Syllabus For Computer Hardware & Networking,V2

Course Name	**COMPUTER HARDWARE & NETWORKING, V2**
Course Code	**STC - ITE/2021/2110, V2**
Occupation	Computer Hardware & Network Maintenance Assistant
Job Description	The person will help in computer related operation and function involved in office activities regarding software installation, Hardware maintenance, network maintenance etc. He will also assist Hardware Analyst and Network Administrator
Anticipated Volume of Training	720 Hrs (Theory: 150 Hrs + Practical: 360 Hrs + Employability Skill: 60 Hrs. + OJT 150 Hrs.)
Trainees' Entry Qualification	Class 8 Pass + ITI (2 Yrs) with 2 years experience, OR Class 10 Pass + ITI (1Yr) after class 10 with 1 year experience, OR Class 10 Pass + ITI (2 yrs) after class 10, OR Class 10 Pass with 2 years experience, OR Class 10 Pass and pursing continuous regular schooling, OR 3 years diploma after class 10 or Class 12 Pass with 6 months experience, OR Previous Relevant Qualification of NSQF Level 3 with 2 yrs experience.
Trainers Qualification	M.E./M.TECH IN ELECTRONICS / ELECTRICAL ENGINEERING / COMPUTER SCIENCE / IT, B.E/B.TECH IN ELECTRONICS / ELECTRICAL ENGINEERING / COMPUTER SCIENCE / IT, 2 Years' Experience.

Structure of Course:

Module No.	Module name	Outcome	Theory (Hrs)	Practical (Hrs)	OJT (Hrs)	Total (Hrs)
1	Computer Fundamentals & Basics of Power System in a Computer.	Identify different parts of a computer system along with installation of SMPS and UPS ITE/2110/OC1	10	20		30
2	Introduction to SMPS & UPS.		10	20		30
3	Introduction to Basic Input Output System.		10	20		30
4	Introduction to Operating System.	Install different OS in a new Computer and all other application software and configure the machine along with install and configure windows and linux server ITE/2110/OC2	10	20		30
5	Computer Management.		10	20		30
6	Disk Partitioning	Assemble and repair Desktop Computer and laptop with all its hardware components, alongwith install & connect accessories like optical drive, keyboard, mouse, monitor, Printer and troubleshoot them. ITE/2110/OC3	10	20		30
7	Details about Central Processing Unit & Main board		10	20		30
8	Primary and Secondary Memory.		10	20		30
9	Computer Accessories		10	20		30

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Module No.	Module name	Outcome	Theory (Hrs)	Practical (Hrs)	OJT (Hrs)	Total (Hrs)
10	Virus/ Malwares	Implement Network Security to protect from various attacks on networking system. ITE/2110/OC4	10	20		30
11	Data Communications and Networking.	Setup and configure networking system using various network devices ITE/2110/OC5	20	70		90
12	Knowledge of Network Topologies, Networking Devices, Transmission Media, Sharing of resources.		20	70		90
13	Knowledge of Internet & Internet Network Configuration		10	20		30
14	Employability Skill	Employability Skill ITE/2110/OC6				60
15	OJT	Work in real job situation with special emphasis on basic safety and hazards in this domain ITE/2110/OC7		150	150	150
		TOTAL:	150	360	150	720

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Module No. 1: Computer Fundamentals & Basics of Power System in a Computer.

Theory Content:

1.1.   Computer Fundamentals History and Generations of Computer (Gen 1 to 5).

1.2.   Architecture of the Computer.

1.3.   Description of Different parts of a computer.

1.4.   Idea about System Software and Application Software. Operating system concept (Basic knowledge).

1.5.   Fundamentals of Electricity, About AC and DC

1.6.   How AC is converted into DC in a Computer

Practical Content:

1.1.   Identification of different Components of a computer and demonstration and uses of them.

1.2.   Different Tools / equipment used for assembling/ disassembling a PC.

1.3.   Demonstrations of the power flow inside a computer through slides/ PPT.

1.4.   Identification of the power source, coloured wires of interest etc.

Module No. 2: Introduction to SMPS & UPS.

Theory Content:

2.1.   SMPS Features, Functions.

2.2.   Types of SMPS

2.3.   Power distribution in SMPS
2.4.   Components and Circuits inside the SMPS Unit
2.5.   Types of UPS Offline, Line Interactive & Online.
2.6.   Working Principle of each type of UPS.
2.7.   Connecting, Maintenance and Troubleshooting.

Practical Content:

2.1.   A running SMPS demonstration

2.2.   Installation of a SMPS on a cabinet

2.3   Isolated Power testing by sorting.

2.4.   Live UPS Demonstration.

2.5.   Changing dead battery from an UPS.
2.6.   Troubleshooting -relay, fuse and Circuits.

Module No. 3: Introduction to Basic Input Output System.

Theory Content:

3.1.   Introduction to BIOS/CMOS Setup, POST(Power on Self-Test)

3.2.   Demonstration of BIOS/CMOS Configuration (Date, Time, Enable/Disable Devices).
3.3.   Dual BIOS Feature BIOS/CMOS Setup, Booting Sequence/Boot Order

Practical Content:

3.1.   Demonstration of BIOS / CMOS setup, POST in a Computer step by step.

3.2.   Demonstration of different types of configurations and effect of changes in an existing BIOS feature for a system.
3.3.   Implementation of Dual Booting setup preferably in windows with Linux (Ubuntu). **May be clubbed with Module 4.**

Module No. 4: Introduction to Operating System.

Theory Content:

4.1.   Definition and types of Operating Systems. Functions & Features of OS.
4.2.   MS-Dos (Prelims), Windows8.1, 10, 11, Red Hat 7 / Fedora Linux Server, Ubuntu,   MAC OS,   Android etc.

4.3.   Process of Booting the Operating System.
4.4.   Installation of Windows8.1, 10, 11 Activation and Automatic Updating procedures.
4.5.   Installation of Linux Server and Creating groups with file/ resource permission.

Practical Content:

4.1. Installation of different types of OS mentioned in module 4.2. Hands on practices of basic Dos command in cmd prompt.
4.3. Demonstration on Windows Using: Safe Mode, Safe Mode Boot options, Last Known Good Configuration, etc.
4.4. Demonstrating Windows Diagnostic Tools, System Restore, Creating Restore point, restore using Restore point, etc.
4.5. Windows Recovery using System Factory Defaults/Recovery tools
4.6. Installation of driver routines for the system.
4.7. Linux Server Configuration and manage devices.

Module No. 5: Computer Management.

Theory Content:

5.1. Computer Management, Disk Management, Defragmentation.
5.2. Services and Applications, Local Users and Groups.
5.3. Advanced System Settings,Device Manager, Task Manager, Windows Registry.
5.4 Different Service management by Linux using **system ctl** command.

Practical Content:

5.1. Demonstrating computer management in Windows using Disk manager, Shrink, Extend, and Creating Logical Drive etc.

5.2. Creating users, groups etc.

5.3. Installing & uninstalling program, devices driver from control panel, uses of task manager,termination of a process etc.
5.4 Start or stop services in Linux from super user prompt (#) using system service-related commands.

Module No. 6: Disk Partitioning

Theory Content:
6.1. Partitioning of Hard Drive/ SSD - Primary, Extended, Logical partitions using Partition Tools in Windows.
6.2. Partitioning of Hard Drive/ SSD - Primary, Extended, Logical partitions using Partition Command (mkpart) in Linux.

Practical Content:

6.1. Demonstration of Partitioning of Hard Drive/ SSD - Primary, Extended, and Logical partitions using Partition Tools in Windows through Disk Manager.
6.2. Demonstration of Partitioning of Hard Drive/ SSD - Primary, Extended, and Logical partitions using Partition Command (mkpart) in Linux.
6.3. Disk Imaging using Ghost Tools like Norton Ghost, Disk Imaging etc. Creating and Restoring Partition Images and Disk images. Using Ghost tools for Disk to Disk and Partition to Disk Ghosting.

Module No. 7: Details about Central Processing Unit & Main board

Theory Content:

7.1.   Definition of CPU, Architecture, Speed, Types of CPU (XT and AT technologies) 32/64 Bit.
7.2.   Types process or technologies like Clock speed, Bus speed, Cache memory.
7.3.   Threading technologies, Core technologies, IRQ & DMA Technologies.
7.4.   Brands (Intel/AMD), CPU Series –like Pentium, PI, PII, PIII, PIV etc.
7.5.   What is" I" Technology, Core series (i3, i5, i7).
7.6.   To explain about PGA and BGA and LGA Model processors, Pins/Sockets.
7.7.   Definition, Architecture, Compatibility with CPU's, Chipsets and Brands.
7.8.   What is Chipset, what is FSB, what is Bus, CPU Sockets, Interface Ports used to connect different Peripherals.
7.9.   I/O Ports (PS/2, Serial, Parallel, USB, VGA, HDMI, Audio, Ethernet, etc.)
7.10 Identifying Expansion Slots (PCI, AGP etc.), Power Form Factor.

Practical Content:

7.1.   Demonstration of different generation CPU (Intel /AMD), showing clock speed, Bus speed & other features.
7.2.   Demonstration of technological difference between different generations's CPU through slides, lecture, picture etc.
7.3.   Hand on practice to install CPU on the slot provided on the compatible main board.
7.4.   Demonstration of different generation's main board (Intel /AMD/ 3rd party) compatible with the system, showing clock speed, Bus speed & other features.
7.5.   Demonstration of different port and interfaces through hand on practices, slides, lecture, and picture as mentioned in theory classes.
7.6.   Hand on practice to install CPU on the slot provided on the compatible main board.
7.7.   Installation of external cards viz. graphics, sound, Ethernet etc. on the main board.

Module No. 8: Primary and Secondary Memory.

Theory Content:

8.1.   Introduction to RAM, ROM, Cache Memory, Buffer Memory, Virtual Memory. Speed, Timeline (EDO, NON-EDO, SD, RD, DDR, DDR2, DDR3, DDR4), Hybrid Memory.
8.2   Comparing and Installing RAM, Memory Module Form Factor, etc.

8.3   Introduction to HDD& SSD, Types, Functioning of HDD, Functioning of SSD, Dual Usage.
8.4   Interface Types of HDD & SSD (IDE or PATA, SATA, SCSI, PCI -E, MSATA, M.2), Data storage technique.
8.5   Tracks, Sectors, Cylinders, Cluster MBR, FAT Area, DIR Area, Zero Track
8.6   IDE Jumper settings (Primary/Secondary),(Master/Slave/Cable Select).
8.7   Installing and Configuring a New HDD / SSD.

Practical Content:

8.1.   Demonstration of different generation's RAM compatible with the system, showing speed, & other features.
8.2.   Hand on practice to install RAM on the slot provided on the compatible main board.
8.3.   Demonstration of different types of HDD/SSD, showing speed, characteristics & other features.
8.4.   Hand on practice to install HDD / SSD or both in a System.
8.5.   Hands on practice to make a HDD /SSD as Primary/ Secondary Master / Slave using IDE Jumper settings or cable select.
8.6.   Fresh installation a HDD/SSD, Partition, Installation of OS, Application S/W.

Module No. 9: Computer Accessories

Theory Content:
Optical Drive

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9.1   Types of Optical Drives -ROM/Writer,
9.2   Types of Media-(CD/DVD/ Blu-ray),
9.3   Difference between Red Ray technology Drives and Blue Ray Technology Drives.
9.4   Layers of CD and DVD,Difference between CD and DVD.
9.5   Storage Technology - Reading, Writing & Re Writing data, Drive Interfaces -(IDE/SATA).
9.6   Burning CD/DVD's using multiple Burning Tools, i.e., Nero, NTI, etc.
9.7   Creating, Managing and Burning ISO Images using tools like: Magic ISO, Power ISO etc.

Keyboard & Mouse

9.8   Types of Keyboards (Membrane / Mechanical), Keyboard Layout.
9.9   Working Principles of Keyboard (Make/Brake Scan Code, Key Matrix).
9.10   Keyboard Interfaces (DIN Type, PS/2, USB, wireless).
9.11   Keyboard Problems and Troubleshooting.
9.12   Types of Mouses (Ball Mouse, Optical Mouse, Trackball).
9.13   Principles of Mouse(X, Y Axis in Ball Mouse & DSP, Sensor in Optical Mouse). Mouse Interfaces(Serial, PS/2,USB,wireless), Mouse Problems and Troubleshooting

Monitor

9.15   Types of Monitors (CRT/LCD/LED), Working Principles of each type
9.16   Demonstration and Practical on Monitor Installation, Menu Configuration, Adjusting Monitor Settings, Monitor Power Supply types, Possible Problems and Troubleshooting.

Printer

9.17 Types of Printers (Dot Matrix, Inkjet, Laser, Thermal, All-in-One Printers, etc.), Interface Cables, Ports & Connectors.
9.18   Working Principles of each type, network Printer.
9.19   Installing a Printer and Configuring Drivers.
9.20   Possible Printer Problems and Troubleshooting Techniques.
9.21   Types of Scanners (Handheld, Flatbed, Sheet fed, Portable Scanners). Interface Cables, Ports &Connectors.
9.22   Working Principles of each type.
9.23   Installation of Scanner, Device Driver Installation.
9.24   Scanner Settings, Scanning Documents, Photos in different Formats like JPG, PDF etc.

Practical Content:

Optical Drive

9.1.   Demonstration of different types of Optical Disk. Jumper Settings.
9.2.   Hand on practice to learn on burning through requisite application Software.
9.3.   Connecting drives with the system with different interfaces.
9.4.   Hand on practice on Burning CD and DVD to create ISO image of software.
9.5.   Creating Recovery Image or Media(CD/DVD/ Pen drive) using Tools like Acronis Backup/ Recovery and Restoring the Image or Media.

Keyboard & Mouse

9.6   Demonstration of different types of Keyboards.

9.7   Keyboard roblems and Troubleshooting.

9.8   Hands on practice with different types of mouses.

9.9   Mouse Problems and Trouble shooting.

Monitor

9.10   Hands on practice with different types of mouses.

9.11   Mouse Problems and Trouble shooting.

Printer

9.12 Demonstration of different types of Printers (Dot Matrix, Inkjet, Laser, Thermal, All-in-One,network Printers etc.)

9.13   Installing a Printer and Configuring Drivers.

9.14   Printer Problems and Troubleshooting Techniques.

9.15   Demonstration of different types of Scanners (Handheld, Flatbed, Sheet fed, Portable Scanners).

9.16   Installing a Scanner and Configuring Drivers.

9.17   Scanner Problems and Printer Trouble shooting Techniques.

9.18 Hands on Practice of Assembling and disassembling a PC with accessories.

Module No. 10: Virus/ Malwares

Theory Content:

10.1   What is a computer virus? How Virus Attacks a computer.

10.2   Types of Viruses (Boot Sector Virus, Partition Virus, File Virus, Trojans, Etc.)

10.3   Malwares, Adwares, Spywares, Phishing Attacks, etc. Prevention and Curing Virus and Spywares.

10.4   Antivirus, Internet Security Tools, Updates etc.

Practical Content:

10.1   Hands on practice with different types of Securities might be imposed for a safe system.

10.2   Internet protocols and security breach.

10.3   Antivirus software, types, installation, Mechanisms.

Module No. 11: Data Communications and Networking.

Theory Content:

11.1 Identify various network media needed to make successful LAN and WAN connections and their distinct roles.

11.2   Understanding the basic concepts of Client, Server, Workstation, Hubs and their applications.

11.3 Understanding different types of Network architectures: Peer-to-Peer, Client-Server and Distributed.

11.4   Basic concept of Transmission Types: Simplex, Half duplex and full duplex Mode.

Practical Content:

11.1   Demonstration of different types of Network Implementation through Slides / Pictures.

11.2 Demonstration of Client, Server, Workstation, Hubs and their applications through Slides / Pictures.

11.3   Hand on Practice to identify Peer-to-Peer, Client-Server and Distributed network system.

11.4   Transmission media types Identification.

Module No. 12:   Knowledge of Network Topologies, Networking Devices, Transmission Media, Sharing of resources.

Theory Content:

12.1 Identify different topologies used in networking with their relative advantages and disadvantages.

12.2   Understanding the knowledge about various types of networking devices and media with their usage.

12.3 IP addressing, MAC addressing, Install and configure a network and configure IP address static and dynamic, DNS, default gateway.

12.4 Design, calculate, and apply subnet masks and addresses to fulfill any organization's requirements.

12.5 Working with installation of Network card, altering MAC address and revealing original MAC, Knowledge of making crossover and straight cable.

12.6 Introduction to windows networking.

12.7 Introduction to Linux Networking. Configuring IP Address on Linux Systems.

Practical Content:

12.1 CrimpingRJ45Connectors, CAT V/ VI wired Colour Matching for Type A and Type B Connection.

12.2   Hand on practice for communication to windows networking.

12.3   Data Sharing, Printer Sharing.

12.4   Remote Desktop Connection using Windows RDC.

12.5 Creating Shared Folders for each user, Assigning Access Rights and Changing Ownership for Shared Folders using File Server Wizard.

12.6   Installing, Configuring Windows Server, DNS, ADS, DHCP Configuration.

12.7   Print Sharing in Linux OS, and sharing between Windows & Linux systems using SAMBA services.

Module No. 13: Knowledge of Internet & Internet Network Configuration

Theory Content:

13.1 Introduction to Internet, Uses of Internet, Working on Internet using various browsers like Edge, Chrome, Firefox, Opera, etc. Explaining URL, HTTP, HTTPS, etc. Clearing Browser Cache.

13.2 Creating Mail ID's, Send/Receive Mails, Mail Client Configuration using Outlook/Thunder bird, etc.

13.3   Internet Configuration using ADSL Router / Modem.

13.4 Introduction to Network Devices: ADSL Router, Wi-Fi Router, Wireless Access Point.   Firewall concepts.

13.5   Configuring and securing Wireless Networks and Access Points, SSID.

13.6   Providing Wireless Client Access with Secure Key and MAC Filtering.

Practical Content:

13.1   Hand on practices on internet, mail and browser properties, security settings.

13.2   Configuring mailbox with Outlook.

13.3   Hands on practice to configure Router and or Modem through Admin.

13.4   Hands on practice to configure Router and or Modem through Admin password.

13.5   Create and configure SSID for secured Wireless connection through a router / modem.

13.6 Practice on different advanced application on router / Wi-Fi modem to produce security filter / firewall in network access.

Learning Outcome – Assessment Criteria

Module No.	Outcome	Assessment Criteria
1	Identify different parts of a computer systema along with installation of SMPS and UPS	**After completion of this module students will be able to:** 1.1 Identify the different Components of a computer. 1.2 Associate different Tools / equipment used for assembling/ disassembling a PC. 1.3 Understand the various types of power flows inside a computer. 1.4 Identify the coloured wires of interest and purposes. 1.5 Identify and functionalities of SMPS & UPS. 1.6 Install SMPS. 1.7 Troubleshoot SMPS and UPS. 1.8 Configure BIOS or CMOS in a Computer system. 1.9 understand the different features associated with BIOS / CMOS. 1.10 Implement Dual booting sequence.
2	Install different OS in a new Computer and all other application software and configure the machine along with install and configure windows and linux server	**After completion of this module students will be able to:** 2.1 Know about the booting process. 2.2 Install OS Windows/ Linux. 2.3 Partition of HDD / SSD. 2.4 Create groups and accessibility. 2.5 Manage different resources in a computer system. 2.6 Create Services and Applications, Local Users and Groups. 2.7 Start / Stop different services using Task Manager / Service manager of the computer system.
3	Assemble and repair Desktop Computer and laptop with all its hardware components, alongwith install & connect accessories like optical drive, keyboard, mouse, monitor, Printer and troubleshoot them.	**After completion of this module students will be able to:** 3.1 Understand the CPU architecture. 3.2 Install a CPU on a compatible mainboard. 3.3 Troubleshoot Mainboard and processor compatibility. 3.4 Identify different slots on a mainboard and installation of related cards in the computer system. 3.5 Demonstrate of different generation's RAM compatible with the system, showing speed, & other features. 3.6 Install RAM on the slot provided on the

Module No.	Outcome	Assessment Criteria
		compatible main board.
		3.7 Demonstrate different types of HDD/SSD, showing speed, characteristics & other features.
		3.8 Install an HDD/SSD, create Partition, Installation of OS, Application S/W.
		3.9 Demonstrate different types of Optical Disk. Jumper Settings.
		3.10 Connect drives with the system using different interfaces.
		3.11 Burn CD and DVD to create ISO image of software.
		3.12 Create Recovery Image or Media (CD/DVD/ Pen drive) using Tools like Acronis Backup/ Recovery and Restoring the Image or Media.
		3.13 Demonstrate different types of Keyboards.
		3.14 Troubleshoot Keyboard and Mouse Problems.
		3.15 Demonstrate different types of Monitors & Working Principles of each type.
		3.16 Attach, Configure, Adjust Monitor Settings.
		3.17 Detect Possible Problems and Troubleshoot Monitors.
		3.18 Demonstrate different types of Printers (Dot Matrix, Inkjet, Laser, Thermal, All-in-One, network Printers etc.) and Scanners (Handheld, Flatbed, Sheet fed, Portable Scanners).
		3.19 Install a Printer and Configuring Drivers.
		3.20 Install a Scanner and Configuring Drivers.
		3.21 Detect Scanner Printer Problems Troubleshoot.
4	Implement Network Security to protect from various attacks on networking system.	**After completion of this module students will be able to:** 4.1 Understand with different types of Securities might be imposed for a safe system. 4.2 Learn internet protocols and security breach. 4.3 Work with Antivirus software.

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Module No.	Outcome	Assessment Criteria
5	Setup and configure networking system using various network devices	**After completion of this module students will be able to:** 5.1 Identify various network media needed to make successful LAN and WAN connections and their distinct roles. 5.2 Understand the basic concepts of Client, Server, Workstation, Hubs and their applications. 5.3 Understand different types of Network architectures: Peer-to-Peer, Client-Server and Distributed. 5.4 Understand basic concept of Transmission Types: Simplex, Half duplex and Full duplex Mode. 5.5 Identify different topologies used in networking with their relative advantages and disadvantages. 5.6 Understanding the knowledge about various types of networking devices and media with their usage. 5.7 Know about IP addressing, MAC addressing, Install and configure a network and configure IP address static and dynamic, DNS, default gateway. 5.8 Design, calculate, and apply subnet masks and addresses to fulfill any organization's requirements. 5.9 Working with installation of Network card, altering MAC address and revealing original MAC, Knowledge of making crossover and straight cable. 5.10 Introduction to windows networking. 5.11 Know about ADSL Router, Wi-Fi Router, Wireless Access Point. Firewall concepts. 5.12 Configure and secure Wireless Networks and Access Points, SSID. 5.13 Providing Wireless Client Access with Secure Key and MAC Filtering.

List of Tools, Equipment & materials needed for 30 Trainees (Practical)

Sl No	Items with description	Qty
1	Desktop Computer, 32/64 bit i3/i5/i7 or any latest processor, WIFI enabled, License OS antivirous compatible with trade related software, necessary component etc.	20
2	Laptop (Standard)	2
3	Printer (Standard)	1
4	Network Printer (Standard)	1
5	UPS (Standard)	As required
6	LCD Projector (Standard)	1
7	Computer Toolkits (Standard)	2
8	Computer Spares (Standard)	As required
9	Mother board (different make)/ Standard	3
10	Cabinet	3
11	Processor (Different make)	2
12	Hard Disk (Different make)	2
13	External Hard Disk	2
14	Keyboard	2
15	Webcam (Standard)	1
16	Crimping Tool, pliers (Standard)	2
17	Different types of Memory Card	2

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Sl No	Items with description	Qty
18	SMPS Trainer Kit	2
19	SMPS Tester	2
20	RAM (1GB / 512 MB)	As required
21	Wireless Network Adapter	As required
22	Router	1
23	LAN Cable Tester	1
24	Network Cables (Standard)	As required
25	Multimeter	2
26	Consumables Goods	As required

Marks Distribution

Outcome	Outcome Code	Total Th Marks	Total Pr. Marks
Identify different parts of a computer system along with installation of SMPS and UPS	ITE/2110/OC1	30	80
Install different OS in a new Computer and all other application software and configure the machine along with install and configure windows and linux server	ITE/2110/OC2	20	60
Assemble and repair Desktop Computer and laptop with all its hardware components, alongwith install & connect accessories like optical drive, keyboard, mouse, monitor, Printer and troubleshoot them.	ITE/2110/OC3	40	100
Implement Network Security to protect from various attacks on networking system.	ITE/2110/OC4	10	40
Implement Network Security to protect from various attacks on networking system.	ITE/2110/OC5	50	220
Work in real job situation with special emphasis on basic safety and hazards in this domain (OJT).	ITE/2110/OC6	0	300
Employability Skill-60 Hrs	DGT/VSQ/N0102	50	0