



Skilling India in Electronics

Participant Handbook

Sector
Electronics

Sub-Sector
IT Hardware

Occupation
After Sales Support

Reference ID - **ELE/Q4607, Version 1.0**
NSQF Level 5



**Service
Engineer**

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“ Skilling is building a better India.
If we have to move India towards
development then Skill Development
should be our mission. ”

Shri Narendra Modi
Prime Minister of India



Certificate

**COMPLIANCE TO
QUALIFICATION PACK - NATIONAL OCCUPATIONAL
STANDARDS**

is hereby issued by the

ELECTRONICS SECTOR SKILL COUNCIL OF INDIA

for

SKILLING CONTENT : Service Engineer

Complying to National Occupational Standards of

Job Role/ Qualification Pack: **"Service Engineer"** QP No. **"ELE/Q1607, NSQF Level 5"**

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Authorised Signatory
(Electronics Sector Skill Council)

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I would like to take the opportunity to thank everyone who contributed in developing this handbook for the QP Service Engineer.

The handbook is the result of tireless pursuit to develop an effective tool for imparting the Skill Based training in the most effective manner.

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CEO

Electronics Sector Skills Council of India

About this Book

This Participant Handbook is designed to enable training for the specific Qualification Pack (QP). Each National Occupational (NOS) is covered across Unit/s.

Key Learning Objectives for the specific NOS mark the beginning of the Unit/s for that NOS.

- Describe support services and role of a service engineer
- Explain the basics of computers, operating system and other related software
- Describe basics of networking, Internet and Web browser
- Identify the faulty module and perform troubleshooting
- Analyse the error codes and messages
- Implement maintenance and repair
- Execute assembling and disassembling of computers
- Explain E-waste management
- Identify the work processes at customer's facility
- Manage and resolve issues at the facility
- Explain the importance of managing assets and warranty
- Identify the tools to monitor the system
- Describe the maintenance schedules and records
- Recognize the organizational goals and targets
- Communicate with superior and subordinates
- Manage Cross-functional interaction to accomplish productivity
- Achieve inter-personal communication
- Recognize the organizational goals and targets
- Communicate with superior and subordinates
- Manage Cross-functional interaction to accomplish productivity

Symbols Used



Key Learning Outcomes



Steps



Role Play



Tips



Notes



Unit Objectives



Activity



Practical

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सत्यमेव जयते
GOVERNMENT OF INDIA
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1. Basics of IT Hardware System

Unit 1.1 – Introduction to Service Engineer

Unit 1.2 – Basics of Computer

Unit 1.3 – Operating System and Other Software

Unit 1.4 – Basics of Networking

Unit 1.5 – Internet and Web Browser



ELE/N4614

Key Learning Outcomes



At the end of this module, you will be able to:

1. Describe support services and role of a service engineer
2. Explain the basics of computers, operating system and other related software
3. Describe basics of networking, Internet and Web browser

UNIT 1.1: Introduction to Service Engineer

Unit Objectives

At the end of this unit, you will be able to:

1. Identify support services
2. Describe IT hardware service engineer
3. List components of IT hardware system

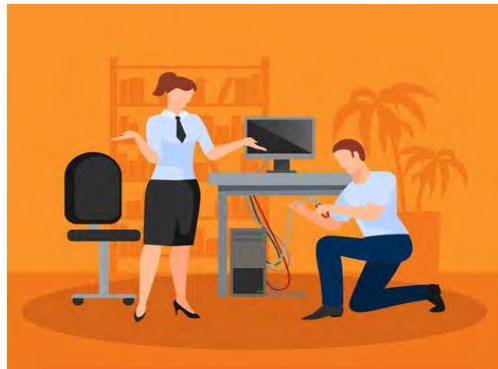
1.1.1 Support Services

Support services are the services that addresses problems with a service or product sold to a customer. This may involve maintenance of the product as well. These services can be provided through an e-mail, a tool where users can log a call or error, or a live support software on a website. Larger organizations frequently have internal technical support available to their staff for handling computer-related problems, network related problems and so on. The following figure shows different ways in which support services can be provided:



Fig. 1.1.1: Different ways in which support services can be provided

Alternatively, support services are provided either at site or remotely. The following figure shows the two ways in which support services can be provided:



Onsite Services
• Providing services at the doorstep



Offsite Services
• Providing service remotely

Fig. 1.1.2: Providing support services at doorstep and remotely

Companies hire service engineers to provide the support services to customers facing difficulty with the equipment and do not have appropriate knowledge to fix it.

1.1.2 Service Engineer

Service Engineer is responsible for attending to problems to resolve or perform maintenance functions by visiting client or remote locations. This person assess and then install or fix the equipment or machinery. A service engineer provides support and service in different fields such as, IT, Biomedical and so on.

An IT Hardware service engineer provides hardware and related software service and maintenance which may include installation or repair of hardware equipment or related software by checking, troubleshooting and substituting faulty modules. This person carries out repairs and installations at customer sites. They are needed when customer requires their expertise and services. They may perform scheduled maintenance to prevent mechanical malfunction; they may also be called in to make repairs when equipment fails unexpectedly. This person works as a devoted engineer at customer premises or remotely.

The following image shows an IT hardware service engineer:



Fig 1.1.3: An IT hardware service engineer

This person:

- Monitors and manages the IT hardware systems such as end-user computing, server and storage administration, network operations for maintaining minimal downtime
- Has knowledge of working on various IT products and analytical
- Works at customer's facility and guarantees a downtime of less than 1% in IT Hardware systems and related software by checking, troubleshooting and substituting faulty modules.
- Monitors customer's critical hardware systems remotely.

1.1.3 IT Hardware System

An IT hardware system mainly consists of:

4. Computer and peripheral devices
5. Related software
6. Network and network devices

The following figure shows various ways in which IT hardware system can be managed, monitored and maintained:



Fig. 1.1.4: Various ways of managing and monitoring hardware system

UNIT 1.2: Basics of Computer

Unit Objectives

At the end of this unit, you will be able to:

1. Define computer and types of computer
2. Identify the basic hardware and related software required in a computer
3. Describe the importance of computer maintenance

1.2.1 Computer and Types of Computer

A computer is an electronic device which transforms data into meaningful information. The following figure shows a computer:



Fig. 1.2.1: Computer

Its basic functionality irrespective of its size or make is shown in the following figure:

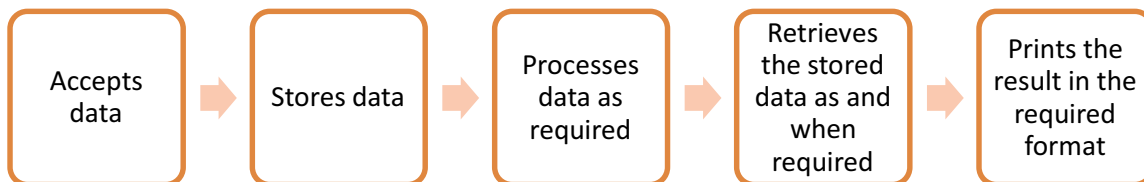


Fig. 1.2.2: Function of a computer

The main features of a computer are accuracy, high speed, versatility, diligence, and storage. There are four functional units in a computer which are:

- **Input unit:** This unit accepts data or instructions from the user for processing by using input peripheral device.
- **Storage unit:** This unit stores data and instructions before and after processing. It is mainly divided into two parts, primary storage and secondary storage.

- **Central processing unit:** This unit processes data, taking them from storage unit based on the specified instructions and the data type provided. It is then sent back to the storage unit. CPU includes arithmetic logic unit (ALU) which helps in performing calculations using arithmetic operators like addition (+), subtraction (-) and so on. It also uses comparison operators like > (greater than), < (less than) and = (equal to). Control unit controls all these operations, enables retrieving data from storage and helps store information back to a storage device.
- **Output unit:** This unit is used for displaying the result to the user in the required format by using output peripheral device.

The following figure represents a block diagram of the functional units of a computer:

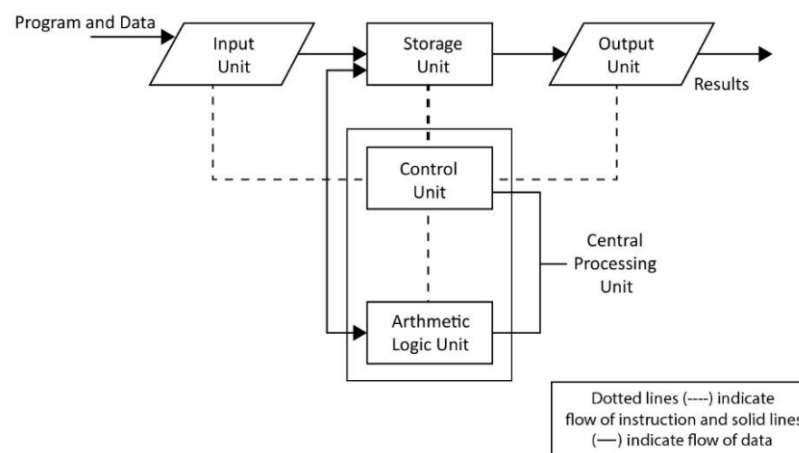


Fig. 1.2.3: Functional units of computer

Peripheral Device

Peripheral devices are input/output devices that are used for entering instructions and information into a computer to store or process and to deliver the data to user.

Any device providing input to a computer is known as input device. There are many input devices such as a keyboard and mouse. An output device is used to present the information received from CPU in required format to the user. The processed data, that is stored in the memory, is transferred to the output unit. The output unit then converts the data into a user-friendly format. The output is typically presented either on a display device such as a monitor, or on paper (hard copy) with the help of a printer.

Tips

Peripheral devices may also be referred to as auxiliary devices.

The peripheral devices are categorized as shown in the following figure:

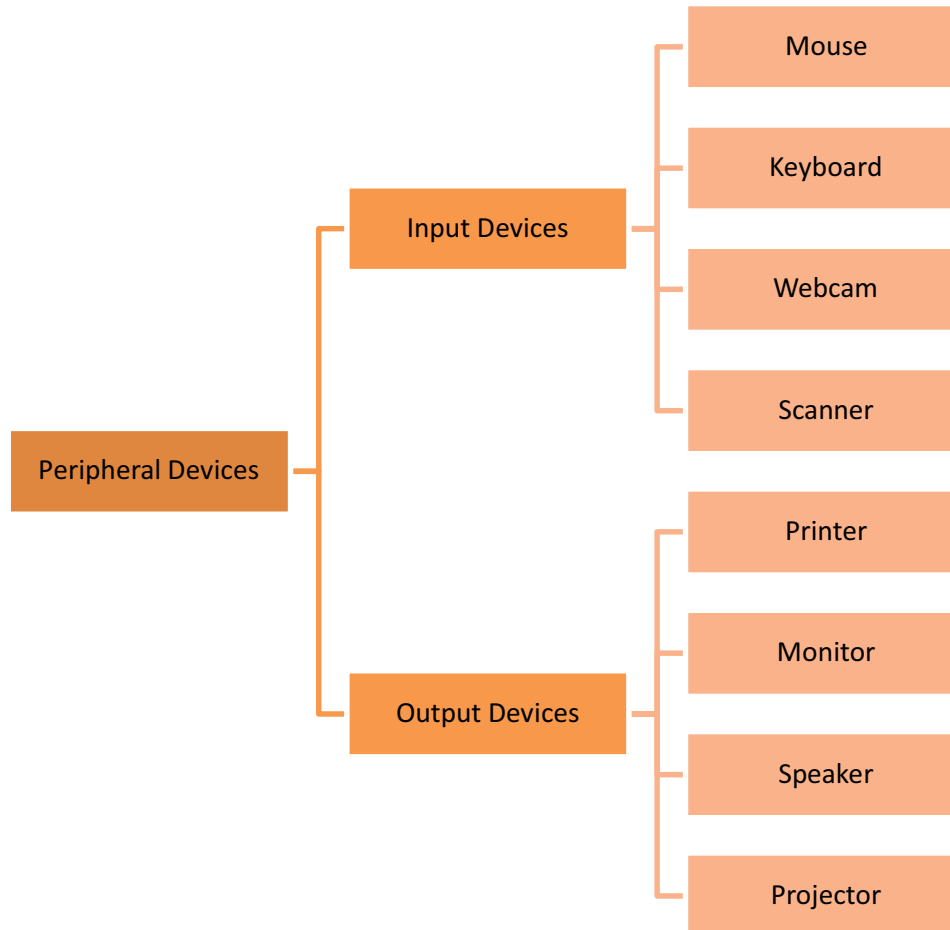


Fig. 1.2.4: Peripheral devices

Storage Unit or Memory

Storage unit or memory, often called computer data storage, stores the data inside the computer. Data is manipulated by the CPU that performs all calculations and storage unit holds that data. Two types of storage are:




- Primary storage, also referred to as internal or main memory, includes random access memory (RAM), cache and read only memory (ROM) which are directly accessible to the CPU for reading instructions. The following list describes different types of main memory:
 - RAM stores frequently used data and instructions to speed up the operation of the CPU. It is a temporary memory in which data is lost if the source of power is switched-off.
 - Cache is a high speed memory area reserved for main memory or storage devices to further speed up the CPU operations.
 - ROM is a non-volatile memory which stores firmware (software related to hardware) or application software. It stores all the basic programs required to start

the computer (boot the computer). This type of memory cannot be easily overwritten or modified.

- Secondary storage is also referred to as auxiliary/external memory. It includes hard disk, optical disks, flash drive and so on which cannot be accessed by the CPU. Computer uses input output devices to access this type of storage.

Types of Computers

Computers can be classified according to their size, speed and computing power. The following table lists the different types of computers:

Type	Description	Image
Microcomputer	<p>It is a single user computer system with a single chip and moderately powerful microprocessor. The different type of microcomputers are:</p> <ul style="list-style-type: none"> • Desktop Computer • Laptop Computer • Notebook • Tablet 	
Work Station	<p>It is like a single user PC, having a microprocessor that is more powerful.</p>	
Mini Computer	<p>It is a computer system that can support multiple users simultaneously and has more powerful processors than a microcomputer. They are also called mid-range computers.</p>	



Main Frame	It supports multiple users and it is like a mini-computer but the software technology is different from that of a minicomputer. They are used to handle and process large amount of data such as in banks and government offices.	
Super Computer	It is the fastest and the most expensive computer system, used for complex scientific computations and numerical calculations such as weather forecasting, nuclear simulations and in the field of astrophysics.	

Fig. 1.2.5: types of computers

Based on their usage, the computers are further classified as:

- Laptop
- Desktop

Laptop Computer

It is a battery or AC powered wireless and portable computer, usually smaller than briefcase in size. It contains "clamshell" form factor and a thin LED/LCD screen on the upper side and alphanumeric keyboard attached on the lower part of the "clamshell".

Tips

Using a docking station, a laptop can be effectively converted into a PC. A docking station is hardware frame supplying connections for peripheral devices like monitor or printer.

The following figure shows a laptop and internal view of the laptop:

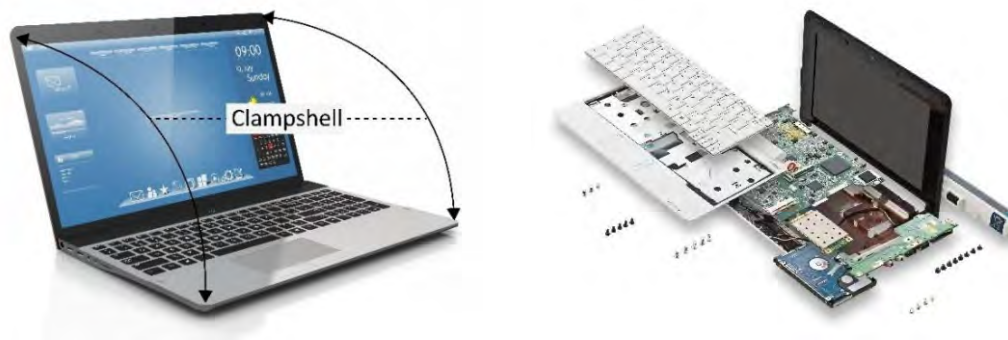


Fig. 1.2.6 Exterior and interior of a laptop computer

Desktop Computer

It is a PC designed to be used at a single place preferably on a desk or table because of its power and size requirements. Unlike a laptop, they are not portable or wireless. A desktop PC has a base unit along with a computer's modules. The latest models in the market have a base unit attached to the monitor for saving space. Desktops usually cost less than laptops but have greater life span. The following figure shows a desktop computer with internal view of the base unit:



Fig. 1.2.7: Exterior and interior of a desktop computer

1.2.2 Computer Hardware

Computer hardware includes the parts of computer that can be easily seen and touched. The computer's internal hardware parts are called components, whereas peripherals are the external hardware devices such as the keyboard, mouse, audio speakers and printers.

Tips 

Hardware includes not only the computer and related devices but also the cables, connectors and power supply units. It is directed by the software to execute the commands or instructions.

The following figure shows a snapshot of basic computer hardware:

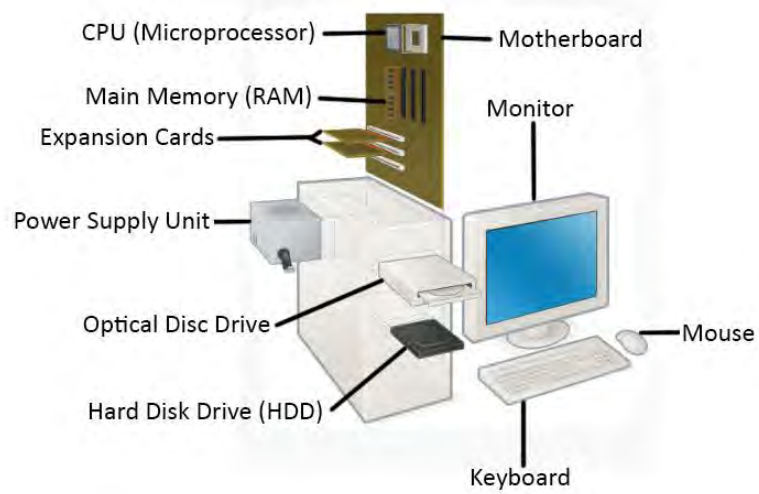


Fig. 1.2.8: Basic computer hardware