

CBSE | DEPARTMENT OF SKILL EDUCATION

CURRICULUM FOR SESSION 2026-2027

ELECTRONICS & HARDWARE (SUB. CODE - 847)

JOB ROLE: INSTALLATION TECHNICIAN – COMPUTING AND PERIPHERALS

CLASS – XI & XII

INTRODUCTION:

It is a matter of great pleasure to introduce this learning outcome based curriculum as part of the vocational training packages for the job role of **Electronics & Hardware – Installation Technician Computing and Peripherals**. The curriculum has been developed for the secondary students of vocational skill education and is aligned to the National Occupation Standards (NOSs) of a job role identified and approved under the National Skill Qualification Framework (NSQF).

The curriculum aims to provide children with employability and vocational skills to support occupational mobility and lifelong learning. It will help them to acquire specific occupational skills that meet employers' immediate needs. The teaching process is to be performed through the interactive sessions in classrooms, practical activities in laboratories and workshops, projects, field visits, and professional experiences.

COURSE OVERVIEW:

Installation Technician – Computing and Peripherals

Field Technician also called 'Field Technician', the Installation Technician provides after sale installation support services to customers, typically, at their premises.

The individual at work is responsible for installing newly purchased products, troubleshooting system problems and, configuring peripherals such as printers, scanners and network devices.

The job requires the individual to have: ability to build interpersonal relationships and critical thinking.

The individual must be willing to travel to client premises in order to attend to calls at different locations.

COURSE OUTCOMES:

On completion of the course, students should be able to:

- ❖ Apply effective oral and written communication skills to interact with people and customers.
- ❖ Identify the principal components of a computer system;
- ❖ Demonstrate the basic skills of using computer;
- ❖ Demonstrate the Self-management skills,
- ❖ Demonstrate the ability to provide a self-analysis in context of entrepreneurial skills and abilities.
- ❖ Identify the principal components of a computer system.
- ❖ Understand basic cyber safety and security norms
- ❖ Will be able to troubleshoot the computer system

SALIENT FEATURES OF THE COURSE:

To be an Installation technician, one requires a lot of hard work and practical hands-on-skill experience. One should have an intense knowledge on computer peripherals and installation technics.

Along with this, as a technician, you will be expected to have intense knowledge on working independently on a desktop and be able to develop applications to handle computations of small scale and record keeping. This course helps the Student to develop following skills:

- ❖ It will empower students with various skills required to work efficiently on computer.
- ❖ Understand basic functional and computational units.
- ❖ Understand networking and internet concepts
- ❖ Recognize various internet devices and threats to cyber security.
- ❖ Skills to work efficiently with basic office tools like word, spreadsheets, presentation
- ❖ Understand basics of ITIL v3
- ❖ Develop Security fundamentals.

Through this course students will not only gain knowledge about the basics of computer but will also develop confidence in developing small applications through programming.

SCHEME OF UNITS:

This course is a planned sequence of instructions consisting of units meant for developing employability and vocational competencies of students of Class XI & XII opting for skill subject along with other education subjects.

The unit-wise distribution of hours and marks is given overleaf:

ELECTRONICS & HARDWARE (SUBJECT CODE - 847)**Class XI (Session 2026-2027)****Total Marks: 100 (Theory-60 + Practical-40)**

	UNITS	NO. OF HOURS for Theory and Practical		MAX. MARKS for Theory and Practical
		260		100
Part A	Employability Skills			
	Unit 1 : Communication Skills-III	10		2
	Unit 2 : Self-Management Skills-III	10		2
	Unit 3 : ICT Skills-III	10		2
	Unit 4 : Entrepreneurial Skills-III	15		2
	Unit 5 : Green Skills-III	05		2
	Total	50		10
Part B	Subject Specific Skills	Theory (In Hours)	Practical (In Hours)	Marks
	Unit -1: Basic Electronics and Computer Fundamentals.	20	30	5
	Unit -2: Installation and configuration of Operating System.	20	30	15
	Unit-3 : Installation of Computer Hardware.	20	30	15
	Unit-4: Computer Assembly and Disassembly	25	35	15
	Total	85	125	50
Part C	Practical Work			
	Practical Examination			15
	Written Test			10
	Viva			5
	Total			30
Part D	Project Work / Field Visit			
	Practical File / Student Portfolio			05
	Viva Voce			05
	Total			10
	GRAND TOTAL	260		100

DETAILED CURRICULUM/TOPICS FOR CLASS XI:

Part-A: EMPLOYABILITY SKILLS

S. No.	Units	Duration in Hours
1.	Unit 1: Communication Skills-III	10
2.	Unit 2: Self-management Skills-III	10
3.	Unit 3: Information and Communication Technology Skills-III	10
4.	Unit 4: Entrepreneurial Skills-III	15
5.	Unit 5: Green Skills-III	05
	TOTAL DURATION	50

NOTE: Detailed Curriculum/ Topics to be covered under Part A: Employability Skills can be downloaded from CBSE website.

Part-B – SUBJECT SPECIFIC SKILLS

- UNIT -1: BASIC ELECTRONICS AND COMPUTER FUNDAMENTALS
- UNIT -2: INSTALLATION AND CONFIGURATION OF OPERATING SYSTEM
- UNIT -3: INSTALLATION AND CONFIGURATION COMPUTER HARDWARE
- UNIT -4: COMPUTER ASSEMBLY AND DISASSEMBLY

UNIT-1 BASIC ELECTRONICS AND COMPUTER FUNDAMENTALS

S. NO	LEARNING OUTCOMES	THEORY	PRACTICAL
1	Explain the basic of electrical and electronics	<ul style="list-style-type: none">• Concept of electricity,• Electrical quantities,• Electronic components – active and passive components,• Passive components – Register, capacitor, inductor• Active components – Semiconductor, Diode, Transistor,• Transformer,• Integrated Circuit,• Semiconductor memory,• Power supply and its types,• Batteries,• Switched Mode Power Supply,• Uninterrupted Power Supply• Printed Circuit Board and its types,• Soldering and de-soldering,	<ul style="list-style-type: none">• Illustrate the energy foundation and concept of electricity,• Identify the conductors and insulators,• Define electrical quantities – voltage, current, resistance,• Identify the various active and passive components,• Identify Transformer,• Identify Integrated Circuit,• Identify semiconductor memory,• Identify power supply and its types,• Identify batteries,• Identify Switched Mode Power Supply,• Identify Uninterrupted Power Supply• Identify Printed Circuit Board and its types,• Illustrate the soldering and desoldering.

2	Explain the Computer System Fundamentals	<ul style="list-style-type: none"> • Computer System, • Characteristics and Limitations of Computer, • Generation of Computer, • Hardware and software, • Main components of computer System, • Classification of Computer, 	<ul style="list-style-type: none"> • Identify the Computer Hardware and Software, • Identify and name the main components of computer, • List the classification criteria of computer, Classify the given computer, • Identify the various computers and determine its type
3	Identify the Input/ Output devices	<ul style="list-style-type: none"> • Input devices • Types of input devices – Text input devices, Pointing devices • Audio visual input devices, Input card readers, Input Reading Text / Codes, Input Sensors. • Output devices • Types of output devices, • Soft copy output devices – Monitors, LCD, LED monitors, • Hard copy output devices – Printer, plotter • Audio output devices 	<ul style="list-style-type: none"> • List the various types of input devices, • Identify and name the various input devices, • List the features of various input devices, • Identify and name the various types of monitors, • Comparing the features of different types of monitors, • Identify and name the various types of printers, • Comparing the features of different types of printers, • Identify and name the audio output devices.

UNIT 2: INSTALLATION AND CONFIGURATION OF OPERATING SYSTEM

S. N O	LEARNING OUTCOME S	THEORY	PRACTICAL
1	Appreciate the basic concept of operating system	<ul style="list-style-type: none"> • Overview of Operating System, • Booting process of operating system, • Functions or Tasks of the operating system, • Types of operating system – Windows, Linux, Mac, • Classification of Operating System, • Components of operating System – Device Driver, Kernel, Shell. 	<ul style="list-style-type: none"> • Observe the booting process , • Illustrate the functions of operating system , • List the various operating systems , • Identify and name the operating system , • Identify the operating system by user interface , • Identify the of operating system as per its , • classification, List the components of operating system – Device Driver, Kernel, Shell , • Identify Switched Mode Power Supply,
2	Install Windows 10 operating system	<ul style="list-style-type: none"> • Windows 10 system requirements, • Windows 10 upgrade or clean installation, • 32-bit and 64-bit versions of Windows 10, • General features of Windows 10, • Configuring correct boot order, 	<ul style="list-style-type: none"> • Identify and list Windows 10 system requirements, • Identify 32-bit and 64-bit versions of Windows 10, • Demonstrate the general features of Windows 10, • Demonstrate to configuring correct boot order, • Perform clean installation of Windows 10, • Perform post installation tasks,

		<ul style="list-style-type: none"> • Clean installation of Windows 10, • Post installation tasks, • Region and language support in Windows 10, • Static IP Address Configuration in Windows10, • Installation of Printer, • Installation of Scanner, • Installation of antivirus software. 	<ul style="list-style-type: none"> • Configure Windows 10 for language support, • Demonstrate to turning off automatic installation of device driver, • Demonstrate to configure static IP address in Windows10, • Demonstrate to installing printer and scanner, • Demonstrate to install antivirus software.
3	Install Ubuntu Linux operating system	<ul style="list-style-type: none"> • Introduction to Linux, • Features of Ubuntu Linux, • Installation Requirements, • Preparing the bootable disk, • Installation process of Ubuntu Linux. 	<ul style="list-style-type: none"> • Identify the features of Linux, • List the requirements for installation of Ubuntu Linux, • Demonstrate to prepare bootable disk, • Demonstrate the installation process of Ubuntu Linux.

UNIT 3: INSTALLATION AND CONFIGURATION COMPUTER HARDWARE

S. NO.	LEARNING OUTCOMES	THEORY	PRACTICAL
1	Install motherboard	<ul style="list-style-type: none"> • Introduction to motherboard • Types of motherboard – integrated and non-integrated, • Basic components of motherboard, • Motherboard form factors, • Installation of motherboards, • The chip-set, • Bus and bus speed, • BIOS chip and CMOS battery, • Expansion slots, • Expansion cards, • Memory slots, • Jumpers, • Front panel connectors, • Input output ports and system resources, • Performance factor of motherboard, • Introduction to BIOS & CMOS, • BIOS /CMOS setting. 	<ul style="list-style-type: none"> • Identify the model and make of given motherboard, • Identify various component on the motherboard, • Identify the processor sockets, memory banks on motherboard, • Identify various expansion slots and ports on the motherboard, • Identify various connectors and jumpers on motherboard, • Install the motherboard, • Identify the CMOS, • Change setup parameters and features on motherboard, • Input output ports and system resources, • Identify the BIOS & CMOS, • Remove and fix BIOS & CMOS battery.

2	Install CPU and Heat Sink	<ul style="list-style-type: none"> • Introduction to processor, • CPU Basics, • CPU generations, • Functions of CPU, • Concept of program execution, • Major components of the CPU, • Register Organization, • CPU features, • Types of CPU – 32 bit and 64 bit, • Intel and AMD processors, • Processor technologies, • Installation of CPU, • Heat sink and fan assembly, • Installation of heat sink and fan assembly. 	<ul style="list-style-type: none"> • Identify the given CPU, • Check the compatibility of CPU with the motherboard, • List the generations of CPU, • Illustrate the concept of program execution, • List the major components of the CPU, • Demonstrate the process of installation of CPU, • Identify heat sink and fan assembly, • Demonstrate the installation of heat sink and fan assembly.
3	Install RAM modules	<ul style="list-style-type: none"> • Introduction to memory. • Importance of memory in computer, • Classification of memory – internal and external, • Types of internal memory – RAM, ROM, • Types of RAM – DRAM, SRAM, • Types of DRAM – SDRAM, RDRAM, DDR SDRAM, DDR1, DDR2, DDR3, DDR4, • Types of DRAM packages – SIMM, DIMM, • RAM configurations and speed, • Installation of RAM 	<ul style="list-style-type: none"> • List the various types of memory, • Identify the given RAM chip, Check the compatibility of RAM chip with the socket on motherboard, • Identify the RAM chips DDR1, DDR2, DDR3, DDR4, • Identify the memory slot on the motherboard, • Demonstrate the installation of various types of RAM modules.
4	Install the Disk Drives	<ul style="list-style-type: none"> • Introduction of Hard Disk Drive (HDD), • Physical and logical components of HDD, • Working of HDD, • Disk Drive Performance, • Types of HDD – IDE, SATA, SCSI, • HDD speeds , • External connections types, • Installation process of HDD in desktop and laptop, • Optical discs and drives, • Functioning of optical drive, Installation of optical drives, Disk drive interfaces. 	<ul style="list-style-type: none"> • Identify the physical and logical components of HDD. • Identify the given HDD, • Observe the working of HDD, • Identify the types of HDD, • Identify external connections of HDD, • Connect the external HDD to the computer, • Demonstrate the installation of HDD in desktop and laptop, • Identify and name the optical discs drives, • Demonstrate the functioning of optical drive, • Demonstrate the installation of optical drives.

UNIT 4: COMPUTER ASSEMBLY AND DISASSEMBLY

S. NO.	LEARNING OUTCOMES	THEORY	PRACTICAL
1	Use tools safely	<ul style="list-style-type: none"> • Hardware tools – ESD tools, Hand tools, Cleaning tools, Diagnostic tools, • Safety measures – electrical safety, fire safety, • Protecting equipment, • Electrostatic Discharge (ESD), • Electromagnetic Interference, • Power fluctuations, • Power protection devices, • Proper disposal to protect environment 	<ul style="list-style-type: none"> • Identify and list various types of hardware tools used for computer assembly, • Observe electrical safety, fire safety, • Demonstrate to protect equipment, • Demonstrate to use power protection devices, • Demonstrate to protect environment. • Demonstrate to tackle power fluctuations,
2	Demonstrate the assembly and disassembly of desktop computer	<ul style="list-style-type: none"> • Tools and equipment required for computer assembly, • Computer parts and peripherals and its compatibility with motherboard, • Connectivity of internal parts of computer system, • Computer assembly process, • Computer dis-assembly process. 	<ul style="list-style-type: none"> • Identify the collect various tools and parts required for computer assembly, • Demonstrate the installation of each part inside computer, • Demonstrate the computer assembly as a whole, • Connect the external parts and peripherals and check the functionality of computer, • Demonstrate to remove each part inside the computer, • Demonstrate the computer disassembly as a whole, • Practice the process of computer assembly and disassembly.
3	Demonstrate the assembly and disassembly of laptop	<ul style="list-style-type: none"> • Tools and equipment required for computer assembly, • Laptop parts and peripherals and its compatibility with motherboard, • Connectivity of internal parts in laptop, • Laptop assembly process, • Laptop disassembly process. 	<ul style="list-style-type: none"> • Identify the collect various tools and parts required for Laptop assembly, • Demonstrate the installation of each part inside Laptop, • Demonstrate the Laptop assembly as a whole, • Connect the external parts and peripherals and check the functionality of Laptop, • Demonstrate to remove each part inside the Laptop, • Demonstrate the Laptop disassembly as a whole, • Practice the process of Laptop assembly and disassembly.

ELECTRONICS & HARDWARE (SUBJECT CODE - 847)**Class XII (Session 2026-2027)****Total Marks: 100 (Theory-60 + Practical-40)**

	UNITS	NO. OF HOURS for Theory and Practical		MAX. MARKS for Theory and Practical
		260		100
Part A	Employability Skills			
	Unit 1 : Communication Skills-IV	10		2
	Unit 2 : Self-Management Skills-IV	10		2
	Unit 3 : ICT Skills-IV	10		2
	Unit 4 : Entrepreneurial Skills-IV	15		2
	Unit 5 : Green Skills-IV	05		2
	Total	50		10
Part B	Subject Specific Skills	Theory (In Hours)	Practical (In Hours)	Marks
	Unit -1: Computer Network Essentials.	25	25	10
	Unit -2: Installation and Configuration of Windows Server.	20	30	10
	Unit-3: Installation and Configuration of Linux Server.	20	30	10
	Unit-4: IT Security Fundamentals.	10	20	10
	Unit-5: Basics of ITIL v3	10	20	10
	Total	85	125	50
Part C	Practical Work			
	Practical Examination			15
	Written Test			10
	Viva			5
	Total			30
Part D	Project Work / Field Visit			
	Practical File / Student Portfolio			05
	Viva Voce			05
	Total			10
	GRAND TOTAL	260		100

DETAILED CURRICULUM/TOPICS FOR CLASS XII:

Part-A: EMPLOYABILITY SKILLS

S. No.	Units	Duration in Hours
1.	Unit 1: Communication Skills-IV	10
2.	Unit 2: Self-management Skills-IV	10
3.	Unit 3: Information and Communication Technology Skills-IV	10
4.	Unit 4: Entrepreneurial Skills-IV	15
5.	Unit 5: Green Skills-IV	05
	TOTAL DURATION	50

NOTE: The Detailed Curriculum/ Topics to be covered under Part A: Employability Skills can be downloaded from CBSE website.

Part-B – SUBJECT SPECIFIC SKILLS

- UNIT -1: COMPUTER NETWORK ESSENTIALS.
- UNIT -2: INSTALLATION AND CONFIGURATION OF WINDOWS SERVER.
- UNIT -3: INSTALLATION AND CONFIGURATION OF LINUX SERVER.
- UNIT -4: IT SECURITY FUNDAMENTALS.
- UNIT -5: BASICS OF ITIL v3

UNIT-1 COMPUTER NETWORK ESSENTIALS.

S. N O .	LEARNING OUTCOMES	THEORY	PRACTICAL
1	Appreciate the network concept and technology	<ul style="list-style-type: none">• Concept of networking,• Computer Networking,• OSI Model ,• Concept of Protocol,• Protocol: TCP, IP, UDP, FTP,• Network Technologies : peer to peer and Client/ Server,• Inter-network (Internet, Intranet, Extranet),• Data transmission : simplex, half duplex, full duplex.	<ul style="list-style-type: none">• Draw a diagram of network and write importance of network in our daily life,• Draw a diagram of OSI model,• Identify the network technology of the given network,• Identify the given network as• Internet, Intranet or Extranet,• Draw the diagram of simplex, half duplex and full duplex data flow.

2	Connect and use network devices and peripherals	<ul style="list-style-type: none"> Physical components : nodes/ computer/ hosts, Modem, RJ 45 Connector and port, NIC, Installation and configuration of NIC, Network Devices – Hub, Switch, Gateway, Router, Repeaters, Bridges. 	<ul style="list-style-type: none"> Identify and name the given network component, Identify and name the given network devices, Connect computers/ host to switch/hub, Assign IP address to host, Check connectivity using ping and ipconfig command, Attach network peripherals to the hosts and share files, folders and peripherals
3	Prepare cable and configure network	<ul style="list-style-type: none"> Introduction to Ethernet, Colour coding in Ethernet, Network transmission medium: <ul style="list-style-type: none"> Guided and, Unguided, Guided : Coaxial cable, Twisted pair cable (UTP/ STP) Unguided : Radio waves, Wi-Fi, Bluetooth, GSM, Cable preparation, Network adapter, Configuring network adapter 	<ul style="list-style-type: none"> Check and verify system is in connected to ethernet, Check colour coding in Ethernet Demonstrate to prepare the given cable for networking, Demonstrate to crimp the cable.
4	Recognize the network designed structure	<ul style="list-style-type: none"> Concept of Internet, IP addressing : Definition, Type(IPv4,IPv6), Ping, ipconfig command, Routing, Types of networking – LAN, MAN, WAN, Network Topology – Bus, Star, Mesh, Hybrid, Ring, Advantages and disadvantages of different topology 	<ul style="list-style-type: none"> Perform installation of LAN and troubleshooting of frequently occurred problems, Draw the diagram of given network topology, Identify the network topology from the given graphics.

UNIT 2: INSTALLATION AND CONFIGURATION OF WINDOWS SERVER.

S. N O	LEARNING OUTCOMES	THEORY	PRACTICAL
1	Install Windows Server 2012	<ul style="list-style-type: none"> Windows Server 2012 Overview, Installing Windows Server 2012, Partitioning, 	<ul style="list-style-type: none"> Deploying Windows Server 2012, Install Windows Server 2012, Create partitioning, Configuring Windows Server 2012 Server, Perform post installation -installation

		<ul style="list-style-type: none"> • Post-Installation Configuration of Windows Server 2012. 	<ul style="list-style-type: none"> • Configuration of Windows Server 2012.
2	Manage Windows Server 2012	<ul style="list-style-type: none"> • Overview of Windows Server 2012 Management, • Management tools available in Windows Server 2012, • Introduction to Windows PowerShell. 	<ul style="list-style-type: none"> • Managing Servers • Using Windows PowerShell to Manage Servers, • Perform basic administrative tasks using Windows • PowerShell.
3	Install and configure Active Directory Domain Services	<ul style="list-style-type: none"> • Overview of AD DS • Overview of Domain Controllers • Installing a Domain Controller, • Structure of AD DS, • Purpose of domain controllers 	<ul style="list-style-type: none"> • Installing a Domain Controller, • Configuring Active Directory Domain Services
4	Manage Active Directory Domain Services Objects	<ul style="list-style-type: none"> • Managing User Accounts • Managing Groups 	<ul style="list-style-type: none"> • Creating and Configuring User Accounts in AD DS • Managing user accounts through GUI, • Manage group accounts user accounts through GUI.
5	Implementing Group Policy	<ul style="list-style-type: none"> • Overview of Group Policy • Group Policy Processing • Creating GPOs 	<ul style="list-style-type: none"> • Create and manage Group Policy Objects (GPOs).

UNIT 3: INSTALLATION AND CONFIGURATION OF LINUX SERVER.

S. N O .	LEARNING OUTCOMES	THEORY	PRACTICAL
1	Install Linux Server	<ul style="list-style-type: none"> • Linux Server Overview, • Installation process of Linux Server, • Partitioning, • Post-Installation Configuration of Linux Server. 	<ul style="list-style-type: none"> • Install Linux Server, • Create partitioning, • Configuring Linux Server, • Perform post installation -installation configuration of Linux Server.

2	Manage Linux Server	<ul style="list-style-type: none"> • Overview of Linux Server Management, • Introduction to Linux terminal, • Concept of superuser, • Linux Server management commands. 	<ul style="list-style-type: none"> • Login as a superuser, • List the common administrative tasks, • List basic commands to manage server, • Use Linux commands for basic administration.
3	Understand the file structure of Linux	<ul style="list-style-type: none"> • Overview of Linux file structure, • Linux users – superuser, group user and others, • User permissions – read, write, execute, • Common commands for system administration. 	<ul style="list-style-type: none"> • Draw the diagram of Linux file structure, • List the various system directory, • Create user and group, • Change user and group permissions, • Perform the basic system administration using command
4	Install and remove packages for services	<ul style="list-style-type: none"> • Overview of various services, • Commands for installing packages for various services, • Commands for removing packages for various services, • Updating packages. 	<ul style="list-style-type: none"> • List the various services and its commands, • Install packages for various services, • Remove packages, • Update packages.

UNIT 4: IT SECURITY FUNDAMENTALS.

S. N O .	LEARNING OUTCOMES	THEORY	PRACTICAL
1	Appreciate IT Security Concepts	<ul style="list-style-type: none"> • Concept of security, • IT security, • Data Threats – Virus, malware, DoS attacks, Trojan, worm, phishing attacks, man-in-the middle, • Value of Information, • Personal Security, • File Security. 	<ul style="list-style-type: none"> • List different types of threats in computer system, • List the Characteristics of • Phishing mail and websites, Recognise malicious, accidental threats to data from individuals, service providers, external organisations, • Demonstrate to set the security level – Low, Medium or High.
2	Describe vulnerabilities	<ul style="list-style-type: none"> • Ports, • Services, • Code. 	<ul style="list-style-type: none"> • List the antivirus software, • Install the antivirus software in the given system, • Scan and eradicate the virus from the disk, • Update the antivirus software automatically and manually, Check and change settings of antivirus software.

3	Describe vulnerabilities	<ul style="list-style-type: none"> Ports, Services, Code. 	<ul style="list-style-type: none"> List the different types of ports, List the various services running in computer, Identify the errors and bugs in the code for vulnerability
4	Describe security procedures	<ul style="list-style-type: none"> Security policy, Physical security, Securing the network, Securing devices, Securing applications, O/S updates. 	<ul style="list-style-type: none"> Check security setting in operating system, Change security setting parameters, Check auto and manual updates of operating system
5	Protect data	<ul style="list-style-type: none"> File and folder permissions, Encryption, Group policy. 	<ul style="list-style-type: none"> Demonstrate simple encryption and decryption method, Draw the diagram of cryptography process
6	Appreciate the use of firewalls	<ul style="list-style-type: none"> Firewall, Types of firewall – software and hardware, Packet filter, Stateful, Application level; Intrusion detection systems; Intrusion prevention systems. 	<ul style="list-style-type: none"> Draw a diagram of firewall, Demonstrate to restrict sites, Checking firewall is enabled or disabled in PC, Name and list intrusion related tools. Draw the diagram of anti-intrusion technique-honey pot

UNIT 5: BASICS OF ITIL v3.

S. N O .	LEARNING OUTCOMES	THEORY	PRACTICAL
1	Appreciate the concept of ITIL	<ul style="list-style-type: none"> Concept of ITIL, Definition of ITIL, The business perspective of ITIL, The core structure of ITIL 	<ul style="list-style-type: none"> List the business perspective of ITIL, Draw the core structure of ITIL.
2	Describe the concepts of Service	<ul style="list-style-type: none"> Internal and external customers, Internal and external services, Service management, IT service management, Stakeholders in service management 	<ul style="list-style-type: none"> Identify the internal and external customer, List the internal and external services, List the benefits of IT service management, List the stakeholders in service management

3	Describe the structure of the ITIL service lifecycle	<ul style="list-style-type: none"> • Structure of the ITIL service lifecycle, • Concept of critical success factors (CSF), • Concept of Key performance indicators (KPI), • Concept of Service Level Agreement (SLA), • The Five Core Processes • Service Strategy, • Service Design, • Service Transition, • Service Operation 	<ul style="list-style-type: none"> • Determine the CSF and KPI for the given problem, • List the components of service strategy, • List the components of service design, • List the components of service transition, • List the components of service operation,
4	Problem management	<ul style="list-style-type: none"> • Problem management process flow, Determination resolution Problem management, • Tracking report and control measures. 	<ul style="list-style-type: none"> • Draw the problem management process flow, • List the significant problems, • Determine the resolution of the given problem

TEACHING/TRAINING ACTIVITIES

The teaching and training activities have to be conducted in classroom, laboratory/ workshops and field visits. Students should be taken to field visits for interaction with experts and to expose them to the various tools, equipment, materials, procedures and operations in the workplace. Special emphasis should be laid on the occupational safety, health and hygiene during the training and field visits.

CLASSROOM ACTIVITIES - Classroom activities are an integral part of this course and interactive lecture sessions, followed by discussions should be conducted by trained teachers. Teachers should make effective use of a variety of instructional aids, such as audio-video materials, colour slides, charts, diagrams, models, exhibits, hand-outs, online teaching materials, etc. to transmit knowledge and impart training to the students.

PRACTICAL WORK IN LABORATORY/WORKSHOP - Practical work may include but not limited to hands-on-training, simulated training, role play, case based studies, exercises, etc. Equipment and supplies should be provided to enhance hands-on learning experience of students. Only trained personnel should teach specialized techniques. A training plan that reflects tools, equipment, materials, skills and activities to be performed by the students should be submitted by the vocational teacher to the Head of the Institution.

FIELD VISITS/ EDUCATIONAL TOUR - In field visits, children will go outside the classroom to obtain specific information from experts or to make observations of the activities. A checklist of observations to be made by the students during the field visits should be developed by the Teachers for systematic collection of information by the students on the various aspects. Principals and Teachers should identify the different opportunities for field visits within a short distance from the school and make necessary arrangements for the visits. At least three field visits should be conducted in a year.

SKILL ASSESSMENT (PRACTICAL) - Assessment of skills by the students should be done by the assessors/examiners on practical demonstration of skills by the candidate. The assessors assessing the

skills of the students should possess a current experience in the industry and should have undergone an effective training in assessment principles and practices.

Practical examination allows candidates to demonstrate that they have the knowledge and understanding of performing a task. This will include hands-on practical exam, viva voce and student portfolio (File/journal).

Project Work (individual or group project) is a great way to assess the practical skills on a certain time period or timeline. Project work should be given on the basis of the capability of the individual to perform the tasks or activities involved in the project. Projects should be discussed in the class and the teacher should periodically monitor the progress of the project and provide feedback for improvement and innovation. Field visits should be organized as part of the project work. Field visits can be followed by a small-group work/project work. When the class returns from the field visit, each group might be asked to use the information that they have gathered to prepare presentations or reports of their observations. Project work should be assessed on the basis of practical file or student portfolio Student **Portfolio** is a compilation of documents that supports the candidate's claim of competence. Documents may include reports, articles, and photos of products prepared by students in relation to the unit of competency.

Viva voce allows candidates to demonstrate communication skills and content knowledge. Audio or video recording can be done at the time of viva voce. The number of external examiners would be decided as per the existing norms of the Board and these norms should be suitably adopted/adapted as per the specific requirements of the vocational subject. Viva voce should also be conducted to obtain feedback on the student's experiences and learning during the project work/field visits.

ORGANISATION OF FIELD VISITS/EDUCATIONAL TOURS:

In a year, at least 3 field visits/educational tours should be organised for the students to expose them to the activities in the workplace.

Visit a computer assembly and service centre and observe the following: Location, Site, Computer systems and peripheral devices. During the visit, students should obtain the following information from the owner or the supervisor:

1. Computer System of various brands.
2. Computer parts and peripherals of various brands.
3. Specifications of various parts of computer system.
4. Comparison of various brands.
5. Types of computers.
6. Types of printers.
7. Types of scanners.
8. External and Internal Hard Disk.
9. Storage capacity of various storage devices.
10. Comparison of various parts based on cost.
11. Tools and equipment required for computer assembly.
12. Cost benefit analysis to purchase computer.
13. Specifications of computer based on the work requirement.

LIST OF EQUIPMENT AND MATERIALS

The list given below is suggestive and an exhaustive list should be prepared by the vocational teacher. Only basic tools, equipment and accessories should be procured by the Institution so that the routine tasks can be performed by the students regularly for practice and acquiring adequate practical experience.

Tools	Equipment	Materials
<ul style="list-style-type: none"> ● Components / Dividers ● Oscilloscope ● Rulers ● T-square ● Multi-tester ● Pliers ● Cutters ● Screw drivers ● Goggles ● Gloves ● Protractor ● Steel rule ● LAN tester ● Utility softwares ● Anti-static wrist wrap ● Masks ● Crimping tools ● Flashlights ● Sharp pointed tweezers ● Mirror (inspection) ● Soldering gun 	<ul style="list-style-type: none"> ● Hubs/switches ● CDROMs ● Modem/router ● Printers ● Hubs ● Server ● Peripherals ● Desktop Computers 	<ul style="list-style-type: none"> ● UTP Cat. 5 cables ● UTP Cat.3 cables ● RJ 45 modular plug ● Learning Manuals ● Work Instruction ● Hand-outs ● Board marker ● White board ● Schematic diagrams ● Charts ● Block diagrams ● Layout plans ● Location Plans ● Instrumentation diagrams ● Loop diagrams ● System Control diagrams ● Drawing boards

TEACHER'S/TRAINER'S QUALIFICATION:

Qualification and other requirements for appointment of vocational teachers/trainers on contractual basis should be decided by the State/UT. The suggestive qualifications and minimum competencies for the vocational teacher should be as follows:

Minimum Qualification	Minimum Competencies	Age Limit
Bachelor of Engineering / Technology in Electronics or Computer Science / Technology OR Master of Computer Application (MCA) OR Master of Science (Computer Science) OR Master of Science (Information Technology) OR NIELIT "B" Level Certificate. It is recommended to have additional qualification such as CCNA, CCP or any other diploma in computer hardware maintenance.	The candidate should have a minimum of 1 year of work experience in the same job role. S/He should be able to communicate in English and local language. S/He should have knowledge of equipment, tools, material, Safety, Health & Hygiene.	18-37 years (as on Jan. 01 (year)) Age relaxation to be provided as per Govt. rules