolytic, ceramic, polyester, tantalum, mica, surface mounted. Colour coding, and tolerance. Measuring capacitance and capacitive reactance. Behavior of capacitance at different frequencies, Capacitors in series and parallel. Meaning of Resonance.Series and parallel resonance circuits.

Module 5: Electronic Components

Semiconductor, intrinsic and extrinsic semi conductors, P and N type semiconductor. Development of P.N. junction, barrier potential. Effect of temperature. Breakdown voltage. Different types of Diodes. Diode terminals. Forward and reverse characteristics of diode. Testing diodes using Multimeter. Half wave and Full

wave rectifiers using diodes. Transformer requirements. Calculating output DC, ripple factor. Bridge rectifier. Calculating output DC, ripple factor. Filters for rectifiers. Calculating output DC, ripple factor. Zener diode-Its characteristics and application for voltage regulation. Calculating the series resistor for required current rating. Specifications of a regulated power supply and testing a power supply for its specifications

Module 6: Transistor and Amplifiers

Working principle of PNP, Bipolar transistors. Types of transistors and applications. Leads of transistors and their identification.Forward and reverse bias of transistor Junction. General values of junction resistances. Quick testing a transistor-using Multimeter. Transistor configuration -CB, CE, CC, alpha, beta. Types of Biasing of transistor amplifiers, comparison and applications. Thermal runaway. Steady and Dynamic characteristics.

Module 7: Power supply

Unregulated, regulated DC Power supply specifications. Application of different types of power supply for specific application types. Series regulator using transistor. Short circuit protection. Overload protection. Shunt regulators using transistors. Fixed Voltage regulators using IC's. Variable voltage regulators using IC's. Mains voltage stabilizers. Inverters and converters, Un-interrupted power supply, types and applications.

Module 8: Other Electrical & Electronics Accessories

Relays, types and its working principles, Basics of gears, Belts, Stepper Motor, Drive. Sensors, its types and working principles. Relays, types and its working principles. Introduction to Microprocessor, Pentium processor architecture basics. Timing Circuits, Electronic Display (7 segment, LED, LCD, Plasma, LED matrix.

Course Code: CCHN-2
Course name: Introduction to computer and peripherals
Credits: 4
No of contact hours: 4 hrs/ week

Module 1: Digital Electronics

Number systems and conversions. Classification of digital IC's. Use of data book for identification of digital IC's. Basic LOGIC GATES and truth table. Boolean algebra.Logic families, logic levels, propagation delay. Multiple input gates. XOR, XNOR gates and application. Simplification of Boolean equations, Combinational logic circuits. Half adder, full adder, parallel binary adder, half subtractor, full subtractor. Commercially available adders/ subtractors. Comparator, decoders, encoders, multiplexer, demultiplexer. Parity generators/ checkers. RS, JK, Master slave flip, flop

Module 2: Introduction to Computer

Introduction to computers, classification, generations, applications. Basic blocks of a digital computer. Hand Tools Basics and Specifications. Types of cabinets, relation with mother board form factor. Precautions to be taken while opening and closing PC cabinet. Main devices components, cards, boards inside a PC (to card or device level only). Types and specifications of the cables and connectors used for inter connecting the devices, boards, cards, components inside a PC. Precautions to be taken while removing and/or re-connecting cables inside a PC.

Module 3: Hardware Identification

Types of I/O devices and ports on a standard PC for connecting I/O devices. Function of keyboard, brief principle, types, interfaces, connectors, cable. Function of Mouse, brief principle, types, interfaces, connectors, cable. Function of monitor, brief principle, resolution, size, types, interfaces, connectors, cable. Function of Speakers and Mic, brief principle, types, interfaces, connectors, cable. Function of serial port, parallel port, brief principle of communication through these ports, types of devices that can be connected, interface standards, connectors, cable. Precaution to be taken while connecting/removing connectors from PC ports. Method of ensuring firm connection.

Specifications of processors (Intel Celeron, P4family, Xeon dual core, quad core, core2 duo, i3, i5, i7 and AMD). Memory devices, types, principle of storing. Data organization 4bit, 8-bit, word. Semiconductor memories, RAM, ROM, PROM, EMPROM, EEPROM, Static and dynamic. Example of memory chips, pin diagram, pin function. Concept of track, sector, cylinder. FD Drive components read write head, head actuator, spindle motor, sensors, PCB. Precaution and care to be taken while dismantling Drives. Drive bay, sizes, types

of drives that can be fitted. Precautions to be taken while removing drive bay from PC. HDD, advantages, Principle of working of Hard disk drive, cylinder and cluster, types, capacity, popular brands, standards, interface, jumper setting. Drive components- hard disk platens, and recording media, air filter, read write head, head actuator, spindle motor, circuit board, sensor, features like head parking, head positioning, reliability, performances, shock mounting capacity. HDD interface IDE, SCSI-I/2/3 comparative study. Latest trends in interface technology in PC and server HDD interface. Concept of SATA and SACH, Precautions to be taken while fitting drives into bays and bay inside PC cabinet. CMOS setting. (restrict to drive settings only). Meaning and need for Using Scan disk and defrag. Basic blocks of SMPS, description of sample circuit.

Module: 4 : Types of software.

System software-OS, Compiler. Application   software-like MS office. High level, low level language, Computer application scientific industrial   and   business. Functions of an operating system. Disk   operating system. Concept of GUI, Modes   of   starting on different occasions. Desktop, Icon, selecting,   choosing, drag and drop. My computer, network neighborhood /   network places. Recycle bin, briefcase, task bar, start menu, tool bar, and menus. Windows Explorer.Properties of files and folders.Executing application programs. Properties of connected devices. Applications under windows accessories.Windows Help.Finding files, folders, computers. Control panel. Installed devices and properties.

Utilities for recovering data from defective/bad hard disks.

Introduction to removable storage devices, Bulk data storage   devices-magnetic, optical,   and magneto optical drives, WORM drives. CD   ROM   drives-Technology, Types of CD drives, working   principle application. Minor repairs and maintenance of CD ROM drives. Technology,   working principle, capacity, media of ZIP drives. Important   parts and functions of a ZIP drive. Minor repairs and maintenance of ZIP drive. Technology,   working principle, capacity, media of DAT   Drive   and   back-up procedures. Important   parts   and functions of DAT drive.

Module 5: Hard Drives

What's Inside a Hard Drive? How Hard Disks Work Inside: Hard Drive Motherboard Desktop, Hard Drive Buyer's Guide, What is RAID? Using Multiple Hard Drives for Performance and Reliability Partitioning hard disk (primary and extended partitions) , Learn how to prevent your PC from getting malware , All the different types of malware and how they attack your PC The difference between Anti-Virus   and   Anti-Spyware software20System Utilities, How to check to see if your hard drive has bad sectors , Fix the master boot record, How to run an in-place installation, Using Task Manager and event Bad Sectors in Hard disk, Master   Boot Record, in-place installation, Registry fixing, performance level check,   Shortcut   fixing, Fixing   Startup process, log, etc. Users and user account. Privileges, scope, Sectors in Hard disk, Master   Boot Record, in-place installation, Registry fixing, performance level check,   Shortcut   fixing, Fixing   Startup   process, log, etc. Users and user account. Privileges, scope, permissions etc. Concept of Virtual Machines

Module 6: Windows Update & Device Driver

Version of a software, Service pack, Updating of OS, Different configurations of Computer system and its peripherals, Compatible with different hardware/software. Software Installation–Pre-installation - Prerequisites, Install procedure, Rollback or Un-install procedure, Tests. Post-installation –Backup procedure & specifications, Restore procedure, Periodical view check. Awareness of legal aspects of using computers such as copyright, patent et

What is a Device manager? Computer Maintenance Tips and Tricks to Backup, Scan and Clean Power on self test, Peripheral diagnostics, general purpose diagnostics, Operating system diagnostics. Hardware boot process, Windows boot process. Junk files, deleted files, configuration of internet browser.-Introduction to UNIX/LINUX and its structure.-Files and Processes in Linux.-Directory structure of Linux O.S. Outlook – Add and use contacts, Calendar basics, Recall and replace sent messages, Send automatic replies when you're out of the office, The ins and outs of BCC, Use Instant Search to find Calendar items, Use Instant Search to find contacts, Use Instant Search to find messages and text, Add holidays to your calendar, Create or delete a search folder, Import and export vCards to Outlook contacts, Make the switch to Outlook 2013, Reach out with contact groups (distribution lists), Send or delete an email stuck in your outbox, Take calendars to the next level, Track email with read receipts, Password protect your mailbox, Use rules to manage your em

Module 7: Laptop PCs :

Introduction of laptop and comparison of various Laptops. Block diagram of laptop & description of all its sections. Study of parts of a laptop. Input system: Touchpad, Trackball, Track point, Docking station, Upgrade memory, hard disk, replacing battery, Configuring wireless internet in a laptop, Latest Tools & Gadgets For Desktop/Laptop Repair

Introduction to word processing and comparison of features. Creating and saving document files using Word Processing Software. Formatting test and editing. Setting page and margins. Tabs and indents. Creating multicolumn documents. Inserting pictures in documents.

Introduction to spread sheet. Creating Worksheets using, Spreadsheet Software. Formatting cells. Using formula in cells. Graphs and tables. Advanced features

Introduction to Power Point and its advantages. Creating Slide Shows. Fine tuning the presentation and good presentation technique.

Linux operating system / Windows operating System
Basic Linux commands. Linux file system, The Shell Users and fill permissions, vi editor, X window system, Filter Commands, Processes. Shell Scripting. Concept of UNIX.

Printer and Plotters
Types of printers, Dot Matrix printers, laser printer, Ink jet printer, line printer. Block diagram and function of each unit head assembly, carriage, and paper feed mechanism. Front panel controls and interfaces. Pin details of interface port. Installation of a printer driver and self test. Ribbon types used, refilling of ribbons. Printer

cable testing defects, effect and servicing. Printer head, types, cleaning and replacing procedures. Printer power supply, circuit analysis, defects, servicing. Carriage motor assembly, paper feed assembly, sensors Procedure for dismantling and replacing mechanical parts. Printer control board, circuit, function, probable defects, servicing. Working principle of LASER printer. Refilling toner cartridges, equipment available for refilling and procedure. Printer drum, function, cleaning and replacing procedure. Mechanical parts and sensors on printer, function, replacement procedure. Working principle of Inkjet / DeskJet printers. Working principle of Plotter and its common faults.

Scanner and MFD

Working principles of Scanner, Barcode Scanner, Network Scanner. Working principles and configuration of Multifunction Printer, Passbook printer, High Speed Printer, Line Printer, Network Printer

Course Code: CCHN-3
Course name: Computer networks
Credits: 4
No of contact hours: 4 hrs /week

Module 1: Network Components

Introduction to Computer Networks – Advantages of Networking, Peer-to-Peer and Client/Server Network. Network Topologies – Star, Ring, Bus, Tree, Mesh, Hybrid. Type of Networks – Local Area Networks (LAN), Metropolitan Area Networks (MAN), Personal Area Network (PAN), Controller Area Network (CAN), Wide Area Networks (WAN). Internet, Ethernet, WI-Fi, Bluetooth, Mobile Networking, Wire and wireless Networking. Difference between Intranet and Internet. Extranet, 3G

Module 2: Crimping & Punching

Communication Media and Connectors – Unshielded , twisted-pair (UTP), shielded twisted-pair (STP), Fibre Optic and coaxial cable: RJ-45, RJ-11, BNC. Understanding colour codes of CAT5 cable. 568A and 568B convention.

Network Cabling : Introduction to Data Communication – Analog and Digital Signals, Simplex, Half-Duplex and Full-Duplex transmission mode.

Network Model : The functions of different layers in OSI and TCP/IP model, Concept of wireless networking, wireless survey.

Module 3: Configuration of Data communication equipments

Network Components - Modems, Firewall, Hubs, Bridges, Routers, Gateways, Repeaters, Transceivers, Switches, Access point, etc. Types, functions, advantages and applications of Network Component. Layer 2 manage switch configuration and use it on network. Latest emerging concepts using open source simulators. Layer 3 switch configuration. VLAN Basic and configurations. Understand the use of Network simulation software and the process of use it.

Module4: IP Addressing & TCP/IP

Protocols, TCP/IP, FTP, Telnet etc, Classes of IP Addressing, Setting IP Address (IP4/IP6) & Subnet Mask. Simple Mail Transfer Protocol (SMTP), Telnet , File Transfer Protocol (FTP), Hyper Text Transfer Protocol (HTTP) , Simple Network Management Protocol (SNMP). LDAP (Lightweight Directory Access Protocol). Introduction to Network Security. Concept of Dynamic Host Control Protocol.

Sharing Resource & Internet connection: Concept of committed bandwidth. Concept of Internet.Architecture of Internet. DNS Server. Internet Access Techniques. ISPs and examples (Broadband, Dialup, Wifi). Concept of Social Networking Sites, Video Calling & Conferencing. Concept of Virus and its Protection using Anti Virus, UTM and Firewall. SSID , Concept of wireless controllers. Concept of SD WAN.

Concept of resource sharing through network. Working principle of Proxy Server. Objective of using it. Features of Proxy Server. Concept of VPN.

Network Protection and troubleshooting : Collaborating using wired and wireless networks, Protecting a Network, Network performance study and enhancement. Techniques & strategies to prevent various attacks on networking.

Module 5: Control & monitoring of network devices

Remote desktop software like NetMeeting, Team Viewer etc. Audit process of a switch/router/APs etc. Surveillance using network devices, collaboration on network for team optimization and support activities. Remote management of devices. Network monitoring and maintaining techniques.

Module 6: Introduction to Windows Server

 Server concepts, installation step, configuration of server. Concept of Active Directory and DNS. Setting up of DHCP, Routing and remote access.
Linux Server : Basic configurations. Editing /etc/hosts file. Concept of DHCH, DNS, WEB SERVER(Apache), SUMBA • Linux package and package installer. Concept of virtual server and containers, cloud computing.

Module 7: Network Security
Modern Network Security. Threats and the basics of securing a network. Secure Administrative Access. LAN security considerations. Aadhar based authentication. Wi-Fi security considerations.

Module 8: Internet and Web Browser

 World Wide Web and website Web Browsing and popular web browsing software. Introduction to Search Engines, Popular Search engines. Concept of Favorites Folder. Concept of Electronic Mail. Email Addressing, BCC and

Course Code: CCHN-4
Course name: Basics of Electrical and Electronics Lab
Credits: 2
No of contact hours: 4 hrs /week

- Identify specification of different types of fuses, switches.
- Identify of meter types and measuring range.
- Construct a simple circuit using AC/DC supply, lamp, fuse and switch.
- Measure circuit voltage and current using voltmeters and ammeters. Also check voltage between earth and neutral
- Measure voltage and current using Multi-meter (analog- digital).
- Use Multimeter to check fuses, lamps and switches.
- Measure DC and AC power using V-I method and using power meter.
- Identify different types of resistors from physical appearance.
- Identify resistor value and tolerance using colour code.
- Measure resistance using Multimeter.
- Practice of soldering and de soldering techniques, practice using hook-up wires. Soldering resistors on Tag board. Practice using surface mount board/ device.
- Verify of Ohms Law and Kirchhoff's Laws.
- Practice of soldering resistors on PCB and De-soldering
- Experiment to check VDR's.LDR'sand Presets
- Identification of different types of inductors and its specifications.
- Measure inductance using LCR meter. Calculate Inductive reactance at different input signal frequencies.
- Identify of different types of capacitors from colour code and typographic code.
- Test working condition of capacitor. Discharge first then test a charged capacitor. Measure capacitance using RLC meter.
- Measure capacitive reactance at different frequencies.
- Measure capacitance and capacitive reactance of capacitors in series and capacitors in parallel
- Identify terminals of different types of diodes. Record its specifications referring to diode datasheet.
- Plot forward and reverse characteristics of diode Testing working condition of diodes.
- Construct and test a half wave and full wave diode rectifiers. (06 hrs)
- Construct and test a Bridge rectifier with and without filter
- Draw Zener diode characteristics, Simple voltage regulator using zener diode.
- Identify types transistors based on their physical appearance. Identify the leads of the given assorted types of transistors.
- Practice Quick test given transistors using Multimeter. Identify opens, shorted junctions.
- Assemble and test a fixed voltage regulator using
- Assemble and test a variable voltage regulator using IC.
- Identify and Test Relays. Try to use it on electronic circuit.

- **Course Code:** CCHN-5
- Course name: Introduction to computer and peripherals Lab
- **Credits: 2**
- **No of contact hours: 4 hrs /week**

- Identification of digital circuits. Verify the truth table of two input OR, NOR, AND, NAND, NOT gates and test truth table of multiple input logic gates
- Construct small circuit using digital electronic components.
- Identify the front and rear panel ports and connectors on a PC cabinet
- Open the cabinet and identify various motherboards components, connectors slots, ports (USB, VGA, DVI, and HDMI), cables and Connectors.
- Identify Motherboard Components and connections. CPU (Processor) RAM (Memory) Hard Drive Connections Mechanical vs. Solid State Drives ROM Drives Graphic Cards, Sound Cards
- Use of SMPS Tester for fault troubleshooting
- Identify connectors with data and power cables, connector used to connect external devices.
- Install & configure add-on cards
- Check various front panel connections on motherboard (power switch, reset switch and HDD Led). Check power and reset switch connection. Replace faulty power switch from cabinet and assemble a new one.
- Check DDR3 and DDR4 RAM's FSB. Insert it on memory slot. Test and understand various beep sounds in case of trouble.
- Find the CMOS/ROM BIOS chip on mother board
- Install a Hard Drive. Identify and check data and power cable and SATA and SACH ports in motherboards
- Troubleshoot defects related to SMPS, its cable, connector and servicing procedure. Removing a Power Supply. Installing a Power Supply. Use SMPS tester
- Install a Graphic and sound cards. Remove them safely.
- Install and removing cooling Fans on pc cabinet
- Removing the Motherboard carefully and Install it again.
- Removing the Processor, Installing the Processor. Understand and identify various different processor sockets
- Find the CMOS Battery. Test it with multimeter. Replace it.
- Boot the PC through a BOOTABLE DVD of OS. Partition the disk, Format the drive. Install Windows 7 and Windows 10
- Practice keyboard shortcuts of mouse activities.
- How to Backup/Restore your Windows partition with the bootable image
- Open windows explorer and find different drives, files and folders, their size and other properties. Do it through command prompt also
- Open control panel and get familiar with different options and their appropriate use (taskbar and start menu, Programs and features, Display, System, Sound, Devices.
- Open command prompt in windows 7 and 10.Open disk drives, folders and files. Execute important commands like DIR, ATTRIB, DEL, RD, DISKPART, COPY, MOVE etc. Use Power shell commands
- Open Device Manager, find various devices and install appropriate driver software (audio, video, chipset, LAN, WLAN, printer and monitor). Use & practice WMIC console.

- Collecting and installing specific/compatible Device driver from internet. Update the driver software from internet. Uninstall
- View System Information to check various configuration of the PC

- **Course Code:** CCHN-6
- Course name: Computer networks Lab
- **Credits: 2**
- **No of contact hours: 4 hrs /week**

• Identify various Network tools like : (a) Wire crimper, (b) Wire Map Testers, (c) Multifunction Cable Tester, (d) LAN Tester, (e) Tone Generator etc
• Identify various Network device like: (a) Switch (Normal and Managed), (b) Router(Normal and wireless), (c) Rack, Patch Panel, i/o box, (d) Access Point etc
• Understand the Layout of network on your lab and campus
• Practice crimping with straight and cross CAT 6 cables.
• Punching practice in IO Box and patch panel.
  - Create cabling using Fibre Optic cable and connectors.
  - Create cabling in a lab with HUB/Switch and IO Boxes and patch panel.
  - Fit Switch Rack.
  - Install &Configure a Peer- to-Peer Network using Windows and Linux Software.
  - Connect computers using Bluetooth, WI-FI, hotspot
  - Connect computers with Network with Drop cable and using Wi Fi configuration.
  - Configure Basic Programmable switch (layer two) and practice to set up Spanning Tree Protocol (STP) from Command Line Interface (CLI).
  - Configure Layer 3 Switch. Verify IP Routing Process. Configure it from CLI in layer three switches.
  - Create simple VLAN and understand the concepts
  - Use Packet tracer Simulator Software
  - Practice IP Addressing technique (IPv4/IPv6) and Sub netting and Super netting the network
  - Install and Configure TCP/IP Protocol. Practice FTP, Telnet and NS lookup.
  - Use popular TCP/IP (windows and Linux) Utilities like PING, IPCONFIG, HOSTNAME, ROUTE, TRACERT etc
  - Practice to set up and use SMTP, TELNET, FTP, HTTP, SNMP, LDAP, SSH, NTP, IPP, HTTPS etc.
  - Configure a wireless router in the lab and practice port forwarding with security features.
  - Practice on configuring DHCP.
  - Configure internet connection to the pc through wire. Check its process. Find the fault and troubleshoot the problems.
  - Configure internet connection to the PC using wireless technology and troubleshoot various connection related problems.
  - Share the internet connection (wire and wireless) in the local network and access it from other machine in LAN.
  - Configure Access Point. Configure both cloud based and frame based access point. Practice LAN controller of access point.
  - Configure internet connection using L2 and L3 switch.
  - Setup and Configure security features in wired and wireless LAN with internet connection.
  - Demonstrate MPLS network.
  - Install Proxy Server and configure it.
  - Use free VPN software
  - Set up basic protection using public keys and MAC address filters.
  - Understand and use Power over Ethernet (PoE).

- Troubleshoot wired and wireless network
- Setup IP camera for basic surveillance scenario, logging and monitoring of devices / locations.
- Use Linux Network Tools to check / maintain / Manage Network.
- Configure services like Active Directory, DNS and DHCP.
- Configure of broadband modem and sharing internet connection
- Configure following on Linux Server: (a) /etc/hosts file, (b) DHCP, (c) DNS, (d) WEB SERVER, (e) NFS and SAMBA.
- Find package installed on your system (DPKG, YUM, DNF) using system control command for configuration and monitoring daemon and services
    - Practice on firewall technologies to secure the network perimeter.
    - Practice LAN security considerations and implement endpoint and Layer 2 security features.
    - Configure Wi-Fi to implement security considerations.