



RQF LEVEL 3



CSATM301

**COMPUTER SYSTEM
AND ARCHITECTURE**

**Telephone
Maintenance**

TRAINEE'S MANUAL

October, 2024



TELEPHONE MAINTENANCE



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ACRONYMS

AC: Alternating current

BGA: Ball Grid Array

C: Capacitor

DC: Direct current

DC: Direct Current

ESD: Electrostatic Discharge

F: Farad

IC: Collector current

K: Kilo ohm

L: Inductor LC: Inductor-capacitor circuit

LCD: Liquid Crystal Display

LED: Light Emitting Diode

OS: Operating System

PCB: Printed Circuit Board

RTB: Rwanda TVET Board

SMD: Surface Mount Device

SOP: Standard Operating Procedure

TQUM Project: TVET Quality Management Project

TVET: Technical and vocational Education and training

WIFI: Wireless Fidelity

μF: Microfarad

Ω: Ohms

INTRODUCTION

This trainee's manual includes all the knowledge and skills required in Computer System and Architecture specifically for the module of **"Telephone Maintenance"**. Trainees enrolled in this module will engage in practical activities designed to develop and enhance their competencies. The development of this training manual followed the Competency-Based Training and Assessment (CBT/A) approach, offering ample practical opportunities that mirror real-life situations.

The trainee's manual is organized into Learning Outcomes, which is broken down into indicative content that includes both theoretical and practical activities. It provides detailed information on the key competencies required for each learning outcome, along with the objectives to be achieved.

As a trainee, you will start by addressing questions related to the activities, which are designed to foster critical thinking and guide you towards practical applications in the labor market. The manual also provides essential information, including learning hours, required materials, and key tasks to complete throughout the learning process.

All activities included in this training manual are designed to facilitate both individual and group work. After completing the activities, you will conduct a formative assessment, referred to as the end learning outcome assessment. Ensure that you thoroughly review the key readings and the 'Points to Remember' section.

MODULE CODE AND TITLE: CSATM301 TELEPHONE MAINTENANCE

Learning Outcome 1: Assemble Telephone hardware parts

Learning Outcome 2: Deploy Telephone software

Learning Outcome 3: Repair Telephone

Learning Outcome 1: Assemble Telephone Hardware Parts



Indicative contents

1.1 Introduction to Telephones

1.2 Identification of Telephone hardware parts

1.3 Assembling Telephones hardware

Key Competencies for Learning Outcome 1: Assemble Telephone Hardware Parts

Knowledge	Skills	Attitudes
● Description of Telephones technology ● Identification of different types of cell phones ● Description of parts of a conventional Telephone ● Description of Feature phone parts ● Description of Smart phone parts ● Description of Tools, Materials and Equipment used in assembling telephone ● Description of SOP part and types	● Selecting telephone hardware parts ● Selecting tools used in assembling ● Interpreting SOP ● Applying telephone Telephone assembly procedures	● Having Teamwork ● Having adaptability ● Having technical curiosity ● Having continuous improvement



Duration: 20 hrs



Learning outcome 1 objectives:

By the end of the learning outcome, the trainees will be able to:

1. Identify properly Telephone technology according to the manufacturer's manual.
2. Identify properly Telephone types of cell phones according to the manufacturer's manual.
3. Identify properly parts of a conventional Telephone according to the phone model.
4. Identify properly Feature phone parts according to the phone model.
5. Identify properly Smart phone parts according to the phone model
6. Select correctly tools used in assembling based on Telephone model.
7. Identify properly SOP part and types according to the phone model assembly
8. Assemble properly Telephone hardware parts according to the manufacturer's manual.



Resources

Equipment	Tools	Materials
● Multimeter ● Soldering Station ● DC Power Supply ● Oscilloscope	● Screwdrivers ● Pliers ● Tweezers ● Soldering irons ● Wire cutters and strippers ● ESD-Safe Cleaning Brush	● Solder wire ● Solder paste ● Thinner or PCB Cleaner ● Ultrasonic Cleaner ● Liquid flux ● Desoldering Wire/wick



Indicative content 1.1: Introduction to Telephones



Duration: 5 hrs



Theoretical Activity 1.1.1: Description of Telephones



Tasks:

1. You are invited to answer the following questions related to Describe Telephones.
 - i. Define Telephone
 - ii. Describe the telephone technology
 - iii. Identify the different types of cell phones
 - iv. Describe the parts of a conventional Telephone
- 2: Present your findings to the whole class and Trainer
- 3: You are directed to read the key readings 1.1.1. for more clarifications on basic concept of Telephones.:



Key readings 1.1.1.: Description of Telephones

1. Telephone

A telephone is a telecommunications device that allows two or more people to communicate with each other in real time, typically using voice signals transmitted over a wired or wireless network

2. Telephones Technology

The telephone is one of the most significant inventions in human history, revolutionizing the way people communicate across distances.

The word telephone originates from the Greek 'tele' meaning far, and 'phone' meaning to speak, was applied as early as the late 17th century

Telephones have come a long way since their invention in the 19th century.

The evolution of telephone technology can be divided into two categories (analog and digital).

Analog Technologies:

1. Early Telephones (Late 19th Century):

In 1876, Alexander Graham Bell received the patent for the invention of the telephone. Early telephones used analog technology, converting sound waves into electrical

signals and transmitting them over wires.



2. Rotary Dial and Manual Switchboards (Early to Mid-20th Century):

Rotary dial phones, introduced in the early 20th century, allowed users to select numbers by rotating a dial corresponding to the desired digit.

The mid-20th century saw the introduction of direct dialing, where users could make Calls without operator assistance.



Rotary Dial phone



Manual Switchboards phone

Digital Technologies:

1. Touch-Tone Dialing (1960s):

Touch-tone phones replaced rotary dial phones. These phones had a keypad with push-button keys, each producing a unique dual-tone multi-frequency (DTMF) signal when pressed.



2. Digital Switching and Integrated Services Digital Network (ISDN, 1980s):

Digital cellular networks, such as GSM and CDMA, replaced analog systems, offering better call quality and enabling features like text messaging (SMS).



3. Mobile Phones (1980s) and Digital Cellular Technology (1990s):

Digital cellular networks, such as GSM and CDMA, replaced analog systems, offering better call quality and enabling features like text messaging (SMS).



4. Smartphones (2000s and Beyond):

Smartphones combine the traditional voice calling with a wide range of features, including internet access, email, multimedia, and mobile apps.

Touchscreen technology and the development of operating systems like iOS and Android have made smartphones ubiquitous.



5. Voice over Internet Protocol (VoIP, 2000s):

VoIP technology allows voice calls to be transmitted over the internet, often at a lower cost than traditional landline services. Popular VoIP services include Skype and Zoom.



2. Identification of different types of cell phones

Cell phones, also known as mobile phones, come in various types, each catering to different user needs and preferences. Cell phones use radio waves to transmit voice and data over cellular networks, allowing users to stay connected virtually anywhere.

The term "**cellular**" comes from the structure of the network, which is divided into small geographic areas called "cells." Each cell is served by a cell tower that transmits and receives radio signals.

Here's an identification of different types of cell phones based on their basic phone and smartphone.

● Basic Phones:

Basic phones are simple, entry-level devices designed primarily for making calls and

sending text messages.

They usually feature physical keypads for dialing and texting, along with basic functions like a camera, FM radio, and limited internet access.

Basic phones are ideal for users who prefer simplicity and long battery life over advanced

Features



✓ **Rugged Phones:**

Rugged phones are designed to withstand harsh environments, including water, dust, and shock.

They feature durable construction with reinforced casing and often meet military-grade standards for durability and ruggedness.

Rugged phones may include additional features like enhanced battery life, GPS tracking,

and specialized sensors for outdoor activities or industrial use.

Rugged phones are favored by users who work in demanding environments such as construction, outdoor recreation, or public safety.



● **Smartphones:**

Smartphones are advanced mobile devices that offer a wide range of features beyond

basic calling and texting.

They typically feature touchscreen displays, powerful processors, and advanced operating

systems like iOS (Apple) or Android (Google).

Smartphones support various applications, including internet browsing, email, social media, multimedia playback, gaming, and productivity tools.

They often include high-resolution cameras, biometric authentication (such as fingerprint

or facial recognition), and support for virtual assistants like Siri or Google Assistant.

Smartphones are suitable for users who require advanced functionality and connectivity

on the go.



✓ **Feature Phones:**

Feature phones bridge the gap between basic phones and smartphones, offering more features than basic models but without the complexity of smartphones.

They typically include a physical keypad or a touchscreen interface with limited app support.

Feature phones may offer basic internet browsing, email access, and multimedia capabilities but lack the extensive app ecosystem of smartphones.

Feature phones are popular among users who want some advanced features without the complexity and cost of smartphones.



✓ **Foldable Phones:**

Foldable phones feature flexible display technology that allows the screen to fold or

bend, offering a larger display area while maintaining portability.

They typically use OLED or similar flexible display panels that can bend without damage.

Foldable phones offer the versatility of a smartphone with the option for a larger screen

size for multimedia consumption or multitasking.

Foldable phones are relatively new to the market and cater to users who desire cutting edge tech



3. Parts of a Conventional Telephone

A conventional telephone consists of several essential components that work together to enable communication. Here's a breakdown of the main parts:

Handset

- **Microphone:** Converts sound waves from your voice into electrical signals.
- **Earpiece:** Converts electrical signals back into sound waves for you to hear.

Base unit

- **Dial pad or keypad:** Used to input phone numbers.
- **Hook switch:** Connects and disconnects the phone from the line.
- **Ringer:** Produces a sound to alert you of an incoming call.
- **Cord:** Connects the handset to the base.

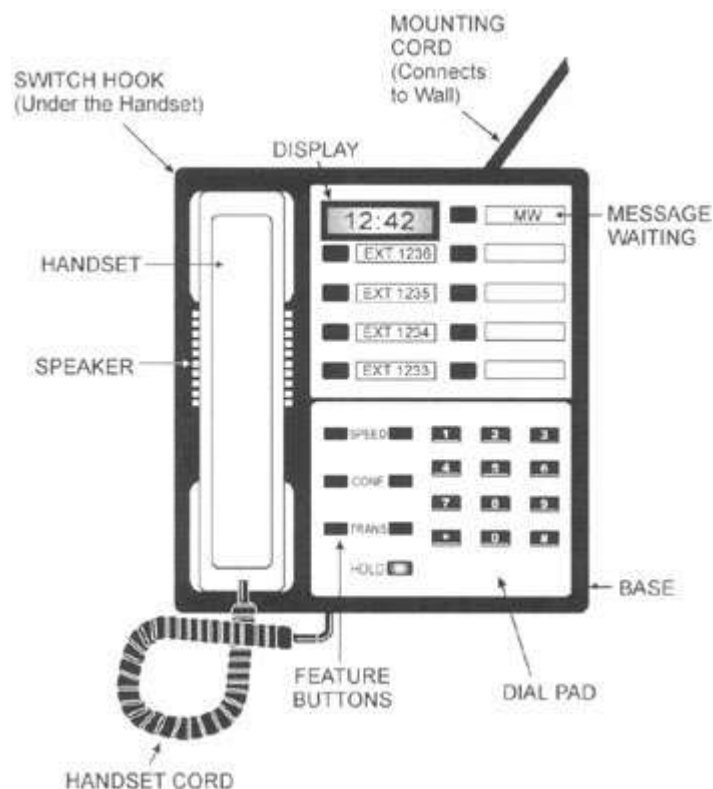
Internal Components:

- **Hook Switch:** A lever that connects and disconnects the phone from the telephone network.
- **Inductance Coil:** Converts electrical signals to audio signals and vice versa.

- **Transformer:** Steps up or steps down the voltage of electrical signals.
- **Bell Ringer:** A device that produces a ringing sound to alert the user of an incoming call.
- **Dialer:** A mechanism that generates pulses or tones to represent numbers.

Additional Components

- **Speakerphone:** Allows hands-free conversations.
- **Display screen:** Shows caller ID, call duration, and other information.
- **Redial button:** Allows you to redial the last number called.
- **Mute button:** Silences your microphone during a call.
- **Flash button:** Used for specific call functions like call waiting or conference calling





Points to Remember

Introduction to the telephone

- A telephone is a telecommunications device that allows two or more people to communicate with each other in real time, typically using voice signals transmitted over a wired or wireless network.
- A telephone converts sound waves into electrical signals for long-distance voice transmission, facilitating conversations between individuals in different locations.
- The telephone technology includes: Analog Telephones and Digital Telephones
- Cell phones, or mobile phones, come in various types to meet diverse user needs:
 - ✓ **Basic Phones and Smartphones**
- A conventional telephone comprises several parts which are **Base Unit, Handset** and **Internal Components** that facilitate communication:



Application of learning 1.1.

You are an ICT technician tasked with training a group of new recruits about the evolution of telephone technology, the types of mobile phones available today, and the components of a conventional telephone. Your role is to prepare practical demonstrations and discussions to help them understand how telephones have developed over time, the differences between basic phones, smartphones, and other mobile devices, as well as the internal parts of a telephone. as an ICT technician you task is to train a group of new recruits on several key aspect of telephone technology. Your training will cover:

1. Evolution of telephone technology
2. Types of mobiles phones.
3. Parts of conversional telephone.



Indicative content 1.2: Identification of Telephone Hardware Parts



Duration: 5 hrs



Theoretical Activity 1.2.1: Identification of Telephone hardware parts

Tasks:

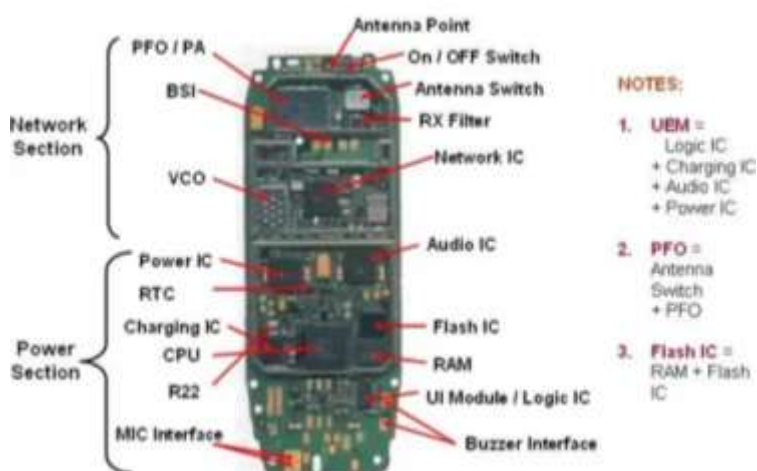
- 1: you are invited to answer the following questions related to telephone hardware parts:
 - i. List the main parts of a feature phone?
 - ii. What are the main parts of a smartphone?
- 2: Present your findings to the whole class and Trainer
- 3: Ask your trainer for any clarification if any
- 4: You are directed to read the key readings 1.2.1. for more clarifications on basic concept of Identification of Telephone hardware parts



Key readings 1.1.1.: Identification of Telephone hardware parts

1. Feature phone parts

Feature phones, which are a step above basic phones but less advanced than smartphones, typically have several key parts (network section parts and power section parts) that facilitate their functionality. Here's a breakdown of the parts



I. Network Section Parts

The network section of a feature phone is responsible for handling communication with the cellular network. It comprises several key components that work together to ensure the phone can make calls, send messages, and connect to the internet (if applicable). Here are the main parts of the network section in a feature phone:

❖ **Antenna**

- **Function:** The antenna is responsible for receiving and transmitting radio signals to and from the cell towers. It ensures that the phone can connect to the cellular network, enabling communication.

❖ **Radio Frequency (RF) Circuit**

- **Function:** The RF circuit handles the processing of radio signals received from the antenna. It amplifies the signals, filters out noise, and converts them into a form that can be processed by the phone's other components.

❖ **Baseband Processor or Network IC**

- **Function:** The baseband processor is the central part of the network section. It processes the signals from the RF circuit, manages communication protocols, and handles tasks like encoding/decoding voice and data, as well as managing the phone's connection to the network.

❖ **SIM Card and SIM Card Interface**

- **Function:** The SIM (Subscriber Identity Module) card stores the user's subscription information, such as the phone number and network authorization data. The SIM card interface connects the SIM card to the phone's internal circuits, allowing it to communicate with the network.

❖ **Power Amplifier (PA)**

- **Function:** The power amplifier boosts the low-power radio signals generated by the baseband processor to a level that can be transmitted by the antenna to the cell tower. It ensures that the phone's signals are strong enough to reach the network.

❖ **Duplexer/Filter**

- **Function:** The duplexer allows simultaneous transmission and reception of signals through the antenna. It filters the incoming and outgoing signals to prevent interference between them, ensuring clear communication.

❖ **Frequency Synthesizer**

- **Function:** The frequency synthesizer generates the necessary frequencies for the RF circuit and the baseband processor. It ensures that the phone can tune into the correct frequency bands used by the cellular network.

❖ **Voltage-Controlled Oscillator (VCO)**

- **Function:** The VCO generates oscillating signals whose frequency can be adjusted based on input voltage. This component is critical in modulating and demodulating signals, allowing the phone to maintain stable communication with the network.

❖ RF Switch

- **Function:** The RF switch directs the signal flow between the transmitter and receiver circuits. It ensures that the correct path is used for sending and receiving signals, minimizing losses and enhancing communication quality.

❖ Modem

- **Function:** The modem converts digital data from the phone into a modulated signal that can be transmitted over the network, and vice versa. It handles tasks like error correction, data compression, and handshaking with the network.

II. Power Section Parts for a Feature Phone

The power section of a feature phone is crucial as it manages the power supply and distribution to various components of the device. Key parts of the power section in a feature phone include:

❖ **Battery:**

- **Description:** The primary source of power for the feature phone, usually a lithium-ion or lithium-polymer battery.
- **Function:** Provides the electrical energy needed to operate the phone.

❖ **Charging IC (Integrated Circuit):**

- **Description:** A chip that manages the charging process of the battery.
- **Function:** Controls the voltage and current flowing to the battery, ensuring safe and efficient charging.

❖ **Power Management IC (PMIC):**

- **Description:** A specialized IC responsible for managing and distributing power to various components of the phone.
- **Function:** Regulates voltage levels, controls power to different sections of the phone, and handles battery charging and discharging.

❖ **Voltage Regulators:**

- **Description:** Electronic components that maintain a constant voltage level to different parts of the phone.
- **Function:** Ensures that various circuits receive stable and appropriate voltage, preventing damage from fluctuations.

❖ **Fuse:**

- **Description:** A safety component that protects the phone's circuitry by breaking the circuit if excessive current flows through.
- **Function:** Prevents damage to the phone's components in case of a short circuit or power surge.

❖ **Battery Connector:**

- **Description:** The interface between the battery and the phone's circuitry.
- **Function:** Provides a secure and reliable connection between the battery and the phone's power management system.

❖ **Power Button and Circuit:**

- **Description:** The button and associated circuitry used to turn the phone on and off.
- **Function:** Initiates the power-on sequence by signaling the power management IC to start supplying power to the phone's components.

❖ **Charger Connector/Port:**

- **Description:** The physical port where the charger is connected to the phone.
- **Function:** Provides a pathway for electrical energy to flow from the charger to the battery.

❖ **Boost Converter:**

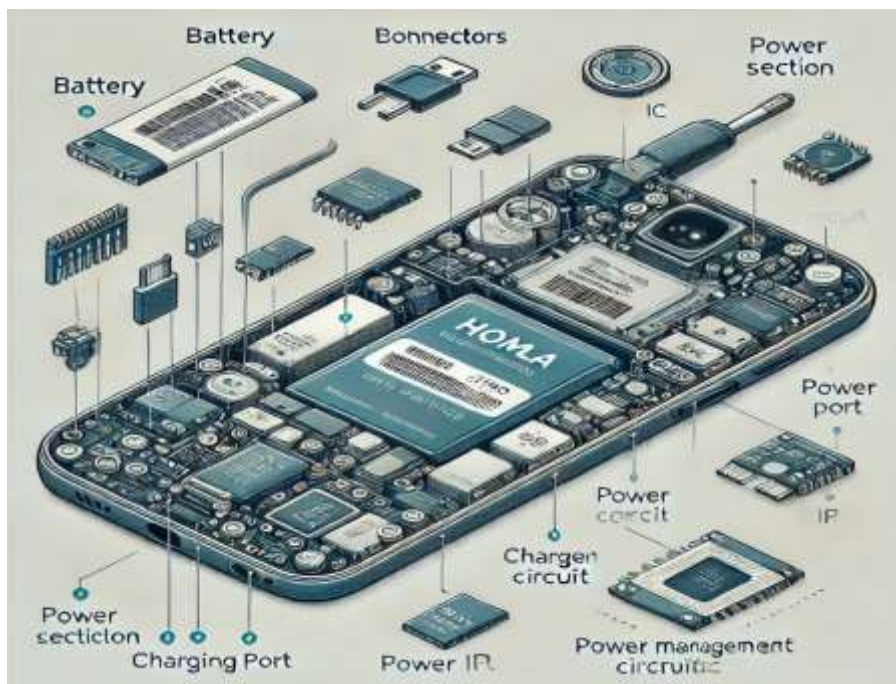
- **Description:** A type of DC-DC converter that steps up the voltage from the battery to a higher level required by some components.
- **Function:** Increases the voltage from the battery to power components that require higher voltage than the battery can supply directly.

❖ **Capacitors:**

- **Description:** Components that store and release electrical energy as needed.
- **Function:** Smooth out voltage fluctuations and provide stable power to the phone's circuits.

❖ **Inductors:**

- **Description:** Coiled components that work in conjunction with capacitors in power management circuits.
- **Function:** Help regulate the flow of current and filter out noise in power lines.



Here is the image of the power section parts of a feature phone, showing components such as the battery, battery connectors, charging port, power IC, and power management circuitry.

Table below explains the functions of the main other parts of a feature phone.

PARTS OF A MOBILE PHONE	PART FUNCTION
Keypad:	Used for inputting or entering data into the phone connected directly to the CPU.
Ear piece:	Converts the electric signal to a sound signal
Mouth piece:	Transmits sound from one phone to another
Battery:	Source of power supply to a mobile phone
Power switch:	Switches the phone on and off
Power IC:	It takes power from the battery and supplies to all other parts of a mobile phone
Oscillator:	It creates frequency during outgoing calls
Screen or display:	Displays data. It is connected to the CPU to receive signals: LCD Data Signal, LCD Reset Signal, LCD WR Signal, LCD RD Signal, LCD FLM Signal, LCD HSYN Signal, etc.
Flash IC:	Stores the software and other programs installed in the phone
Charging IC:	Takes the current from the charger and charges the battery
CPU:	Controls all sections of a mobile phone
Antenna:	Receives and transmit radio frequencies and helps the phone connect to the cellular network

2. Smart phone parts

Smartphones are intricate devices composed of various components that work together to provide functionality. Some of the key parts of a smartphone include:



❖ **Display / Touchscreen:**

- The front-facing part of the smartphone where users interact. It shows the visual output and responds to touch inputs.

❖ **Enclosure, Main, Top and Bottom:**

- The protective casing or body of the smartphone that houses all internal components. The top enclosure usually includes the front-facing elements like the screen, while the bottom may cover internal components like the battery and motherboard.

❖ **Interconnect PCB:**

- A printed circuit board (PCB) that connects various components inside the smartphone, enabling them to communicate with each other.

❖ **Power / Volume Button Assembly:**

- The buttons used to control the power state of the phone and adjust the volume. This assembly includes the buttons and the associated electronics that detect button presses.

❖ **USB Connector PCB:**

- The board that houses the USB port, used for charging the smartphone and transferring data to and from a computer or other devices.

❖ **Haptic / Vibration Motor:**

- A small motor that provides tactile feedback, such as vibrations when you receive a call or touch the screen.

❖ **Loudspeaker, Receiver, and Ringer Assembly:**

- The components responsible for audio output. The loudspeaker emits sound during calls or media playback, and the ringer alerts you to incoming calls or notifications.

❖ **WLAN Antennas A and B:**

- Wireless Local Area Network (WLAN) antennas that allow the smartphone to connect to Wi-Fi networks. Having multiple antennas improves signal reception and data transmission speeds.

❖ **SIM Tray:**

- The slot where the SIM card is inserted. The SIM card is necessary for connecting to a mobile network.

❖ **Fingerprint Sensor Assembly:**

- The sensor used for biometric authentication, allowing the user to unlock the phone or authorize actions with a fingerprint.

❖ **Primary Camera:**

- The main rear-facing camera used for capturing high-quality photos and videos.

❖ **Secondary Camera:**

- An additional camera, often used for wide-angle shots, telephoto zoom, or depth sensing.

❖ **Microphone PCB:**

- The board that contains the microphone, which captures audio during calls, recordings, and voice commands.

❖ **Camera Flash PCB:**

- The circuit board connected to the camera flash, which provides light for photography in low-light conditions.

❖ **NFC Antenna:**

- The Near Field Communication (NFC) antenna enables the smartphone to perform wireless communication with nearby devices, often used for contactless payments and data exchange.

❖ **Main PCB:**

- The primary printed circuit board in the smartphone, which houses the central processing unit (CPU), memory, and other essential electronics.

❖ **Audio Jack:**

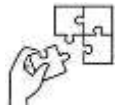
- The port where headphones or earphones can be connected. This feature is becoming less common in newer models.



Points to Remember

Main hardware parts of feature phone are: Antenna, Battery, Battery Charger.

Main hardware parts of smart phones are: Display/Touchscreen, Enclosure (Top & Bottom), Interconnect PCB.



Application of learning 1.2.

You are a computer system assembly technician tasked with training a group of junior technicians on the critical components of feature phones and smartphones, particularly focusing on the network and power sections. Your goal is to help them understand the functionality of each part and its role in the overall operation of these devices. You have a mix of old feature phones and modern smartphones available for practical demonstrations. Each trainee will disassemble both a feature phone and a smartphone during the session to identify and label key components.



Indicative content 1.3: Assembling Telephones Hardware



Duration: 10 hrs



Theoretical Activity 1.3.1: Identification of tools used in telephone assembling

Tasks:

- 1: You are invited to answer the following questions related to Identification of tools:
 - i. List tools used in hardware assembly.
 - ii. What is a cell phone toolkit?
 - iii. What is Electrostatic Discharge (ESD), and why is it important in telephone assembly?
 - iv. Why is cleaning important in telephone assembly?
- 2: Present your findings to the whole class and Trainer
- 3: Ask your trainer for any clarification if any
- 4: You are directed to read the key readings 1.3.1. for more clarifications on identification of tools.



Key readings 1.3.1.: Identification of tools used in telephone assembling

1. Cell phone tool kit

A cell phone toolkit, also known as a mobile phone repair toolkit, is a set of tools designed to assist with the disassembly, repair, and maintenance of mobile phones. These toolkits typically include various specialized tools required to open, dismantle, and work on the internal components of mobile devices. Here are some common tools you might find in a cell phone toolkit:

- **Screwdrivers:**

Precision screwdrivers of various sizes to remove screws from the phone's casing.



- **Tweezers:**

Fine-tipped tweezers for handling small components, such as screws and connectors.



- **3.Suction Cup:**

Used to lift the phone's display or back cover without damaging the casing.



- **Plastic Opening Tools:**

Non-conductive tools to prevent accidental short-circuits when working on electronic components.



- **Anti-Static Wrist Strap:**

Helps discharge any built-up static electricity from your body to prevent damage to sensitive electronic components.



- **6.Precision Scissors:**

Small, sharp scissors for cutting adhesive or other materials during the repair process.



- **Cleaning Tools:**



Microfiber cloths, brushes, and compressed air for cleaning components and removing dust.

- **Magnifying Glass:**

Helps with inspecting small components and solder joints more closely.



- **Soldering station:**

A soldering station is a versatile tool used for soldering electronic components onto circuit boards, wires, or other conductive materials.



- **ESD-Safe Mat:**

An anti-static mat that provides a safe work surface to protect against electrostatic discharge.



- **SIM Card Ejector Tool:**

A small pin or tool for ejecting the SIM card tray.



- **Pentalobe Screwdriver:**

Specialized screwdriver for opening devices with pentalobe screws, commonly used in iPhones.



- **Tri-wing Screwdriver:**

Screwdriver for opening devices with tri-wing screws, often found in some Nintendo products and other electronics.

It's important to note that the specific tools you need may vary depending on the make and model of the cell phone you're working on. Additionally, if you're not experienced with phone repairs, it's advisable to follow proper guides and safety precautions to avoid damaging the device or risking injury.



- **Soldering iron**



Blue Soldering Iron V802 AC 220V 40W Constant Temperature LOW PRICE Soldering Iron Tools Electric Rework Station

Great for electronics, computer equipment, watch repair, and many other hobby and craft projects. Perfect for your soldering needs

2.Esd tools

1 Antistatic Mat (ESD Mat)

An ESD Mat or Antistatic Mat is laid or placed on the table or workbench where mobile repairing is done. The mat is grounded using a grounding cord or normal grounding wire. This prevents damage from static electricity.

- **Antistatic wrist Strap**

It is worn in the wrist of the person who is repairing a mobile phone. It is used for ESD Prevention and helps to discharge or ground static charge thus preventing the PCB or electronic components from any damage.

- **Antistatic Hand Gloves**

It is important to wear ESD-Safe hand gloves while repairing a mobile phone to prevent PCB and electronic components from static charge.

- **Antistatic bag**

An antistatic bag is a packaging material that is specially designed to help prevent static electricity interacting with sensitive electrical components. These bags are made of plastic polyethylene and often used to store and transfer electrostatic sensitive equipment.

3.Cleaning Tools

- **Microfiber Clothes**

Microfiber cloths are made from very fine synthetic fibers, typically a blend of polyester and nylon, that are woven together to create a soft, highly absorbent, and durable material. These fibers are much finer than a human hair, allowing microfiber cloths to effectively trap dust, dirt, and moisture.



2. Lysol spray

Microfiber cleaning cloths and mops work well for removing organic matter (dirt, oils, grease) as well as germs from surfaces.

Lysol Cleaner eliminates viruses, bacteria, soap scum, and tough grease.



3 Brush

Brush, device composed of natural or synthetic fibres set into a handle that is used for cleaning, grooming, polishing, writing, or painting.





Practical Activity 1.3.2: Selecting Tools Used in Telephone Assembling



Task:

- 1: Referring to the key readings 1.3.2, you are requested to interpret SOP to the following task:
 - I. You are a computer system assembly technician working at a mobile phone assembly center, tasked with assembling a new smartphone model. Your supervisor has asked you to select the appropriate tools required for the assembly process, ensuring all tools meet the safety and quality standards for handling sensitive electronic components.
- 2: Follow instructions and procedures provided in that key readings and perform the given task
- 3: Present your final products to your trainers/colleagues
- 4: Ask for any clarification to the trainer where necessary



Key readings 1.3.2.: Selecting Tools Used in Telephone Assembling

1. Analyze the Assembly Process:

- ✓ Break down the tasks.
- ✓ Determine component types.

2. Identify Required Tools:

- ✓ Consult assembly instructions.
- ✓ Consider component types.
- ✓ Assess precision and size.

3. Evaluate Tool Specifications:

- ✓ Size and shape.
- ✓ Material.
- ✓ Precision.

4. Consider Tool Kits:

- ✓ Specialized kits.

5. Test Tools:

- ✓ Practice with similar components.
- ✓ Common Tools for Telephone Assembly:
 - ✓ Screwdrivers
 - ✓ Tweezers
 - ✓ Soldering iron and solder
 - ✓ Wire cutters and strippers
 - ✓ Heat gun
 - ✓ Pliers
 - ✓ Anti-static wrist strap

By following these steps and considering the specific requirements of the telephone assembly process, you can select the appropriate tools to ensure efficient and accurate work.



Theoretical Activity 1.3.3: Introduction of SOP



Tasks:

- 1: you are invited to answer the following questions related to Interpretation of SOP:
 - i. What is an SOP?
 - ii. What is the purpose of SOP?
 - iii. What are the common parts of an SOP for telephone assembly?
 - iv. What are the different types of SOPs used in telephone assembly?
- 2: Present your findings to the whole class and Trainer
- 3: Ask your trainer for any clarification if any
- 4: You are directed to read the key readings 1.3.3. for more clarifications on basic concept of Interpretation of SOP:



Key readings 1.3.3.: Introduction of SOP

1. SOP (stands for Standard Operating Procedure)

SOP stands for Standard Operating Procedure. It is a document that outlines the step-by-step instructions on how to perform a particular task or process within an organization. SOPs are crucial for ensuring consistency, efficiency, and compliance with industry regulations. The interpretation of SOP involves understanding its components, types, and the purpose it serves in various contexts.

2. Purpose of SOP

The purpose of a **Standard Operating Procedure (SOP)** is to provide clear, step-by-step instructions on how to perform specific tasks or processes consistently and effectively. SOPs serve several key purposes:

- ✓ **Consistency:** Ensures that tasks are performed the same way each time, leading to uniformity in operations.
- ✓ **Efficiency:** Helps streamline workflows and reduce errors, improving productivity.
- ✓ **Compliance:** Assists in meeting regulatory, legal, and organizational standards or requirements.
- ✓ **Training:** Acts as a training tool for new employees, providing them with clear guidelines on how to perform tasks.

✓ **Quality Control:** Helps maintain a high standard of work and ensures quality output.

1. **Safety:** Provides safety guidelines to reduce risks and prevent accidents or mishaps.
2. **Accountability:** Establishes clear expectations and roles, ensuring accountability within teams.

3. SOP Parts

1. **Title:** Clearly indicates the name of the procedure.
2. **Purpose/Objective:** States the reason for the existence of the SOP and what it aims to achieve.
3. **Scope:** Defines the boundaries and applicability of the SOP.
4. **Responsibility:** Identifies the individuals or roles responsible for carrying out specific tasks in the procedure.
5. **Procedure Steps:** Provides a detailed, step-by-step guide on how to perform the task or process.
6. **References:** Includes any documents, standards, or regulations that the SOP is based on.
7. **Definitions:** Clarifies any terms or acronyms used in the SOP.
8. **Attachments/Appendices:** Includes any additional documents or forms relevant to the procedure.

4. SOP Types

1. **Process SOPs:** Outline the steps involved in a specific business process.
2. **Policy SOPs:** Detail the organization's policies and the procedures associated with them.
3. **Work Instruction SOPs:** Provide detailed instructions for specific tasks or activities.
4. **Equipment SOPs:** Describe the proper use and maintenance of equipment.
5. **Safety SOPs:** Focus on procedures to ensure a safe working environment.
6. **Quality SOPs:** Outline processes and standards to maintain product or service quality.
7. **HR SOPs:** Cover human resource-related processes and policies.
8. **IT SOPs:** Detail procedures related to information technology systems and usage.

The interpretation of SOP parts and types is essential for employees to follow standardized processes, maintain consistency, and ensure compliance with regulatory requirements. It also aids in quality control, risk management, and the overall efficiency of an organization's operations.



Practical Activity 1.3.4: Interpreting Telephone assembling SOP



Task:

1: Referring to the key readings 1.3.4, you are requested to interpret SOP to the following task:

1. As a mobile technician, you have been tasked with assembling a feature phone following a detailed Standard Operating Procedure (SOP). The phone's components include the motherboard, keypad, screen, battery, antenna, and casing. The SOP provides step-by-step instructions on assembling the device. Your goal is to interpret the SOP correctly and ensure the phone is assembled efficiently and functions properly.

2: Follow instructions and procedures provided in that key readings and perform the given task

3: Present your final products to your trainers/colleagues

4: Ask for any clarification to the trainer where necessary



Key readings 1.3.4.: Interpreting Telephone assembling SOP

1. Understanding the SOP

- **Familiarize with SOP Structure:** Review the SOP in its entirety before beginning the assembly. Ensure you understand each step, especially the order of operations and safety instructions.
- **Highlight Critical Points:** Identify important steps such as the order of component assembly, torque specifications for screws, or any particular handling instructions for fragile components.
- **Review Diagrams and Images:** If the SOP contains diagrams or images, cross-reference these with the physical components to ensure proper identification and orientation.

2. Preparing the Workspace

- **Organize Tools and Components:** Arrange the necessary tools (e.g., screwdrivers, tweezers, ESD mat) and components (motherboard, keypad, screen, battery, antenna, casing) in an orderly fashion. Ensure all items are within easy reach.
- **Maintain Cleanliness:** Ensure the workspace is clean and free from dust or debris that may interfere with the assembly. Use an antistatic mat to prevent electrostatic discharge (ESD) damage to sensitive components like the motherboard.
- **Safety Gear:** Wear an ESD wrist strap and follow grounding procedures to protect components from electrostatic damage.

3. Motherboard Installation

- **Handle the Motherboard Carefully:** Use both hands or appropriate tools (like

tweezers) to handle the motherboard, avoiding any contact with delicate circuitry.

- **Align Properly:** Ensure the motherboard is correctly aligned with its mounting points inside the casing.
- **Secure with Screws:** Follow the SOP's guidance on the torque or pressure to apply when securing the motherboard with screws. Tighten screws evenly to prevent damage.

4. Keypad and Screen Assembly

- **Keypad Alignment:** Check the orientation of the keypad and align it with the motherboard connectors or its designated frame in the casing. Confirm that all buttons fit snugly into their respective slots.
- **Screen Attachment:** Carefully attach the screen to the motherboard, ensuring that the connectors (ribbon cables) are seated firmly in place. Double-check that the screen is positioned flush with the front casing and free from dust or fingerprints before securing it.

5. Battery and Antenna Installation

- **Battery Connection:** Ensure the battery terminals are aligned correctly with the contacts on the motherboard. Follow any SOP-specific steps for securing the battery in place (e.g., clips or screws).
- **Antenna Placement:** Properly position the antenna according to the SOP's instructions. Ensure it is secured to its mounting points and does not obstruct other components. The antenna must make contact with the motherboard or designated connectors.

6. Casing Assembly

- **Inspect for Alignment:** Before closing the casing, ensure that all internal components are correctly seated and nothing is pinched or misaligned.
- **Snap or Screw the Casing:** Depending on the design, either snap the front and back halves of the casing together or secure them using screws. Follow the SOP to ensure correct pressure or torque settings are used to avoid damaging the plastic parts.
- **Check Buttons and Ports:** Once assembled, test the physical buttons (keypad, power, and volume buttons) to ensure they function correctly. Also, verify that ports (charging, audio jack) are unobstructed.

7. Final Testing and Quality Checks

- **Power-On Test:** Power on the device and check that the display turns on and all essential functions (keypad, touchscreen, and sound) are responsive.
- **Functional Tests:** Run diagnostics as specified in the SOP (e.g., checking call functionality, signal reception, screen brightness, and battery performance).
- **Inspect for Defects:** Look for any cosmetic defects such as scratches or gaps in the casing. Ensure the screen is clear, and all buttons are aligned correctly.
- **Battery and Signal Performance:** Test the battery's charge retention and verify

that the antenna receives a signal. Confirm there are no loose connections.

8. Recording and Reporting

- **Document the Assembly:** Record key details of the assembly process, including any deviations from the SOP, adjustments made, and tools used.

Feedback and Issues: If any issues were encountered (e.g., defective components or ambiguous instructions in the SOP), report them to the appropriate supervisor for future process improvements.



Practical Activity 1.3.5: Interpreting Telephone assembling SOP



Task:

1: Referring to the key readings 1.3.5, you are requested to perform the following task:

1. You are working as a senior technician at a mobile repair and assembly facility. The company has recently received a large order to assemble a batch of feature phones from individual components. Each phone must be carefully assembled following a specific set of steps to ensure functionality and durability. You are requested to assemble a batch of feature phones from individual components, ensuring each device meets the specified standards for functionality and durability.
- 2: Follow instructions and procedures provided in that key readings and perform the given task
- 3: Present your final products to your trainers/colleagues
- 4: Ask for any clarification to the trainer where necessary



Key readings 1.3.5.: Interpreting Telephone assembling SOP

What is Disassemble?

Telephone disassembling refers to the process of taking apart a telephone or its components.

This activity may be undertaken for various reasons, such as troubleshooting, repairs, upgrades and cleaning.

What is to assemble? To assemble is to fit together all the separate pieces in order to form one whole.

The following are the steps that you should take when disassembling a mobile phone:

1. Switch off the phone
2. Remove the battery cover
3. Remove the battery, SIM card memory card (if any)

4. Remove all the screws from the phone
5. Lift back the cover with the help of a flat screwdriver
6. Remove the strips (buzzer strip, display, camera, volume and speaker button strips)
7. Remove the antennae wire from the outside
8. Remove the motherboard and vibrator.

Assembling Feature Phone step by step

The following are the steps that you should take when assembling a mobile phone:

1. Install the Motherboard (PCB)
 - **Place the PCB:** Align the **PCB (printed circuit board)** with the mounting points in the phone's frame or casing.
 - **Secure with Screws:** Use the appropriate precision screwdriver to fasten the motherboard in place. Be careful not to overtighten and damage the board or components.
 - **Connect Internal Components:** Attach any required components such as **microphone**, **speaker**, or **antenna** to the motherboard using their respective connectors.
2. Assemble the Display
 - **Place the Screen:** Position the LCD/LED screen in its slot within the phone's frame.
 - **Connect the Display Ribbon:** Use tweezers to carefully connect the ribbon cable from the display to the motherboard. Ensure the connection is secure but not forced.
 - **Secure the Display:** If required, secure the display with screws or adhesive strips, ensuring it fits snugly in the casing.
3. Install the Keypad or Touchpad
 - **Place the Keypad:** Align and place the physical **keypad** onto the phone's frame, ensuring all keys are positioned correctly.
 - **Connect the Keypad:** If the keypad has a ribbon connector, carefully attach it to the motherboard.
4. Install Peripheral Components
 - **Install the Speaker and Microphone:** Place the **speaker** and **microphone** in their designated spots in the casing. Use tweezers to connect them to the motherboard.
 - **Install the Antenna:** If the phone has an internal **antenna**, connect and secure it properly, making sure it is aligned for optimal signal reception.
5. Insert the Battery
 - **Position the Battery:** Place the **battery** in its designated compartment, ensuring the positive and negative terminals align correctly with the contacts on the motherboard.
 - **Secure the Battery:** If the battery requires a screw or clip to hold it in place, secure it appropriately.
6. Assemble the Outer Casing

- **Attach the Back Casing:** Carefully snap or screw the **back cover** of the phone into place, ensuring all locking tabs or screws are properly engaged.
- **Install Screws:** Use the correct screwdriver to fasten any remaining screws that hold the outer casing together.

7. Final Inspection and Cleaning

- **Check for Alignment:** Ensure that all components, such as the screen, keypad, and outer casing, are aligned correctly and fit snugly.
- **Clean the Phone:** Use a **microfiber cloth** to clean the screen and casing to remove fingerprints or dust.

8. Test the Phone

- **Power On the Phone:** Insert the SIM card and battery (if not already inserted), then power on the phone to ensure it boots up properly.
- **Test the Key Functions:** Check the **keypad** or **touchpad**, **display**, **speaker**, **microphone**, and **antenna** for proper functionality. Ensure that the phone can make calls, send messages, and access the network.
- **Run Diagnostics:** If necessary, use any available diagnostic tools or software to verify the internal components, such as the display and memory.



Practical Activity 1.3.6: Perform Smartphone Assembly Procedures



Task:

- 1: Referring to the key readings 1.3.6, you are requested to perform the following task:
 - I. You are a computer system assembly technician working in a smartphone repair workshop. A customer has brought in a smartphone that was accidentally dropped, resulting in a cracked screen and damaged internal components. Your task is to assemble the smartphone, ensuring it is fully functional before returning it to the customer.
- 2: Follow instructions and procedures provided in that key readings and perform the given task
- 3: Present your final products to your trainers/colleagues

4: Ask for any clarification to the trainer where necessary



Key readings 1.3.6.: Perform Smartphone Assembly Procedures

What is Disassemble?

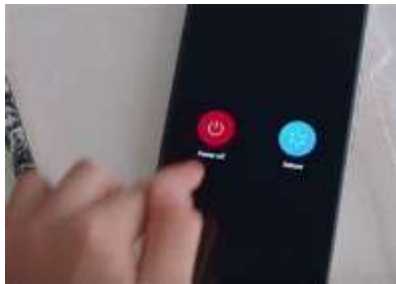
Telephone disassembling refers to the process of taking apart a telephone or its components.

This activity may be undertaken for various reasons, such as troubleshooting, repairs, upgrades and cleaning.

What is to assemble? To assemble is to fit together all the separate pieces in order to form one whole.

The following are the steps that you should take when disassembling a mobile phone:

1. Switch off the phone



2. Remove the battery cover



3. Remove the battery, SIM card memory card (if any)



4. Remove all the screws from the phone



5. Lift back the cover with the help of a flat screwdriver



6. Remove the strips (buzzer strip, display, camera, volume and speaker button strips)



7. Remove the antennae wire from the outside



8. Remove the motherboard and vibrator.



Assembling a Smart Phone step by step

The following are the steps that you should take when assembling a mobile phone:

1. Fix the vibrator strips of speaker and volume button



2. Fix the motherboard
3. Connect the antenna with wire



4. Place the camera and connect it

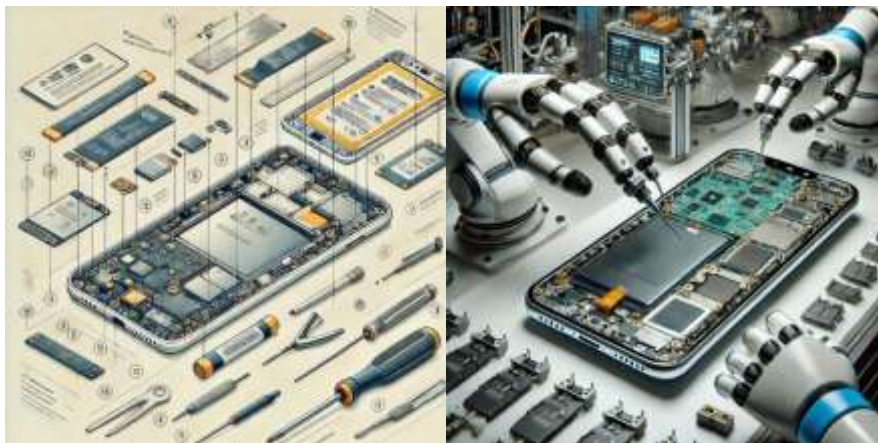


5. Place the buzzer
6. Put the camera cover
7. Make sure that the LCD is working before you place the screen
8. Put battery and battery cover



A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, train and confirmation of user input such as a mouse click or keystroke.

A buzzer is a small sound-producing device that can be used in alarm or to notify some person.





Points to Remember

- **Tools for Assembly:** Common tools include screwdrivers, anti-static wrist straps, tweezers, and cleaning materials. A cell phone toolkit helps with disassembly, repair, and maintenance.
- **Electrostatic Discharge (ESD):** ESD can damage electronic components during assembly, potentially causing product failures. Anti-static precautions should be taken.
- **Cleaning Importance:** Proper cleaning during assembly removes contaminants, ensures better adhesion, and prevents short circuits, enhancing quality and reliability.
- **Standard Operating Procedures (SOPs):** SOPs guide specific steps to ensure consistency, quality, and safety in telephone assembly. Key parts include the title, purpose, scope, materials, and step-by-step procedures.
- **Assembly Process Steps:**
 - ✓ Install the motherboard (PCB)
 - ✓ Assemble the display
 - ✓ Install the keypad or touchpad
 - ✓ Connect the antenna and other peripheral components
 - ✓ Insert the battery and outer casing
 - ✓ Conduct final testing and quality checks



Application of learning 1.3.

As a technician at TechWorks Ltd., you are responsible for assembling 50 feature phones from refurbished parts for a large client order. You ensure a smooth process by selecting the right tools and materials and setting up an efficient, quality-focused workspace. Following the SOP, you guide the team through each step of the assembly, making sure every phone is properly built, tested, and meets quality standards. Additionally, you lead hands-on training for new technicians, teaching them how to assemble and disassemble smartphones. You emphasize the importance of each step, ensuring they understand its role in the production line. By providing this guidance, you prepare the recruits to efficiently contribute to future assembly tasks. Your dual focus on quality and training ensures both immediate success and long-term efficiency at TechWorks Ltd



Learning outcome 1 end assessment

Theoretical assessment

A. Open question

Question1: define telephone

Question2: Name the main parts of a feature phone.

Question3: List the main hardware components found in a smartphone.

Question4: Explain the difference between assembling a feature phone and a smartphone.

B. Multiple-Choice Questions

Choose the letter corresponding to the correct answer:

1. What is the primary difference between mobile phones and smartphones?
 - a) Mobile phones can access the internet.
 - b) Smartphones have a touchscreen interface.
 - c) Mobile phones have a physical keypad.
 - d) Smartphones use analog signals.
2. If you need a phone that can survive in harsh environments, which type should you choose?
 - a) Basic Phone
 - b) Smartphone
 - c) Rugged Phone
 - d) Feature Phone
3. Which of the following best explains the evolution of telephone technology?
 - a) From analog signals to mobile connectivity.
 - b) From basic phones to smartphones.
 - c) From landlines to digital phones.
 - d) From analog signals to digital and wireless communication platforms.
4. Which type of phone is most suitable for users who require advanced connectivity and application support?
 - a) Basic Phone
 - b) Feature Phone
 - c) Smartphone
 - d) Rugged Phone
5. If you were to create a new type of phone combining the best features of basic and smartphones, what would you name it?
 - a) SmartBasic
 - b) HybridPhone
 - c) SimpleSmart
 - d) MultiPhone

Question: What is the first step in assembling a smartphone?

- a) Placing the battery in the slot
- b) Connecting the mainboard
- c) Cleaning the workspace
- d) Testing the display module

Answer by True if the statement is correct and False if the statement is wrong.

- a) Analog telephones convert sound waves into digital signals for transmission.
- 2. VoIP technology allows voice communication over the internet.
- b) Feature phones have touchscreen interfaces similar to smartphones.
- c) An ESD-safe mat helps prevent damage to sensitive electronic components from static electricity.
- d) Bluetooth has a range of around 50 meters.
- e) The process of assembling a phone begins with fixing the antenna.
- f) Smartphones typically require more components to be assembled than feature phones.

D. MATCHING QUESTIONS

Match the technology with its description:

Column A	Column B
1. VoIP	a. Converts sound waves into electrical signals
2. Analog Telephones	b. Offers advanced features like internet browsing and apps
3. Smartphones	c. Facilitates wireless short-range communication between devices
4. Bluetooth	d. Converts analog voice signals into digital data packets
5. Anti-Static Wrist Strap	e. Helps discharge static electricity
C. Basic phone	

E. Fill-in-the-Blank Questions

1. Telephones turn sound waves into _____ signals to transmit sound over long distances.
2. A _____ is worn on the wrist to prevent static charge from damaging the phone's electronic _____ components.
3. The _____ allows voice communication over the internet by converting analog voice _____ signals _____ into _____ digital _____ data.
4. The _____ is used to inspect small components closely during phone repair.

5. The _____ converts electrical signals into sound waves, allowing the user to hear during a call.

Practical assessment

You are a technician in a mobile phone manufacturing company, and your task for the day is to assemble a batch of feature phones. The company has recently updated its Standard Operating Procedures (SOP) for phone assembly and disassembly. Before you begin, your supervisor asks you to interpret the SOP and explain how you will follow the update procedures for both assembling and disassembling the phones.

END



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Learning Outcome 2: Deploy Telephone Software.



Microsoft

Indicative contents

- 2.1 Introduction to Telephone firmware.**
- 2.2 Description of Telephone Operating System.**
- 2.3 Installation of Telephone Operating System.**
- 2.4 Installation of mobile applications.**
- 2.5 Testing Telephone.**

Key Competencies for Learning Outcome 2: Deploy Telephone software.

Knowledge	Skills	Attitudes
● Description of key terms used in telephone firmware ● Description of Telephone device firmware Importance ● Description of firmware types ● Description of OS Functions ● Description Features of Telephone Operating System ● Description Components of Telephone Operating System ●	● Installation of Telephone Operating System ● Installation of mobile applications ● Testing Telephone ● Installation of Telephone Android OS ● Installation of Telephone iOS ● Installation of Telephone Windows ● Installation of Telephone Tizen ●	● Having problem solving ● Having critical thinking ● Being team work ● Having Hardworking ● Having creative ● Having time management ● Having decision making



Duration: 10 hrs



Learning outcome 2 objectives:

By the end of the learning outcome, the trainees will be able to:

1. Select properly the telephone firmware based on telephone model.
2. Install correctly telephone firmware based on telephone model.
3. Install correctly application based on installed operating system.
4. Test properly operation of mobile telephones according to functionality.



Resources

Equipment	Tools	Materials
• Computer • Mobile phone	• Odin • Miracle Thunder Box • SP Flash Tool • 3uTools • iTunes/Finder	• Applications packages • Telephone firmware • App Licenses, • Internet bundles • Phone USB Connectors



Indicative content 2.1: Introduction to Telephone Firmware



Duration: 2 hrs



Theoretical Activity 2.1.1: Description of firmware.



Tasks:

- 1: you are invited to answer the following questions related to the description of firmware:
 - i. Define phone model?
 - ii. Define firmware?
 - iii. What is operating system?
 - iv. What is mobile application?
 - v. List the Importance of Telephone device firmware?
 - vi. What are the main types of firmware?
- 2: Present your findings to the whole class and Trainer.
- 3: Ask your trainer for any clarification if any.
- 4: You are directed to read the key readings 2.1.1 for more clarifications on basic concept description of firmware.



Key readings 2.1.1.: Description of firmware.

1. **Phone model** Refers to a specific variant or version of a mobile phone or smartphone produced by a manufacturer
2. **Telephone firmware:** refers to the software embedded in a telephone's hardware that controls its operation, features, and functionality. It serves as the operating system for the telephone device, enabling it to perform various tasks such as making and receiving calls, managing contacts, displaying user interface elements, and interacting with network services
3. The term "**telephone operating system**" typically refers to the software that manages the operations of a smartphone. In the context of smartphones, the operating system (OS) serves as the foundation software that enables the device to function and provides an interface for users to interact with various applications and hardware components.
4. **A mobile application**, often abbreviated as "mobile app," is a software application specifically designed to run on mobile devices such as smartphones and tablets. Mobile apps are created to offer users a wide range of functionalities, from

productivity tools and entertainment to communication and gaming.

5. Importance of Telephone device firmware

✓ **Hardware Control:** Telephone device firmware controls the hardware components of the device, including the baseband processor, modem, microphone, speaker, touchscreen, and other peripherals. It translates higher-level commands from the operating system or applications into low-level instructions that the hardware can understand and execute.

✓ **System Boot-up:** Firmware initiates the boot-up process when the telephone device is powered on. It performs essential tasks such as hardware initialization, memory configuration, and loading the operating system into memory. A well-designed firmware ensures a smooth and reliable boot-up sequence, allowing the device to start up quickly and efficiently.

✓ **Power Management:** Firmware manages power consumption and battery usage in telephone devices. It includes power-saving features such as sleep modes, dynamic voltage and frequency scaling, and optimizations for efficient use of resources. Effective power management extends battery life, prolongs device uptime, and enhances overall energy efficiency.

✓ **Signal Processing:** In cellular telephones, firmware is responsible for signal processing tasks such as modulation, demodulation, encoding, decoding, error correction, and frequency hopping. It ensures reliable communication over wireless networks by processing incoming and outgoing signals accurately and efficiently.

✓ **Security Features:** Telephone device firmware implements security features to protect against various threats, including malware, unauthorized access, and data breaches. This includes secure boot mechanisms, encryption algorithms, secure communication protocols, and access control mechanisms. Robust firmware security safeguards sensitive user data and prevents unauthorized tampering or exploitation of vulnerabilities.

✓ **Bug Fixes and Performance Enhancements:** Manufacturers regularly release firmware updates to address bugs, vulnerabilities, and performance issues identified after the initial release of the device. These updates may also introduce new features, improvements, and optimizations based on user feedback and technological advancements. Keeping firmware up-to-date ensures optimal performance, stability, and security of the telephone device.

✓ **Compatibility and Interoperability:** Firmware plays a crucial role in ensuring compatibility and interoperability with various network standards, protocols, and communication technologies. It enables seamless connectivity and communication between different devices, networks, and services, allowing users to stay connected and productive across diverse environments

6. Types of Firmware

There are many types of technology-specific firmware, but all firmware can generally be sorted into three categories based on the level of hardware integration.

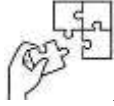
- ✓ **Low-level firmware:** Low-level firmware is considered an intrinsic part of a device's hardware. It is often stored on non-volatile, read-only chips like ROM and therefore cannot be rewritten or updated. Devices containing low-level firmware have one-time programmable memory.
- ✓ **High-level firmware:** High level firmware does allow updates and is generally more complex than low-level firmware. In a computer, high-level firmware resides on flash memory chips.
- ✓ **Subsystem firmware:** Subsystem firmware often comes as part of an embedded system. It is comparable to high-level firmware in that it can be updated and is more complex than low-level firmware. One example is a server's power subsystem, which is a piece of server hardware that functions semi-independently from the server



Points to Remember

Description of firmware.

- Phone model: A specific variant or version of a mobile phone.
- Telephone firmware: The software embedded in a phone's hardware that controls its operation.
- Telephone operating system: The software that manages the operations of a smartphone.
- Mobile application: Software specifically designed to run on mobile devices.
- **Importance of Telephone Device Firmware**
 - ✓ Controls hardware components.
 - ✓ Initiates the boot-up process.
 - ✓ Manages power consumption.
 - ✓ Processes signals for communication.
 - ✓ Implements security features.
 - ✓ Provides bug fixes and performance enhancements.
 - ✓ Ensures compatibility and interoperability
- Types of Firmware
 - ✓ Low-level firmware
 - ✓ High-level firmware
 - ✓ Subsystem firmware



Application of learning 2.1.

A leading smartphone manufacturer is planning to launch a new smartphone model designed to provide advanced functionality, improved security, and seamless performance. This device will run on the latest operating system and come pre-installed with mobile applications tailored for productivity, fitness, and entertainment. As a computer system architecture assembly focus on the firmware's role in optimizing hardware control, enhancing power efficiency, and ensuring security.



Indicative content 2.2: Description of Telephone Operating System.



Duration: 2 hrs



Theoretical Activity 2.2.1: Identification of Operating system.



Tasks:

- 1: You are invited to answer the following questions related to telephone hardware parts:
 - i. What is the primary function of a telephone operating system?
 - ii. What are some essential features of a modern telephone operating system?
 - iii. What are the main components of a telephone operating system?
 - iv. What are pointers in the context of a telephone operating system?
 - v. What are the key differences between Android and iOS in terms of user experience?
- 2: Present your findings to the whole class and Trainer
- 3: Ask your trainer for any clarification if any
- 4: You are directed to read the key readings 2.2.1 for more clarifications on basic concept of Identification of operation system



Key readings 2.1.1.: Identification of Operating system.

1. Functions of OS

An operating system performs various tasks. Let us study them. Several functions of OS are:

✓ **Memory Management**

It is the management of the main or primary memory. Furthermore, whatever program is executed, it has to be present in the main memory. Therefore, there can be more than one program present at a time. Hence, it is required to manage the memory.

The operating system:

- Allocates and deallocates the memory.
- Keeps a record of which part of primary memory is used by whom and how much.
- Distributes the memory while multiprocessing.

✓ **Processor Management/Scheduling**

When more than one process runs on the system the OS decides how and when a process will use the CPU. Hence, the name is also **CPU Scheduling**. The OS:

- Allocates and deallocates processor to the processes.
- Keeps record of CPU status.

✓ **Device Management**

The processes may require devices for their use. This management is done by the OS. The OS:

- Allocates and deallocates devices to different processes.
- Keep records of the devices.
- Decides which process can use which device for how much time.

✓ **File Management**

The files on a system are stored in different directories. The OS:

- Keeps records of the status and locations of files.
- Allocates and deallocates resources.

✓ **Security**

The OS keeps the system and programs safe and secure through authentication. A user id and password decide the authenticity of the user.

✓ **Other Functions**

Some other functions of the OS can be:

-  Error detection.
-  Keeping a record of system performance.
-  Communication between different software etc.

2. Features of Mobile Operating System

✓ **Easy to use**

- The graphics should be attractive.
- The buttons and features should be easy to use. moreover, the functionalities should not be very complicated.
- Features should be powerful and useful.

✓ **Good app store**

- An app is one of the basic parts of an OS.
- Good and useful apps form an important part of an OS.
- The apps should be simple and interactive.

✓ **Good battery life**

- Power is one of the main requirements of a smartphone.
- They require power for processors sensors etc. Therefore, the battery holds a very important role.
- Smartphones power usage keeps on increasing therefore, a good battery backup is very essential.

✓ **Data usage and organization**

- An operating system should focus on controlling the data and network usage. It

should keep the limit and requirement in focus.

- Secondly, the organization of data related to to-do lists, calendars, alarms, reminders etc. Is very important. A good OS should keep this data in a very organized and safe manner. Moreover, the data should be readily and easily available.

3. The main components of a telephone operating system

Here are the **components of a telephone operating system** based on common mobile operating systems:

✓ **Kernel**

- The core component that manages hardware resources like CPU, memory, and I/O devices. It acts as an intermediary between the hardware and software applications.
- Example: Linux kernel in Android OS.

✓ **User Interface (UI)**

- The graphical or touch interface that allows users to interact with the device. It includes menus, icons, buttons, and other visual elements.
- Example: Android's Material Design UI or iOS's UIKit.

✓ **Application Framework**

- Provides developers with tools and APIs to create apps. It manages basic system services like resource management, telephony, and hardware access.
- Example: Android SDK for Android OS, UIKit for iOS.

✓ **System Libraries**

- Libraries that provide functionality to applications, such as graphics rendering, data management, and network communication.
- Example: OpenGL for graphics, SQLite for database management.

✓ **Device Drivers**

- Software that allows the operating system to interact with hardware components like cameras, Bluetooth, and Wi-Fi.
- Example: Camera driver, GPS driver.

✓ **Telephony Subsystem**

- Manages call handling, messaging, network connectivity, and SIM card interaction.
- Example: Telephony Manager in Android OS, Core Telephony framework in iOS.

✓ **Security System**

- Protects the system from unauthorized access and provides encryption, secure boot, and app permission management.
- Example: Android's Security-Enhanced Linux (SELinux), iOS's secure enclave.

✓ **File System**

- Manages how data is stored and retrieved on the device, ensuring files are organized and secure.
- Example: Ext4 file system in Android, Apple File System (APFS) in iOS.

✓ **Power Management**

- Manages the battery and ensures efficient use of power by apps and hardware components.
- Example: Android's Battery Saver Mode, iOS's Battery Health features.

✓ **Multimedia Framework**

- Handles media playback, recording, and streaming services for audio, video, and images.
- Example: Android's MediaCodec API, iOS's AVFoundation framework.

✓ **Network Stack**

- Manages network connections like Wi-Fi, cellular data, Bluetooth, and Near-Field Communication (NFC).
- Example: Android's Connectivity Manager, iOS's Network Extension framework.

✓ **App Store Integration**

- Facilitates the download, installation, and management of applications on the device.
- Example: Google Play Store for Android, App Store for iOS.

4.Pointers for Telephone Operating Systems

Telephone operating systems (OS) have evolved significantly, especially with the advent of smartphones. Pointers for telephone operating systems include:

✓ Hardware Limitations

Processing power: The hardware of a telephone, especially smartphones, may have limitations in terms of processing power, affecting the performance of applications and multitasking capabilities. Memory constraints: Limited RAM and storage space can restrict the number and size of applications that can be run simultaneously and stored on the device. Battery life: Battery capacity and efficiency directly impact the usage time and overall usability of the device. Display size and resolution: Smaller screens with lower resolutions may limit the visual experience and usability of certain applications and features. Connectivity options: Limited connectivity options, such as older wireless standards or lack of certain ports, can restrict the device's compatibility with peripherals and networks.

✓ Software Limitations Compatibility issues

Software limitations may arise due to compatibility issues between different applications, operating systems, or hardware configurations.

Performance overhead: Resource-intensive software processes can strain the device's hardware, leading to slowdowns, crashes, or reduced battery life. Update cycles: Software updates may not be available for older devices or may take longer to roll out, leaving them vulnerable to security threats or lacking new features. Dependency on network connectivity: Certain software functionalities may require a stable internet connection, limiting their usability in areas with poor connectivity. Legal and regulatory constraints: Software may be subject to legal and regulatory requirements, such as privacy laws or industry standards, which can limit its functionality or distribution.

✓ Other Correspondences Interoperability

Seamless integration and communication between different devices and platforms enhance user convenience and productivity. Accessibility features: Including features such as screen readers, voice commands, and adjustable font sizes ensures that the software is accessible to users with disabilities.

Localization: Adapting software to different languages, cultures, and regions increases its usability and acceptance in diverse markets. Customer support: Prompt and effective customer support services help users troubleshoot issues and enhance their overall experience with the software.

✓ Future Scope

Artificial intelligence integration: AI technologies can enhance telephone operating systems by providing personalized recommendations, predictive capabilities, and intelligent automation.

Augmented reality (AR) and virtual reality (VR): Integrating AR and VR technologies into telephone OS can unlock new possibilities for gaming, communication, and productivity. Internet of Things (IoT) integration: Future telephone OS may seamlessly integrate with IoT devices, enabling users to control smart home appliances, wearables, and other connected devices from their phones. Enhanced security measures: Advancements in biometric authentication, encryption, and decentralized identity systems will strengthen the security of telephone OS against evolving threats. Sustainability initiatives: Future telephone OS may prioritize energy efficiency, recyclability, and environmentally friendly practices to reduce their ecological footprint and contribute to sustainability efforts.

5. Comparison on different Operating Systems

✓ **Android**

- Developed by Google, Android is an open-source operating system widely used on smartphones and tablets.
- Customizability: Android offers extensive customization options, allowing users to personalize their device's interface, install custom ROMs, and access a wide range of apps through the Google Play Store.
- Fragmentation: Due to the open nature of Android, there's a wide variety of devices running different versions of the OS, leading to fragmentation issues, with some devices not receiving timely updates.
- Integration with Google services: Android tightly integrates with Google's ecosystem, including Gmail, Google Maps, Google Assistant, and others, providing seamless access to these services.



✓ **iOS**

- Developed by Apple, iOS is a closed-source operating system exclusive to Apple's iPhone, iPad, and iPod Touch devices.
- User experience: iOS offers a polished and consistent user experience across devices, with a focus on simplicity, smooth performance, and intuitive design.
- Tight integration with hardware: iOS is tightly integrated with Apple's hardware, ensuring optimized performance and reliability. This integration also enables features like AirDrop, Handoff, and Continuity.
- App Store ecosystem: The Apple App Store offers a curated selection of high-quality apps, with strict guidelines for app submission, ensuring security and quality.
- Closed ecosystem: The closed nature of iOS restricts customization options compared to Android, but it also enhances security and reduces fragmentation.



✓ **Other Operating System**

✓ **Windows Phone/Windows 10 Mobile**

- Developed by Microsoft, Windows Phone was initially introduced as a mobile operating system but later evolved into Windows 10 Mobile.
- Unique UI: Windows Phone featured a distinctive tile-based user interface called "Metro" or "Modern UI," providing a visually appealing and efficient user experience.
- Lack of app ecosystem: Windows Phone struggled to attract developers and build a robust app ecosystem, leading to a limited selection of apps compared to Android and iOS.
- Continuum feature: Windows 10 Mobile introduced the Continuum feature, allowing

compatible devices to connect to an external monitor and function like a desktop PC when paired with a keyboard and mouse.

- **Discontinued:** Microsoft announced the end of support for Windows 10 Mobile in December 2019, signaling the end of its development and updates.
 - Windows Phone/Mobile has been discontinued by Microsoft, but if you have a device that supports it, you can usually update the OS through the device's settings menu or using the Windows Device Recovery Tool.
 - For Windows-based smartphones and tablets, the installation process typically involves downloading and installing updates through the device's settings or using Windows Update on a PC.



✓ **Ubuntu Touch:**

- Ubuntu Touch is a mobile version of the Ubuntu operating system. Installation procedures vary depending on the device.
- Typically, you would need to unlock the bootloader, flash a custom recovery, and then install Ubuntu Touch using tools like UBports Installer or manually flashing the OS image.

✓ **BlackBerry:**

- BlackBerry devices run BlackBerry OS or BlackBerry 10, both of which are proprietary operating systems.
- Updating BlackBerry OS or BlackBerry 10 is typically done through the device's settings menu or using the BlackBerry Desktop Software on a computer.

✓ **Tizen:**

- Tizen is primarily used on Samsung's smartwatches and some smart TVs.
- Updating Tizen on smartwatches is usually done through the wearable's settings menu or using the Galaxy Wearable app on a smartphone.
- For smart TVs, updates are typically delivered over-the-air through the TV's

settings menu.

Always ensure you have backups of important data before attempting to install or update any operating system, and follow official instructions provided by the device manufacturer or OS developer to avoid any potential issues.



Points to Remember

- **Operating System Functions:**

- ✓ Memory Management.
- ✓ Processor Management/Scheduling.
- ✓ Device Management.
- ✓ File Management.
- ✓ Security.
- ✓ Other Functions.

- **Features of Mobile Operating Systems:**

- ✓ Ease of Use.
- ✓ Good App Store.
- ✓ Good Battery Life.
- ✓ Data Usage and Organization

- **Pointers for Telephone Operating Systems:**

- ✓ Hardware Limitations.
- ✓ Software Limitations.
- ✓ Future Scope

- **Comparison of Different Operating Systems:**

- ✓ Android: Open-source, customizable, integrates with Google services, but has fragmentation issues.
- ✓ iOS: Closed-source, user-friendly, tightly integrated with Apple hardware, but limited customization.



Application of learning 2.2.

As a mobile technology consultant, you are tasked with delivering a training session to a group of entry-level mobile phone technicians. The session will cover the role of firmware and operating systems in modern telephones, emphasizing how these technologies contribute to functionality, security, and the overall user experience.



Indicative content 2.3: Installation of Telephone Operating System.



Duration: 2 hrs



Practical Activity 2.3.1: Installation of Android OS



Task:

1: Referring to the key readings 2.3.1 you are requested to solve the following problem:

- I. Dmitri is excited about his new phone, but when he turns it on, he discovers that it's running a Chinese version of Android. The phone's interface is in Chinese, and he can't find any settings to change the language to English. He's frustrated and wants to use his phone in his native language, what steps can Dmitri take to install an English version of Android on his phone? Describe the process and the tools he might need to successfully perform this task.
- 2: Follow instructions and procedures provided in that key readings and perform the given task
- 3: Present your final products to your trainers/colleagues
- 4: Ask for any clarification to the trainer where necessary



Key readings 2.3.1.: Installation of Android OS

Installing a telephone Android OS operating system typically involves different procedures depending on the specific OS and the device you're using.

Steps to Install the Android OS

Prerequisites

1. **Tools (Miracle Thunder Box, Odin, SP Flash Tool)** Ensure you have the latest version installed on your PC According the software you have selected.
2. **Firmware/ROM:** Download the correct firmware/ROM for the specific device model.
3. **USB Cable:** A compatible USB cable to connect your device to the PC.
4. **Drivers:** Install the necessary USB drivers for your device on the PC.
5. **Battery:** Ensure your device has at least 50-60% battery charge.



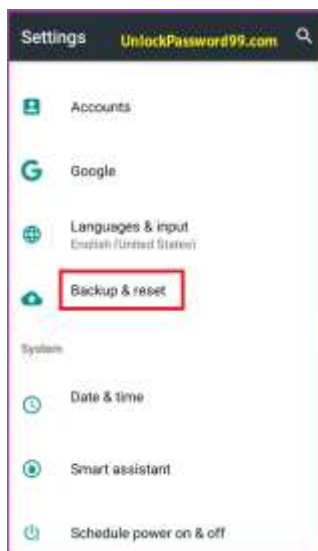
Back up your data

Since the procedure is quite dangerous, it is important to do everything possible to avoid losing personal data while installing the operating system. Therefore, it is advisable to transfer all your files to an external storage device or other devices, or better still, make a backup before you carry out the operation:

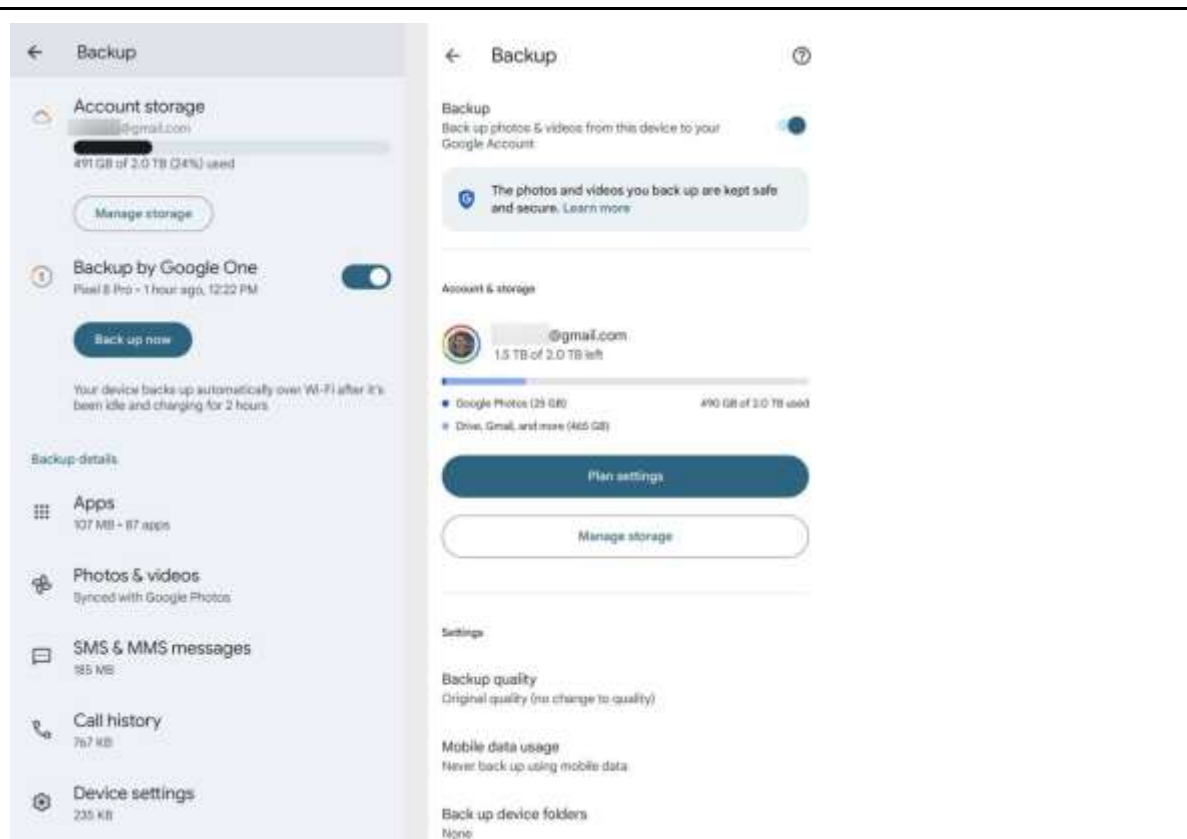
- ✓ **Open the phone settings.**



- ✓ **Go to “backup and reset”.**



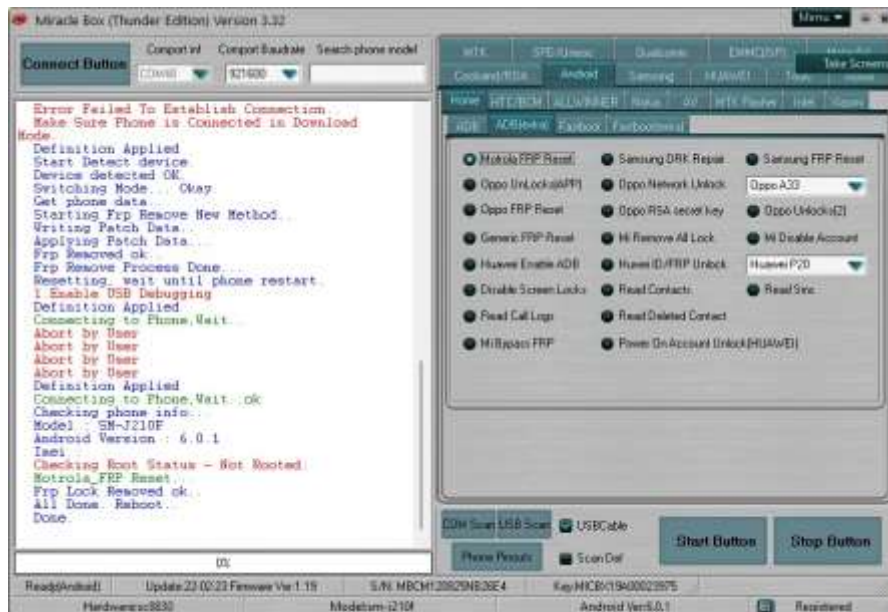
- ✓ **Press the “Back up” button.**



Next, you need to select where you want to save the backup. This can be the internal memory of the device; in which case you have to transfer the copy to external media. Another option is to upload a backup to Google Drive cloud storage. Here, however, you may find that you need to sign up for a paid subscription, as the cloud initially only provides 15GB of free space.

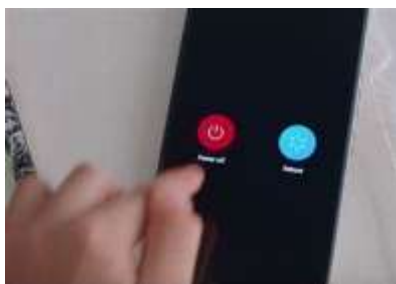
1. Install and Set Up Miracle Thunder Box

- **Install Miracle Thunder Box Software:** Download and install the Miracle Thunder Box software on your PC.
- **Run the Software:** Launch the Miracle Thunder software, ensuring that the box is connected to your PC.



2. Connect the Device

- **Turn Off the Device:** Ensure the device is powered off.



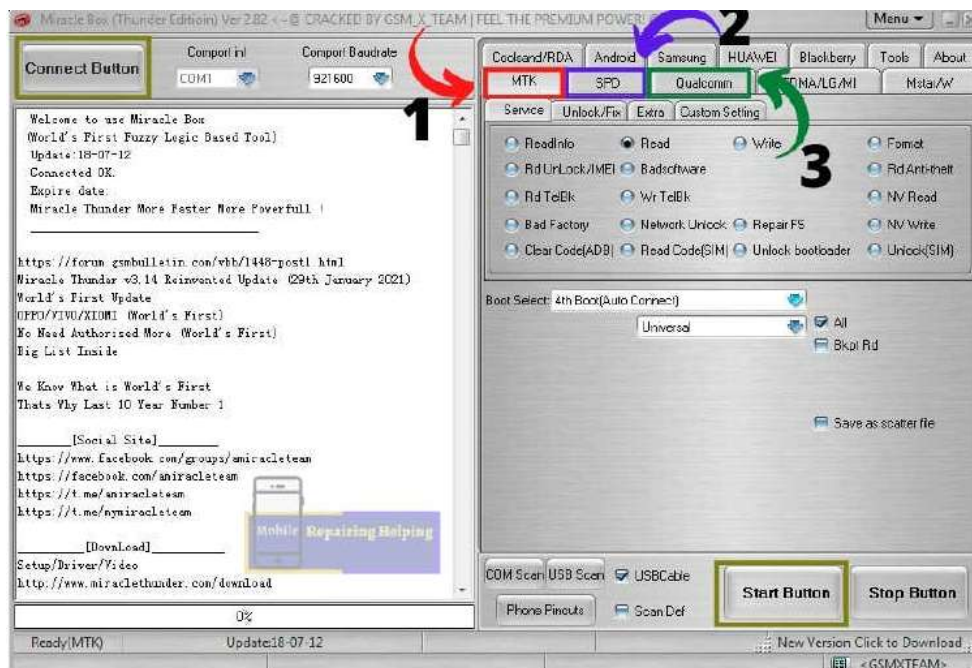
- **Connect to PC:** Connect the device to the PC using a USB cable. You might need to hold a specific key combination (such as Volume Down + Power) to enter download mode, depending on the device.



3. Select the Device Brand and Model

- **Open the Software Interface:** On the Miracle Thunder software interface, go to the “MTK” or “SPD” tab, depending on your device’s chipset (e.g., MediaTek,

Spreadtrum).



- **Select the Brand and Model:** From the list, select your device's brand and model. If it's not listed, select **"Custom"** and manually choose the chipset type.

4. Load the Firmware/ROM

- **Navigate to Flashing Section:**
 - Click on the **"Flashing"** tab or button.
 - Choose **"Write"** or **"Flash"** depending on the software version.
- **Load the Firmware:**
 - Click **"Select"** or **"Browse"** to load the downloaded firmware/ROM file. This file is usually in .bin, .img, or .pac format.
 - Make sure the firmware matches your device model to avoid bricking the device.

5. Start the Flashing Process

- **Initiate the Flashing:**
 - Click **"Start"** or **"Flash"** to begin the flashing process.
 - The software will detect your device and start flashing the ROM onto it.
- **Wait for the Process to Complete:**
 - The flashing process may take a few minutes. Do not disconnect the device or interrupt the process.

6. Reboot the Device

- **Successful Flash:** Once the flashing process is complete, you will see a success message in the software.

- **Reboot the Device:** Disconnect the device and power it on. It should boot into the newly installed Android OS.

Initial Setup: Follow the on-screen instructions to set up your device.



Practical Activity 2.3.2: Installation of iOS



Task:

- 1: Referring to the key readings 2.3.2, you are requested to solve the following problem:
 1. Tech Solutions Ltd., a mobile device repair and service center, frequently handles customer requests to update or reinstall iOS on their Apple devices. The company recently received a batch of iPhones that required a complete reinstallation of the iOS operating system due to software corruption. As a part of the technical team, your task is to manage the reinstallation process for these devices.
- 2: Follow instructions and procedures provided in that key readings and perform the given task
- 3: Present your final products to your trainers/colleagues
- 4: Ask for any clarification to the trainer where necessary



Key readings 2.3.2.: Installation of iOS

Installing iOS on an Apple device typically involves using software like iTunes (or Finder on macOS Catalina and later) for standard updates or restores, and tools like 3uTools for more advanced tasks. Below is a guide for both methods:

1. Using iTunes (or Finder on macOS Catalina and Later)

Prerequisites

- **Computer:** A Mac or Windows PC with the latest version of iTunes (or Finder on macOS Catalina and later).
- **USB Cable:** A Lightning cable to connect your iPhone, iPad, or iPod Touch to the computer.



- **Backup:** Always back up your data before proceeding with the installation.

Steps for Installation

1. Connect Your Device

- **Launch iTunes/Finder:** Open iTunes on Windows or Finder on a Mac running macOS Catalina or later.



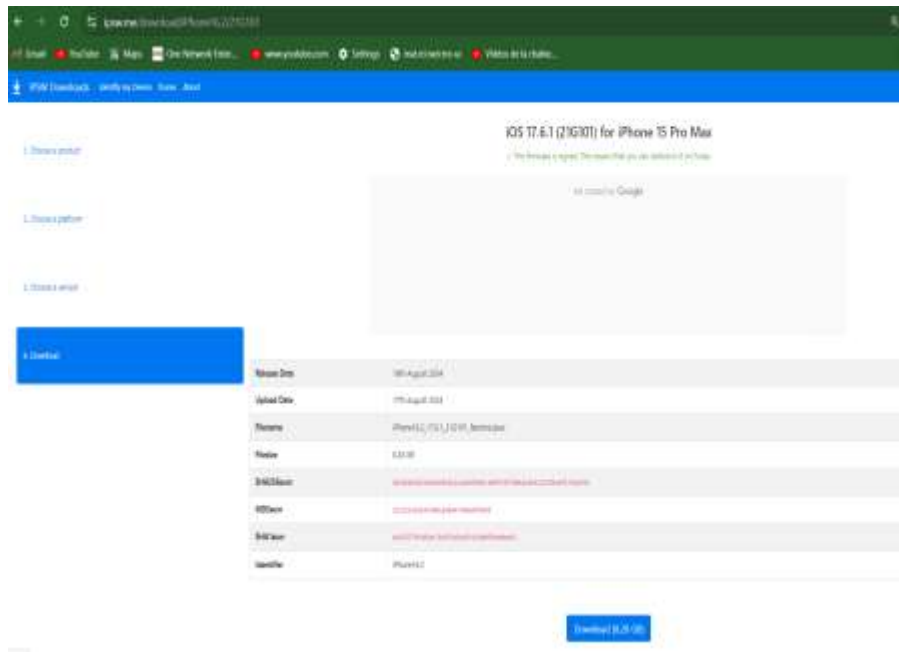
- **Connect Device:** Use the Lightning cable to connect your Apple device to the computer.

2. Backup Your Device

- **Automatic Prompt:** If a prompt appears asking if you want to back up, choose to back up the device to the computer.
- **Manual Backup:** You can also manually start a backup by clicking on the “**Back Up Now**” button under the “**Summary**” or “**General**” tab.

3. Download the iOS Firmware (Optional)

- **Firmware Download:** If you are installing a specific version of iOS, download the correct IPSW file from a trusted source (such as ipsw.me).



4. Install iOS

- **Standard Update:**
 - **Check for Updates:** In iTunes or Finder, select your device and click “Check for Update” under the “Summary” or “General” tab.
 - **Install:** If an update is available, click “Download and Install” to install the latest iOS version.
- **Manual Installation:**
 - **Option/Shift Key:** Hold down the **Option** (Mac) or **Shift** (Windows) key and click “Restore iPhone” or “Update” in iTunes/Finder.
 - **Select IPSW File:** Navigate to the downloaded IPSW file and select it. This will begin the installation process.

5. Complete the Installation

- **Wait for the Process:** The installation may take a few minutes. Your device will reboot and complete the setup.
- **Restore Backup:** After the installation, you can restore your data from the backup.

2. Using 3uTools for Advanced Installation

Prerequisites

- **3uTools Software:** Download and install the latest version of [3uTools](#) on your Windows PC.
- **USB Cable:** A Lightning cable to connect your device to the PC.
- **Backup:** Ensure that you have backed up your device before proceeding.

Steps for Installation

1. Connect Your Device

- **Launch 3uTools:** Open the 3uTools software on your computer.
- **Connect Device:** Use the Lightning cable to connect your iOS device to the PC.

2. Navigate to Flash & JB Section

- **Flash & JB Tab:** Once your device is connected, click on the **“Flash & JB”** tab at the top of the 3uTools interface.

3. Select Firmware

- **Download Firmware:** 3uTools will automatically detect your device model and display available firmware versions. You can either download the firmware directly through 3uTools or use an already downloaded IPSW file.
- **Import Firmware (Optional):** If you have already downloaded an IPSW file, click on **“Import”** and select the file.

4. Flash the Firmware

- **Flash Mode:** You can choose between several flashing modes:
 - **Easy Flash:** Automatically flash the firmware without data loss.
 - **Retain User’s Data:** Flash while retaining your personal data.
 - **Quick Flash:** Use this option if you want to perform a clean install.
- **Start Flashing:** After selecting the appropriate mode, click **“Flash”** to start the installation process.

5. Complete the Installation

- **Wait for the Process:** The flashing process will take some time, and your device will reboot automatically once it's done.
- **Setup Device:** Follow the on-screen instructions to set up your device after flashing.



Points to Remember

Android OS Installation:

- **Prerequisites:** Backup your data to prevent loss during the process.
- **Tools:** Use software like Miracle Thunder Box, Odin, or SP Flash Tool for the installation.
- **Steps for Installation:**
 - ✓ Connect the device to a computer.
 - ✓ Select the correct device brand and model.
 - ✓ Load the appropriate firmware/ROM.
 - ✓ Start the flashing process and reboot the device.
- **Caution:** Make sure to select the correct firmware to avoid damaging the device.

iOS Installation:

- ✓ **Method 1: Using iTunes/Finder:**
 - ✚ Prerequisites: A computer with the latest iTunes/Finder, a Lightning cable, and a data backup.
 - ✚ Connect the device and choose to back up data.
 - ✚ Download the correct IPSW file if needed.
 - ✚ Install iOS through a standard update or manual installation using the IPSW file.
- ✓ **Method 2: Using 3uTools:**
 - ✚ Use a Windows PC with 3uTools installed and a Lightning cable.
 - ✚ Connect the iOS device, select the "Flash & JB" tab, and choose firmware.
 - ✚ Select a flashing mode (Easy Flash, Retain User Data, or Quick Flash) and start the process.
- ✓ **Patience Required:** Both methods take time, and the device will reboot during the process.



Application of learning 2.3.

Emily has been using her iPhone for a few years and recently noticed that some apps are starting to require a newer version of iOS. Her current iOS version is outdated, and she wants to update to the latest version to ensure her phone runs smoothly and securely. As computer system assembly technician your task is to install latest version of IOS the Emily iphone.



Indicative content 2.4: Installation of Mobile Applications



Duration: 2 hrs



Theoretical Activity 2.4.1: Identification of Mobile Applications Stores.



Tasks:

- 1: you are invited to answer the following questions related to telephone hardware parts:
 - i. What is a mobile application store?
 - ii. What are the main purposes of a mobile application store?
- 2: Present your findings to the whole class and Trainer
- 3: Ask your trainer for any clarification if any
- 4: You are directed to read the key readings 2.4.1. for more clarifications on basic concept of Identification of mobile application stores.

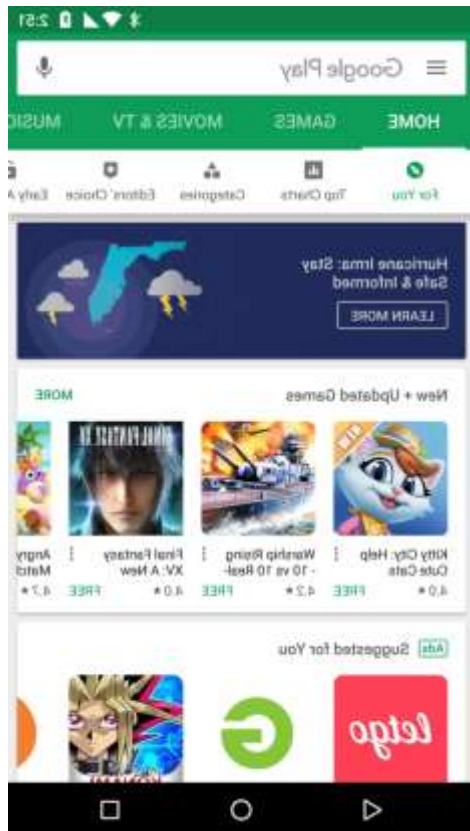


Key readings 2.4.1: Identification of Mobile Applications Stores.

1. Installing mobile applications typically involves accessing the your device's operating system and following the installation procedure. Here's a general identification of Mobile Application Stores:
 - ✓ **App Store** is the official app store for iOS devices. In general, an app store is an app that helps a user find software and install it on their computer or mobile device. It's a collection of free or commercial software and games approved for use on your device. You can browse, purchase, download, install, and update software through your device's app store.



- ✓ **Google Play Store** is the official app store for Android devices. The **Google Play Store** is an app store provided by Google for Android devices, the Chrome web browser, and Chrome OS computers. It was launched on October 22, 2008, as "Android Market." Unlike other App Stores, Google Play allows users to purchase digital music and e-books.



2. The main purposes of a mobile application store are:

1. **App Distribution:** It provides a platform for developers to distribute their applications to a wide audience, making it easy for users to discover, download, and install apps.
2. **Revenue Generation:** Mobile app stores enable monetization through app sales, in-app purchases, subscriptions, and advertisements, allowing developers to earn revenue from their apps.
3. **Security and Quality Assurance:** App stores implement security checks and quality control measures to ensure that the apps available are safe, reliable, and meet certain standards before being made available to users.
4. **Updates and Maintenance:** They provide a centralized location for users to receive updates and bug fixes, ensuring that apps remain functional and up-to-date.
5. **User Reviews and Ratings:** App stores allow users to rate and review apps, providing feedback that can guide other users in their purchasing decisions and help developers improve their apps.
6. **Content Management:** App stores organize and categorize apps, making it easier for users to find apps based on their interests or needs.
7. **Device Compatibility:** They ensure that apps are compatible with various devices and operating systems, providing users with a seamless experience across different platforms.



Practical Activity 2.4.2: Application of Mobile Application Installation

Procedures.

Task:



1: Referring to the key readings 2.4.2, you are requested to Solve the following problem:

- i. A young adult named Alex wants to try a popular new mobile game called "Pixel Quest." He has a recent model Android smartphone and a stable internet connection. Your task is to help Alex to successfully download and install the "Pixel Quest" game on his Android smartphone.
- ii. A new user, Sarah, just purchased a shiny new iPhone and wants to download a popular social media app, "InstaSnap." Your task is to help Sarah to successfully download and install the "InstaSnap" app on her new iPhone.

2: Follow instructions and procedures provided in that key readings and perform the given task

3: Present your final products to your trainers/colleagues

4: Ask for any clarification to the trainer where necessary



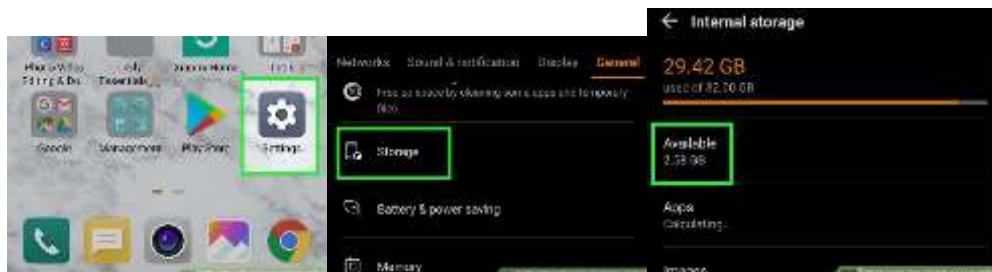
Key readings 2.4.2.: Application of Mobile Application Installation Procedures.

1. Installation of Mobile Android Application procedure.

To successfully download and install the "Pixel Quest" game on his Android smartphone, Alex should follow these steps:

1. Ensure Sufficient Storage:

- Before downloading, Alex should check that his smartphone has enough available storage space to accommodate the game. He can do this by going to Settings > Storage on his device.



2. Connect to a Stable Internet:

- Since Alex has a stable internet connection, he should connect his smartphone to Wi-Fi to avoid using mobile data, especially if the game is large in size.



3. Open the Google Play Store:

- Alex should open the Google Play Store app on his smartphone.



4. Search for "Pixel Quest":

- In the search bar at the top of the Google Play Store, Alex should type "Pixel Quest" and press enter.

5. Select the Correct Game:

- Alex should locate the correct "Pixel Quest" game from the search results and tap on it to view its details.

6. Download the Game:

- He should tap the "Install" button to start downloading the game. The Play Store will automatically handle the download and installation process.

7. Wait for Installation to Complete:

- Alex should wait until the download and installation process is complete. The game will be installed automatically once the download finishes.

8. Open the Game:

- Once installed, Alex can either tap "Open" directly from the Play Store or find the "Pixel Quest" icon on his home screen or app drawer and tap it to start playing.

9. Grant Necessary Permissions:

- The first time Alex opens the game, it may request certain permissions (e.g., access to storage or the internet). He should review these permissions and allow them if necessary for the game to function correctly.

10. Enjoy the Game:

- After following these steps, Alex should be able to start playing "Pixel

Quest" on his Android smartphone

2. **Installation of Mobile iPhone Application procedure**

To successfully download and install the "InstaSnap" app on her new iPhone, Sarah should follow these steps:

1. **Connect to Wi-Fi:**

- Ensure her iPhone is connected to a stable Wi-Fi network to avoid using mobile data and to speed up the download process.

2. **Open the App Store:**

- Tap the **App Store** icon on the iPhone's home screen to launch the App Store.

3. **Search for InstaSnap:**

- Tap on the **Search** tab at the bottom of the screen.
- In the search bar at the top, type "**InstaSnap**" and press **Search** on the keyboard.

4. **Download the App:**

- Once she finds the InstaSnap app in the search results, tap the **Download** button (the cloud icon with a downward arrow) next to the app. If it's her first time downloading the app, it might show a **Get** button instead.
- If prompted, use **Face ID, Touch ID, or enter her Apple ID password** to authorize the download.

5. **Wait for the Installation:**

- The app will begin downloading and installing automatically. Sarah can monitor the progress on the home screen.

6. **Open the App:**

- Once the installation is complete, the Download button will change to **Open**. She can tap this to launch the app immediately.
- Alternatively, the InstaSnap app icon will appear on her home screen, and she can tap it to open the app.

7. **Sign In or Sign Up:**

- Upon opening InstaSnap, she may need to sign in with her existing account or create a new account if she's a first-time user.

Other platforms: The installation procedure for other app stores follows similar steps, including searching for the app, selecting it, and initiating the installation process. Each store may have its own specific interface and features, but the general process remains consistent. Following these steps will allow you to install mobile applications from the respective app stores for your device's operating system



Points to Remember

Identification of Mobile Application Store

- ✓ A mobile application store is a digital marketplace where users can download and install apps for smartphones and tablets.

Main Purposes of a Mobile Application Store

- ✓ **For Developers:** Provides a platform to distribute apps to a wide audience.
- ✓ **For Users:** Allows browsing and searching for apps by categories, keywords, or recommendations.

Popular Mobile Application Stores

- ✓ **Google Play Store:** The largest app store for Android devices. Offers a mix of free and paid apps, but some may be less reliable.
- ✓ **Apple App Store:** Available for iPhones, with a smaller selection of apps that are generally of higher quality and more secure, as it is a curated store.

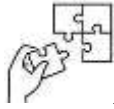
Mobile Application Installation Procedures

✓ Android Installation

- 🔧 Check device storage.
- 🔧 Connect to Wi-Fi.
- 🔧 Open the Google Play Store.
- 🔧 Download and install the desired app.
- 🔧 Open the app.

✓ iPhone Installation

- 🔧 Check device storage.
- 🔧 Connect to Wi-Fi.
- 🔧 Open the App Store.
- 🔧 Download and install the desired app.
- 🔧 Open the app.



Application of learning 2.4.

Jane is a tech-savvy professional who frequently uses her smartphone for various tasks, including managing her finances. Recently, she heard about a new mobile banking application from her bank that offers enhanced security features, real-time notifications, and easy access to all her accounts. Excited about the convenience this app could bring, Jane decides to install it on her smartphone. As Computer System Assembly technician you requested to install Jane's mobile banking Application Ensure that the app is compatible with Jane's smartphone model and operating system version.



Indicative content 2.5: Testing Telephone



Duration: 2 hrs



Theoretical Activity 2.5.1: Description of Telephone Testing



Tasks:

- 1: You are invited to answer the following questions related to telephone hardware parts:
 - i. Why is telephone testing important?
 - ii. What are the main types of telephone testing?
 - iii. What types of tests can testing apps perform?
 - iv. Explain apps for testing a mobile phone?
- 2: Present your findings to the whole class and Trainer
- 3: Ask your trainer for any clarification if any
- 4: You are directed to read the key readings 2.5.1. for more clarifications on basic concept of description of telephone testing



Key readings 2.5.1.: Description of Telephone Testing

1. We need telephone Testing to

- Ensure functionality: Testing ensures that all phone features work as intended, including calling, messaging, internet browsing, and app usage.
- Quality assurance: Testing helps identify and rectify defects or issues before devices reach customers, ensuring high-quality products.
- Compliance with standards: Testing ensures that phones comply with regulatory Standards and industry requirements for safety, security, and performance.

2.Types of Telephone Testing

1. Functional Testing

This mobile testing type aims to verify that every function of an app is working precisely as required. Multiple usage scenarios must be included in mobile app functional testing, but some of the important ones would be:

- ✓ App installs and launches correctly
- ✓ Users can sign-up and log into the app easily
- ✓ Text boxes, buttons, menus, and icons function accurately

2. Interruption Testing

This type of mobile testing checks how an application responds when faced with an

unexpected interruption. Depending on the nature of the interruption, the application should pause and then return to its original state or even react in a particular way. The kind of interruptions will differ based on the application under test, but some common interruptions that should be considered while testing are:

- ✓ Incoming or phone calls when an application is running
- ✓ Incoming messages or SMS when an application is running
- ✓ The low battery when an application is running
- ✓ The device is plugged in or out of charging when an application is running
- ✓ Device shuts down when an application is running

3. Localization Testing

This variant of mobile app testing is meant to test features dependent on an app's geographical location. These features can vary from enabling different languages and commerce in local currency to adherence to local laws and regulations.

4. Speed Testing

Speedtest measures the speed between your device and a test server, using your device's internet connection. Even for website testing, it is important to check how fast a site loads on mobile devices.

It is easier to run website speed tests using **Speed Lab**, a free tool from **Browser Stack**.

- ✓ Simply enter your website URL
- ✓ Select the mobile device-browser combinations you want
- ✓ Get a free report detailing how fast the site loads on many **browsers and devices**. The report also offers actionable performance insight and user-centric metrics for benchmarking site performance.

5. Performance Testing

It is essential to test how an application performs under various conditions. This is where performance testing comes in. It puts the device under various forms of pressure to function correctly in non-optimal conditions. A few things that performance testing should verify:

- ✓ **Device performance:** Installation and log-in time, battery consumption, memory consumption, etc.
- ✓ **Network performance:** Delays, errors, pauses in receiving digital information or rendering network-activated features
- ✓ **API (Application Program Interface)/Server performance:** Speed and formation of data transfer from back-end to front-end

6. Security Testing

Security Testing is a type of Software Testing that uncovers vulnerabilities, threats, risks in a software application and prevents malicious attacks from intruders.

The purpose of Security Tests is to identify all possible weaknesses of the software system which might result in a loss of information, revenue, reputability at the hands of the employees or outsiders of the Organization.

3. Applications used for Testing a mobile phone

- **Spira Test** for Security Test
- **Speed Lab for Speed Test**
- **User Acceptance Testing tool** for Functional testing
- **Apptim** for performance testing
- **Software quality assurance (SQA) Solution** for Localization testing
- A command-line tool called **The Monkey** is available through their SDK for Interruption testing.



Practical Activity 2.5.2: Test of mobile phone



Task:

- 1: Referring to the key readings 2.5.2, you are requested to perform the following task:
 1. A company is developing a new e-commerce mobile app designed to work on both Android and iOS platforms. The app allows users to browse products, add items to their cart, and complete purchases. Your task is to test the application thoroughly to ensure that it performs smoothly on different devices and operating systems before launch.
- 2: Follow instructions and procedures provided in that key readings and perform the given task
- 3: Present your final products to your trainers/colleagues
- 4: Ask for any clarification to the trainer where necessary



Key readings 2.5.2.: Test of mobile phone Apply mobile phone testing procedure

To test a mobile telephone, you can follow these steps to ensure that all key functions and features are working properly:

1. Physical Inspection

Check for damages: Inspect the phone for any visible physical damage such as cracks, scratches, or loose parts.

Verify components: Ensure all hardware components are present, including SIM card slot, buttons, charging port, and headphone jack.

2. Power On/Off Test

Turn on the phone: Press the power button and ensure the phone powers on without issues.

Restart the phone: Test restarting the device to confirm the power cycling process works smoothly.

3. SIM Card and Network Connection Test

Insert SIM card: Insert a SIM card into the phone and check if it detects the network provider.

Call and text: Make test calls and send text messages to confirm the device can communicate with the network.

Mobile data: Enable mobile data to ensure internet access is working correctly.

Check signal strength: Move to different areas to check if the phone can maintain a stable network connection.

4. Wi-Fi and Bluetooth Testing

Wi-Fi connection: Test the phone's ability to detect and connect to Wi-Fi networks, and browse the internet.

Bluetooth pairing: Attempt pairing with a Bluetooth device (headphones, speaker, etc.) to ensure the feature works.

5. Display and Touchscreen Test

Brightness and colors: Check the display for proper brightness, color accuracy, and sharpness.

Touch sensitivity: Test touch responsiveness across the entire screen by swiping and tapping in different areas.

Screen rotation: Test auto-rotation by tilting the device and checking if the screen orientation changes.

6. Camera and Audio Test

Take photos and videos: Test both front and rear cameras by capturing photos and recording videos. Check the quality of the images and sound.

Microphone and speaker: Test the microphone by recording voice memos, and check speaker output by playing music or making calls.

Headphone jack: Plug in headphones and check the audio output.

7. Battery and Charging Test

Battery status: Check the battery percentage and confirm it aligns with expected values.

Charging test: Plug the phone into a charger to ensure it charges properly and verify how quickly it charges.

Battery drain: Monitor battery usage over time to ensure it holds charge as expected.

8. Operating System and App Performance

Check OS version: Verify the phone is running the correct version of its operating system (iOS, Android, etc.).

App performance: Open several pre-installed and third-party apps to test their loading

times and functionality.

Multitasking: Switch between apps and check for any lag or freezing.

9. Sensor Test

Proximity sensor: During a phone call, check if the screen turns off when the phone is brought close to your face.

Fingerprint/Face recognition: Test biometric sensors for unlocking the device.

Accelerometer and gyroscope: Test motion-based controls such as shaking the phone or gaming.

10. Storage and File Transfer Test

Check available storage: Verify the phone's internal storage and confirm it matches the specified capacity.

File transfer: Test the USB connection to transfer files between the phone and a computer.

11. Software Updates

Check for updates: Look for available software or security updates and attempt to install them to ensure the phone can update properly.

12. Final User Experience Test

Overall performance: Use the phone for daily activities like calling, mess



Points to Remember

Description of Telephone Testing

- Ensures the quality, functionality, and reliability of phones.
- Helps identify and fix issues before the device reaches consumers, enhancing user experience and customer satisfaction.

Key Types of Telephone Testing

- ✓ **Functional Testing:** Verifies basic features work as intended.
- ✓ **Performance Testing:** Evaluates speed, battery life, and network performance.
- ✓ **Stress Testing:** Assesses durability by pushing the phone to its limits.
- ✓ **Compatibility Testing:** Checks if the phone works with various networks, devices, and accessories.
- ✓ **Security Testing:** Tests the phone's vulnerability to security threats.
- ✓ **Usability Testing:** Evaluates ease of use and navigation.
- ✓ **Performance Tests:** Measures CPU usage, memory usage, battery life, and network speed.

Steps for Testing a Mobile Phone

✓ **Physical Inspection and Power Testing:**

- ✚ Check for physical damage and ensure all components are intact.
- ✚ Test if the phone powers on and restarts smoothly.

✓ **SIM, Network, Wi-Fi, and Bluetooth:**

- ✚ Insert a SIM card to make calls, send texts, and check mobile data.
- ✚ Test Wi-Fi connectivity and Bluetooth pairing.

✓ **Display, Touchscreen, and Camera:**

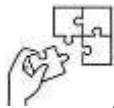
- ✚ Check display brightness, touch sensitivity, and screen rotation.
- ✚ Test the front and rear cameras, microphone, speaker, and headphone jack.

✓ **Battery, Charging, and Sensors:**

- ✚ Test battery status, charging speed, and the functionality of biometric, proximity, and motion sensors.

✓ **Operating System, App Performance, and Storage:**

- ✚ Confirm the OS version, test app loading times, multitasking, available storage, and check for software updates.



Application of learning 3.1.

Sarah is a technician working at a mobile phone service center. A customer brings in a brand-new smartphone that requires an operating system (OS) installation and several key mobile applications to be set up. The customer also requests that the system's overall functionality be tested to ensure that the phone operates smoothly and meets all expectations. As computer system assembly technician Sarah asked you to install the OS, set up the necessary applications, and verify the system's functionality to ensure the device is fully operational and ready for use.



Learning outcome 2 end assessment

Theoretical assessment

A. Multiple Choice Questions:

Choose the letter corresponding to the correct answer:

1. **Which of the following is the correct definition of firmware?**
 - A) The hardware components of a phone
 - B) The software that provides control for a phone's hardware
 - C) The mobile applications installed on a phone
 - D) The design of a phone's body
2. **Which of the following is NOT a type of telephone operating system?**
 - A) Android
 - B) Windows
 - C) Ubuntu Touch
 - D) BIOS
3. **What is the key role of a phone's operating system?**
 - A) To enhance the hardware performance
 - B) To allow mobile applications to function
 - C) To manage the storage hardware
 - D) To test the phone's functionality
4. **Which of the following is a mobile application store for iOS devices?**
 - A) Google Play Store
 - B) Windows Store
 - C) App Store
 - D) BlackBerry World
5. **What is one limitation of telephone operating systems?**
 - A) Hardware compatibility issues
 - B) Inability to charge the phone
 - C) Weak network signal
 - D) Limited battery size
6. **Which of the following is a common mobile operating system for smartphones?**
 - A) Linux
 - B) Windows OS

- C) Tizen
- D) Android OS

7. Which of these is NOT a function of the telephone operating system?

- A) Managing hardware resources
- B) Allowing user interaction with the device
- C) Running diagnostic tests on hardware
- D) Enabling app installations

8. Which mobile OS was specifically developed by BlackBerry?

- A) iOS
- B) Android
- C) Tizen
- D) BlackBerry OS

9. Why is telephone firmware important?

- A) It adds new hardware to the phone
- B) It helps control the device's functionality
- C) It speeds up mobile data connections
- D) It repairs physical damage to the phone

10. Which mobile OS supports Ubuntu Touch?

- A) iOS
- B) Android
- C) Linux-based OS
- D) Windows

Fill in the Blank Questions

- 11.** Firmware is essential because it controls the phone's _____.
- 12.** The _____ is the interface between the user and the hardware of a mobile phone.
- 13.** Google Play Store is the official app store for _____ OS.
- 14.** _____ testing is necessary to ensure a mobile phone functions correctly before use.
- 15.** _____ is a Linux-based mobile operating system that focuses on user customization.

B. Answer by True if the statement is correct and by False if the statement is wrong

- 16.** The operating system manages both hardware and software resources of a phone.
- 17.** iOS is an open-source mobile operating system.
- 18.** Firmware updates can fix bugs in mobile phones.
- 19.** All mobile operating systems have the same hardware limitations.
- 20.** Windows OS is the most widely used mobile operating system today.

Closed Questions

- 21.** Does Android OS allow installation of third-party apps?
- 22.** Is firmware responsible for running mobile applications?

23. Can firmware be updated over the air on most phones?
24. Is BlackBerry OS still widely used in modern smartphones?
25. Can a phone function without an operating system?

C. Matching Questions

Match the following terms to their descriptions:

Terms	Descriptions
1. Baseband Firmware	A. Controls core functions of the operating system, including the user interface and hardware interaction.
2. Camera Firmware	B. Responsible for communication between the smartphone and the cellular network, handling tasks like call setup and data transfer.
3. Battery Management Firmware	C. Monitors and manages battery usage, ensuring optimal battery performance and safety.
4. Touchscreen Firmware	D. Controls the functions related to autofocus, image processing, and exposure control of a phone's camera.
5. Operating System Firmware	E. Interprets touch gestures and sends them to the operating system for execution.
	F. To verify that all the basic function of the phone work as intended

Practical assessment

You are a junior technician at a mobile phone service center, recently assigned to manage firmware updates and mobile phone testing. Your task is to update the firmware and reinstall the operating systems on different mobile phones, including Android, iOS, and Windows devices. Additionally, you will be responsible for testing the phone's functionalities and ensuring that all installed applications perform as expected.

To begin, your supervisor hands you three phones, each running a different operating system. You need to:

1. Identify the current firmware version on each phone.
2. Download and install the latest compatible firmware version for each device.
3. Install specific mobile apps from their respective application stores.
4. Reinstall the operating system on one of the devices and compare its performance against another.
5. Test each phone's functionality, including calls, messaging, and internet connectivity, and ensure all installed applications run smoothly.

You are also tasked with identifying and using appropriate testing applications to assess each phone's overall performance and documenting any discrepancies. By the end of the process, you must submit a report that includes your findings on the firmware update, operating system performance comparison, and phone testing results.

END



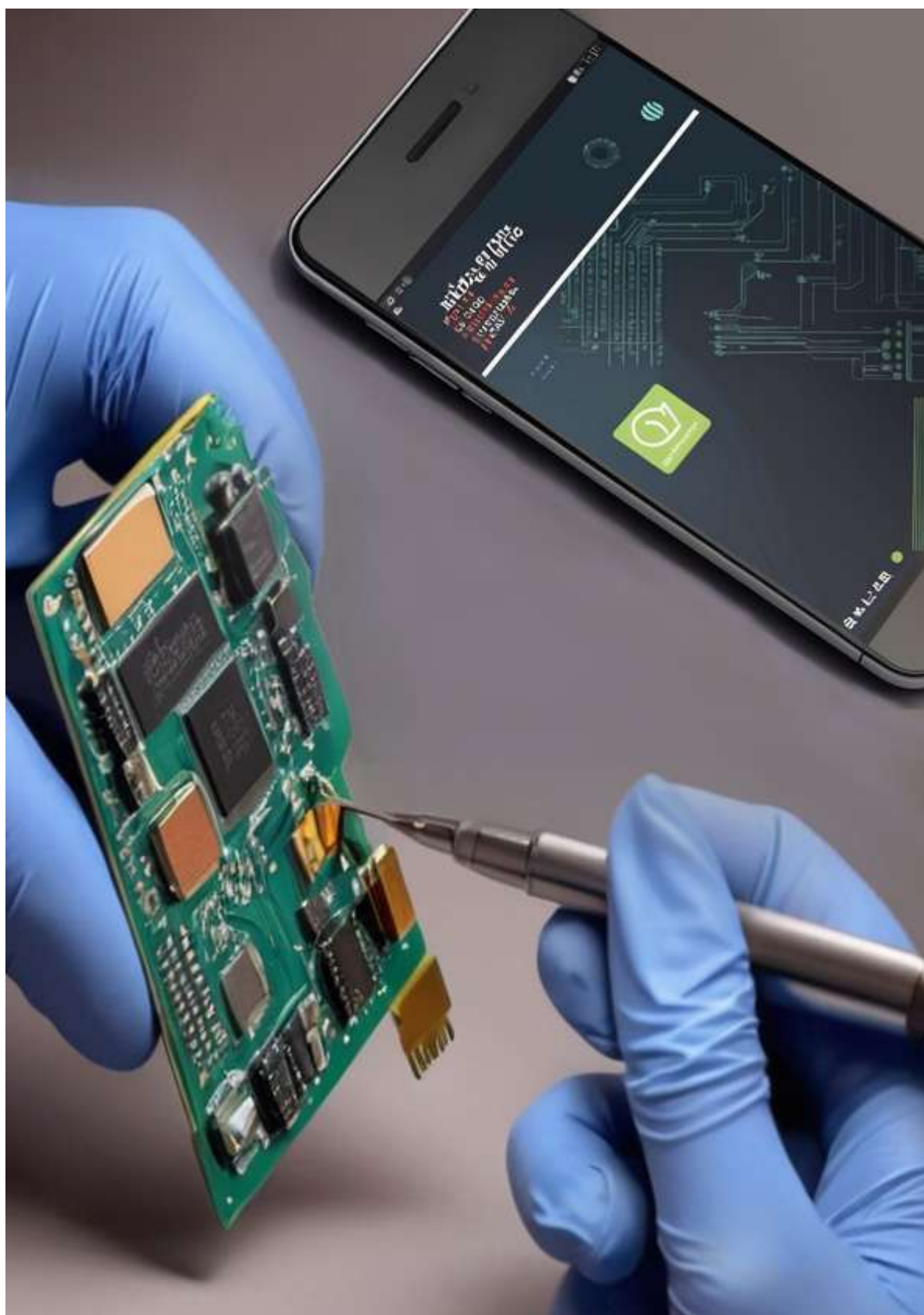
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Learning Outcome 3: Repair Telephone



Indicative contents

3.1 Selection of Tools, materials and equipment

3.2 Perform phone hardware repair

3.3 Perform mobile Software repair

3.4 Repair report

Key Competencies for Learning Outcome 3: Repair Telephone

Knowledge	Skills	Attitudes
● Description of Hardware Faults and Repair Procedures ● Identifying different telephone components ● Introduction to basic electrical circuits and how they function in telephones ● Description of Software Repair Terminologies and Procedures ● Description of Repair report	● Selection of Tools, materials and equipment ● Applying systematic problem-solving methods to diagnose telephone faults ● Fixing common telephone issues	● Being patient ● Being Analytical and details oriented ● Being adaptable ● Being Accurate



Duration:20 hrs



Learning outcome 2 objectives:

By the end of the learning outcome, the trainees will be able to:

1. Select correctly Tools, materials and equipment according to the work to be done.
2. Identify properly Hardware faults based on diagnostic findings.
3. Fix correctly Hardware faults according to the identified faults.
4. Fix correctly Software problems according to the software issues.
5. Make a repair report correctly elaborated based on work done.



Resources

Equipment	Tools	Materials
● Digital Multimeter ● Power supply unit, Hot air blower ● Battery booster ● Microscope ● Test JIG box ● LCD screen tester ● PCB Holder ● LCD/Touchscreen ● Soldering station ● Anti-static wrist trap ● Anti-static mat	● Probe wires soldering tin ● Soldering paste flux ● Flashing software ● Power extension cord ●	● Mobiles phones repair tool kit ● Software repair tool (volcano box, miracle thunder box, sigma ● Box, octoplus flasher box ● MX key dongle ● CS tools dongle, infinity box, Universal box)



Indicative content 3.1: Selection of Tools, materials and equipment



Duration: 2 hrs



Theoretical Activity 3.1.1: Introduction to repairing Tools, materials and Equipment

Tasks:

- 1: You are invited to answer the following questions related to the Selection of Tools, materials and equipment:
 - i. What are the common tools used for mobile phone disassembly? List at least five and describe their purposes.
 - ii. List the common types of materials and equipment used for mobile phone repairs.
- 2: Present your findings to the whole class and Trainer
- 3: Ask trainer for any clarification if any
- 4: You are directed to read the key readings 3.1.1. for more clarifications on basic concept of Tools, materials and equipment



Key readings 3.1.1.: Introduction to repairing Tools, materials and Equipment

1. For selecting tools used for mobile phone disassembly, it's essential to consider factors such as the specific requirements of the task, budget constraints, and the level of precision needed.

Here's how you might approach each category:

Tools:



Cleaning Tools:

Anti-static brushes: Used for cleaning delicate electronic components without generating static electricity.

Compressed air dusters: Ideal for removing dust and debris from electronics and small components.

Isopropyl alcohol and lint-free wipes: Effective for cleaning circuit boards, connectors, and other electronic components.



ESD (Electrostatic Discharge) Tools:

ESD wrist straps: Prevents static discharge from damaging sensitive electronic components during handling.

ESD mats: Provides a grounded work surface to protect against static electricity buildup.

ESD-safe tweezers and pliers: Minimizes the risk of static discharge when handling small components.

Diagnostic Tools:

Multimeter: Measures voltage, current, and resistance to troubleshoot electrical circuits.

Oscilloscope: Displays the waveform of electrical signals to diagnose issues with signal integrity.

Logic analyzer: Captures and analyzes digital signals to debug communication protocols and timing issues.

Hand Tools:

Screwdrivers (Phillips, flathead, torx): Essential for disassembling and assembling electronic devices.

Pliers (needle-nose, wire cutters): Useful for bending, gripping, and cutting wires and small components.

Soldering iron and soldering station: Required for soldering and desoldering electronic components.

Wire strippers: Removes insulation from wires to prepare them for soldering or connection.

Flashing Tools:

JTAG programmers: Used for programming microcontrollers and debugging embedded systems.

USB-to-serial adapters: Enables communication between a computer and microcontroller for programming and debugging.

Flash programmers: Devices for programming flash memory chips used in Microcontrollers, FPGAs, and other embedded systems.

2. Common types of materials and equipment used for mobile phone repairs.

Materials required for a project can vary widely depending on the specific task. **Some common materials include:**

Solder and flux: Used for soldering electronic components onto circuit boards.

Heat shrink tubing: Provides insulation and strain relief for wires and connections.

PCB (Printed Circuit Board) materials: Copper-clad boards, solder mask, and etchant for prototyping and manufacturing PCBs.

Thermal paste: Facilitates heat transfer between electronic components and heat sinks.

common types of Equipment include:

Flasher Boxes:

In-circuit programmers: Used for programming microcontrollers and other programmable Devices in-circuit.

Universal programmers: Supports a wide range of programmable devices and memory chips for development and production purposes.

Device-specific programmers: Designed for programming specific types of devices such as EEPROMs, flash memory, or microcontrollers.

Testing Equipment:

Digital multimeters (DMM): Measures voltage, current, resistance, and continuity for

troubleshooting and testing electrical circuits.

Oscilloscopes: Analyzes electrical signals in the time domain to diagnose circuit operation and performance.

Spectrum analyzers: Measures and analyzes the frequency spectrum of electrical signals to detect interference and troubleshoot RF (Radio Frequency) circuits.

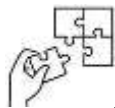
Power supplies: Provides adjustable DC voltage and current for testing and powering electronic circuits and devices.



Points to Remember

Selection of tools; materials and equipment

- Cleaning Tools
- ESD Tools
- Diagnostic Tools
- Hand Tools
- Flashing Tools



Application of learning 3.1.

You have been assigned to disassemble a mobile phone to identify the cause of a hardware failure. The phone is unresponsive and requires thorough inspection, cleaning, and possible replacement of faulty components. Your task is to ensure that you select the right tools for each step, considering the phone's delicate internal components and the need to prevent further damage. Additionally, you must ensure the work area is safe from electrostatic discharge and that diagnostic and flashing tools are on hand for troubleshooting and potential firmware updates.



Indicative content 3.2: Perform Phone Hardware Repair



Duration: 8 hrs



Theoretical Activity 3.2.1: Introduction to Phone Hardware Repair



Tasks:

- 1: You are invited to answer the following questions related to phone hardware repair:
 - i. What are some common hardware faults that can occur in mobile phones?
 - ii. Apply the steps for replacing a damaged audio jack in a mobile device.
- 2: Present your findings to the whole class and Trainer
- 3: Ask your trainer for any clarification if any.
- 4: You are directed to read the key readings 3.2.1. for more clarifications on basic concept of phone hardware repair.



Key readings 3.2.1.: Perform Phone Hardware Repair

1. Common Hardware Faults and Repair Procedures



Repairing Faulty Charging Circuits

Symptoms: Phone not charging, slow charging, or intermittent charging.

Repair Procedure

Inspect charging port for damage or debris.

Clean charging port with compressed air or a soft brush.

Replace charging port if damaged.

Check charging cable and power adapter for faults.

Replace battery if it fails to hold a charge.



Audio and Alert Faults:

Symptoms: No sound, distorted sound, or low volume.

Repair Procedure:

Test with different headphones or speakers.

Check volume settings and mute switch.

Inspect audio jack for damage or debris.

Replace audio jack or speaker if faulty.



Video/Graphic/Display Faults:

Symptoms: No display, blank screen, flickering, or distorted images.

Repair Procedure:

Restart phone to rule out software issues.

Check display settings and brightness level.

Inspect LCD or OLED screen for physical damage.

Replace screen or display assembly if damaged.

Switches' Faults:

Symptoms: Power button, volume buttons, or home button not responding.

Repair Procedure:

Clean buttons and surrounding areas with compressed air.

Check for loose or damaged connections.

Replace buttons or flex cables if necessary.

SIM and Memory Card Faults:

Symptoms: SIM card not detected, unable to read memory card.

Repair Procedure:

Remove and reinsert SIM card.

Clean SIM card contacts with a soft cloth.

Test SIM card in another phone.

Check for damage to SIM card tray or memory card slot.

Replace SIM card tray or memory card reader if damaged.

Network Faults:

Symptoms: No network signal, dropped calls, or slow data speeds.

Repair Procedure:

Restart phone and check network settings.

Test SIM card in another phone.

Check for network coverage in the area.

Contact network provider for assistance.

Update phone's software to the latest version.

Restarting or Rebooting Faults:

Symptoms: Phone constantly restarting or freezing.

Repair Procedure:

Check for software updates and install if available.

Perform a factory reset (backup data first).

Remove and reinsert battery (if removable).

Test with a different battery if possible.

Check for water damage or overheating issues.

PCB or Motherboard Faults:

Symptoms: Phone not powering on, intermittent faults across multiple components.

Repair Procedure:

Inspect PCB for physical damage, corrosion, or burnt components.

Test power distribution circuits with a multimeter.

Repair or replace damaged components.

Consider professional repair services if motherboard issues persist.

Keypad Faults:

Symptoms: Keypad buttons not responding or sticking.

Repair Procedure:

Clean keypad and surrounding area with compressed air.

Check for debris or liquid damage under keypad.

Replace keypad or flex cable if necessary.

Water Damage Faults:

Symptoms: Phone not powering on, erratic behaviour, or corrosion.

Repair Procedure:

Immediately power off the phone and remove the battery (if possible).

Dry the phone using a soft cloth or towel.

Place the phone in a bag of uncooked rice or silica gel packets to absorb moisture.

Avoid using heat sources (such as hair dryers) as they may damage internal components.

If severe damage occurs, consult a professional repair service.

2. Repair Guidelines for Various Common Faults:

Always begin troubleshooting with basic checks like restarting the phone and checking for software updates.

Use appropriate tools and equipment for disassembly and repair.

Handle components with care to avoid further damage.

Consult service manuals, online guides, and forums for specific repair instructions.

If unsure or uncomfortable with the repair process, seek professional assistance.

Document each step of the repair process for future reference.



Practical Activity 3.2.2: Apply Mobile Phone Hardware Repair



Task:

1: Referring to the key readings 3.1.2, you are requested to perform following task:

- I. You are working in a mobile phone repair shop, and a customer brings in a phone experiencing various hardware issues. The phone isn't charging properly, the sound is distorted, and the display intermittently flickers. Additionally, they mention the phone was exposed to water recently. Your task is to diagnose and perform the necessary repairs on the hardware components.

2: Follow instructions and procedures provided in that key readings and perform the given task

3: Present your final products to your trainers/colleagues

4: Ask for any clarification to the trainer where necessary.



Key readings 3.2.1.: Introduction to Phone Hardware Repair

Water-Damaged Phone

1. Initial Inspection and Safety

- **Power Off the Device:** If the phone is still powered on, turn it off immediately to prevent further damage from short circuits.
- **Check for Liquid Damage Indicators (LDI):** Most phones have LDI stickers that change color when exposed to moisture. Locate and inspect these indicators to confirm water exposure.
- **Wear ESD Protection:** Ensure you're grounded to avoid electrostatic discharge (ESD) while working on delicate components.

2. Disassembly Procedure

- **Remove the Back Cover:** Use appropriate disassembly tools to remove the phone's back cover carefully.
- **Disconnect the Battery:** Safely disconnect the battery to avoid short circuits while working on other components.
- **Inspect Internals for Corrosion:** Check the internal components, especially connectors and circuit boards, for any signs of corrosion, rust, or moisture residue.

3. Drying and Cleaning the Internal Components

- **Clean with Isopropyl Alcohol (IPA):** Use a soft brush and 90% or higher isopropyl alcohol to clean corroded areas gently. Ensure that connectors, charging ports, and audio jacks are free of moisture and corrosion.
- **Use Compressed Air:** After cleaning, blow compressed air over the components to ensure any remaining moisture or alcohol is removed.
- **Leave to Dry:** Let the device dry completely for several hours in a warm, dry environment, or use a dedicated drying machine if available.

4. Addressing Specific Hardware Issues

A. Charging Issue:

- **Inspect the Charging Port:** Check if the charging port is damaged, corroded, or clogged. Clean or replace the port if necessary.
- **Check the Charging Circuit:** Use a multimeter to test the continuity and voltage of the charging circuit. Replace damaged components if needed.
- **Inspect the Battery:** Check the battery for swelling or other signs of damage due to water exposure. If compromised, replace the battery.

B. Sound Distortion Issue:

- **Inspect the Speaker and Audio Jack:** Look for corrosion or physical damage on the speaker and audio jack. Clean them thoroughly or replace the speaker module if damaged.

- **Check Audio IC (Integrated Circuit):** If the issue persists, test the audio IC on the motherboard. Replace it if necessary.

C. Display Flickering Issue:

- **Check Display Connectors:** Inspect the display connectors for corrosion or loose connections. Reseat the connectors after cleaning.
- **Test the Display Panel:** If reseating the connectors doesn't solve the problem, test the display panel with a known working one to determine if the issue lies in the panel or elsewhere.
- **Check for Logic Board Damage:** Examine the logic board for any visible damage, especially in the area handling display signals. Replace or repair the logic board if needed.

5. Reassembly and Final Testing

- **Reassemble the Phone:** Once repairs are complete, carefully reassemble the phone, ensuring all components are securely connected.
- **Test Functionality:** Power on the phone and test all repaired systems:
 - **Charging:** Connect the charger and verify proper charging behavior.
 - **Sound:** Test the speaker, microphone, and headphone jack.
 - **Display:** Check if the display works properly without flickering.

6. Preventive Recommendations to Customer

- Advise the customer on using waterproof cases to prevent future damage from water exposure.
- Recommend regular backups in case the phone experiences significant hardware failure in the future.

When a mobile phone display is not working, several potential issues could be causing the problem, ranging from software glitches to hardware failures. The following are step-by-step procedures to diagnose and solve the issue:



Points to Remember

Common Hardware Issues and Solutions

- ✓ **Charging Issues:** Inspect the charging port, replace damaged parts, and check battery health.
- ✓ **Audio Problems:** Test audio components, check settings, and replace faulty parts.
- ✓ **Display Issues:** Check display settings, inspect for physical damage, and replace the screen if needed.
- ✓ **Button Malfunctions:** Clean buttons, check connections, and replace faulty components.

- ✓ **SIM/Memory Card Problems:** Check the card and tray, clean contacts, and replace if necessary.
- ✓ **Network Issues:** Check the SIM card, network coverage, and phone software.
- ✓ **Restart/Reboot Problems:** Check for software updates, perform a factory reset, and inspect hardware.
- ✓ **Motherboard Issues:** Inspect for damage, test components, and consider professional repair.
- ✓ **Keypad Issues:** Clean the keypad, check for damage, and replace if necessary.
- ✓ **Water Damage:** Dry the phone immediately, avoid using heat, and seek professional help if the damage is severe.

General Repair Guidelines

- ✓ Start with basic troubleshooting like restarting the phone and checking for software updates.
- ✓ Use the proper tools and handle components with care.
- ✓ Refer to manuals and online resources for guidance.
- ✓ Seek professional help if unsure about a repair.
- ✓ Document the repair process for future reference.

Steps to Perform Phone Hardware Repair

- ✓ **Preparation:** Gather necessary tools, materials, and equipment.
- ✓ **Diagnose Issues:** Identify the specific problem.
- ✓ **Disassemble the Phone:** Carefully take apart the phone's hardware.
- ✓ **Perform Repair:** Fix or replace the faulty components.
- ✓ **Reassemble the Phone:** Put the phone back together and test to ensure it works correctly.



Application of learning 3.2.

A client has brought in their smartphone, complaining that it either doesn't charge at all or charges very slowly. They've tried using different charging cables and adapters, but the issue persists. The phone is crucial for their daily work, so they need it repaired quickly.

You are tasked with diagnosing and repairing the phone's charging circuit. The client expects a thorough check and a quick solution.



Indicative content 3.3: Perform Mobile Software Repair



Duration: 8 hrs



Theoretical Activity 3.3.1: Perform Mobile Phone Software Repair



Tasks:

1: You are invited to answer the following questions related to Perform Phone Software repair

- i. What are Software Repair Terminologies and Procedures?
- ii. What are the essential tools required for the flash programming process?
- iii. Explain the role of device compatibility in the functionality of a flasher box.
- iv. Why is it important to analyse error logs during software fault diagnosis?
- v. How would you verify that the flashing process was successful?
- vi. What are some common issues caused by faulty charging circuits?
- vii. How do network faults differ from SIM card faults?
- viii. What steps would you take to repair water damage in a device?
- ix. What factors would you consider when diagnosing display faults on a phone?
- x. How would you determine if a rebooting fault is software or hardware related?
- xi. Design a step-by-step troubleshooting process for SIM and memory card faults.

2: Present your findings to the whole class and Trainer

3: you are directed to read the key readings 3.3.1. for more clarifications on basic concept of phone software repair



Key readings 3.3.1: Perform Phone Software Repair

Performing mobile software repair involves understanding various terminologies, procedures, requirements, and tools. Here's a breakdown of each aspect:

1. Software Repair Terminologies and Procedures

Rooting: Gaining administrative control over the device's operating system to access system files and settings.

Flashing: Installing or re-installing the device's firmware or operating system software.

ROM: Read-Only Memory, referring to the firmware or operating system software stored on the device.

Bricking: Rendering the device unusable due to software errors or modifications.

Factory Reset: Restoring the device to its original factory settings, erasing all user data

and settings.

Custom Recovery: A specialized recovery mode that allows users to perform advanced operations like flashing custom ROMs or making system backups. **Stock ROM:** The original firmware or operating system software provided by the device manufacturer.

Custom ROM: A modified version of the device's firmware or operating system software developed by third-party developers.

2.Requirements for the Flash Programming Process:

Correct Firmware: The specific firmware or ROM intended for the device model and variant. **Flash Tool:** Software tool used to flash firmware onto the device, such as Odin for Samsung devices or SP Flash Tool for MediaTek devices. **USB Drivers:** Device-specific drivers installed on the computer to facilitate communication between the computer and the device during the flashing process. **Fully Charged Battery:** To prevent interruptions during the flashing process that could result in bricking the device. **Backup:** Backup of user data and important files to prevent data loss during the flashing process.

3. Features and Components of Software Flasher Boxes:

Device Compatibility: Flasher boxes designed to support a wide range of device models and brands. **Flash Memory Support:** Compatibility with different types of flash memory chips, such as NAND or eMMC. **User Interface:** Intuitive software interface for selecting firmware files, configuring flashing options, and initiating the flashing process. **Security Features:** Protection against data corruption, device bricking, and unauthorized access during the flashing process. **Advanced Functions:** Additional features like bootloader unlocking, IMEI repair, or partition management.

Updates and Support: Regular software updates and customer support to ensure compatibility with new device models and firmware versions.

1. Software Faults Diagnosis:

Symptom Identification: Identify specific issues reported by the user, such as device freezing, app crashes, or performance degradation. **Software Testing:** Use diagnostic tools and software testing techniques to identify the root cause of the issue.

Error Logs: Analyze system logs, error messages, and crash reports to pinpoint software faults. **Troubleshooting Steps:** Perform steps like clearing cache, uninstalling problematic apps, or performing a factory reset to resolve software issues. **Hardware Check:** Rule out hardware issues by testing device components like battery, storage, and connectivity.

2. The Flash Programming Process

Backup: Backup user data and files from the device to prevent data loss during the flashing process. **Download Firmware:** Obtain the correct firmware or ROM file for the

device model and variant. **Install Flash Tool:** Download and install the appropriate flash tool software on the computer. **Enable USB Debugging:** Enable USB debugging mode on the device to allow communication with the computer. **Connect Device:** Connect the device to the computer using a USB cable. **Load Firmware:** Load the firmware or ROM file into the flash tool software. **Initiate Flashing:** Start the flashing process and follow on-screen instructions to flash the firmware onto the device. **Wait for Completion:** Wait for the flashing process to complete, and the device to reboot. **Verify:** Verify that the device boots up properly and functions without issues after flashing.



Practical Activity 3.3.2: Apply Mobile Phone Software Repair



Task:

- 1: Referring to the key readings 3.3.2, you are requested to Solve the following question:
 - i. John, a mobile repair technician, receives a smartphone from a customer who attempted to install a custom ROM on their device. However, the installation process failed, and now the phone won't turn on, showing no signs of life. The customer is worried they have "bricked" their device and seeks John's expertise to revive it.
- 2: Follow instructions and procedures provided in that key readings and perform the given task
- 3: Present your final products to your trainers/colleagues
- 4: Perform the task provided in application of learning 3.3.2



Key readings 3.3.2.: Apply Mobile Phone Software Repair

A custom ROM (Read-Only Memory) is a modified version of the Android operating system that replaces the original firmware on a smartphone or tablet. Unlike the stock ROM provided by the manufacturer, custom ROMs offer more customization options and often provide updates for devices that have reached their end-of-life cycle.

Why Install a Custom ROM?

- **Customization:** Users can tweak various aspects of the operating system, such as the interface, features, and performance.

- **Updates:** Custom ROMs can provide newer versions of Android, even for devices that no longer receive official updates from the manufacturer.
- **Performance:** Some custom ROMs can optimize the device's performance and battery life.
- **Root Access:** Custom ROMs often grant users root access, allowing for advanced system modifications.

Risks of Installing a Custom ROM:

- **Voiding Warranty:** Installing a custom ROM can void the device's warranty.
- **Bricking the Device:** If the installation process goes wrong, it can render the device unusable.
- **Loss of Data:** The process of flashing a custom ROM can erase all data on the device.
- **Incompatibility:** Not all custom ROMs are compatible with every device, and some may have stability issues.

Installing a custom ROM can be risky and can potentially "brick" your device. It's essential to understand the risks involved and proceed with caution. If you're unsure about the process, it's highly recommended to seek assistance from a professional or experienced user.

Prerequisites:

- **Research:** Ensure that a custom ROM is available for your specific device model. Check online forums and communities for information and recommendations.
- **Backup:** Create a full backup of your device's data, including contacts, photos, messages, and apps.
- **Unlock Bootloader:** Most devices require an unlocked bootloader to install a custom ROM. Check your device's manufacturer's website or online forums for instructions on how to unlock it.

Steps Involved:

1. Boot Your Device into Download Mode

- Power off your Smartphone.
- Press and hold the **Volume Down + Home + Power** buttons simultaneously.
- Release the buttons when the warning screen appears.
- Press **Volume Up** to enter Download Mode.

2. Launch Odin on Your PC

- Extract the Odin zip file you downloaded and run the Odin.exe file as an administrator.
- Connect your Samsung device to the PC using a USB cable. Odin should detect your device and display a blue box in the ID section, indicating that the device is connected.

3. Flash the Custom Recovery

- In Odin, click on the **AP** (or PDA) button, and navigate to the folder where you downloaded the custom recovery (e.g., TWRP .tar file). Select the .tar or .tar.md5 file.
- Ensure that **Auto Reboot** and **F. Reset Time** are checked in Odin. **Re-Partition** should not be checked.
- Click on the **Start** button in Odin to begin flashing the custom recovery.
- Wait for the process to complete. Odin will display a "PASS" message if the recovery is successfully flashed, and your device will reboot.

4. Boot into Recovery Mode

- Once your device reboots, power it off again.
- Boot into the custom recovery mode by pressing and holding the **Volume Up + Home + Power** buttons simultaneously until the recovery screen appears.

5. Wipe Data and Cache

- In the custom recovery (TWRP/ClockworkMod), navigate to **Wipe**.
- Select **Wipe Data/Factory Reset** to clear the existing ROM data.
- Optionally, you can also wipe the **Cache** and **Dalvik Cache** for a clean installation.

6. Flash the Custom ROM

- In the recovery menu, select **Install** or **Install Zip from SD Card**.
- Navigate to the custom ROM .zip file you downloaded earlier and select it.
- Confirm the installation and wait for the process to complete. This may take several minutes.

7. Flash GApps (Optional)

- If your custom ROM does not include Google Apps (GApps), you'll need to flash them separately.
- Follow the same steps as above to install the GApps .zip file after the ROM has been flashed.

8. Reboot Your Device

- Once the ROM (and GApps, if applicable) is installed, go back to the main menu of the custom recovery and select **Reboot > System**.
- The device will reboot into the newly installed custom ROM. The first boot may take longer than usual.

1. **Download Necessary Files:** Download the custom ROM image, a compatible recovery tool (like TWRP or OrangeFox), and any required drivers for your device.
2. **Install Recovery:** Use a tool like ADB (Android Debug Bridge) to flash the custom recovery image onto your device. This will replace the stock recovery.
3. **Boot into Recovery:** Power off your device, then hold the volume up, volume

down, and power buttons simultaneously to boot into recovery mode.



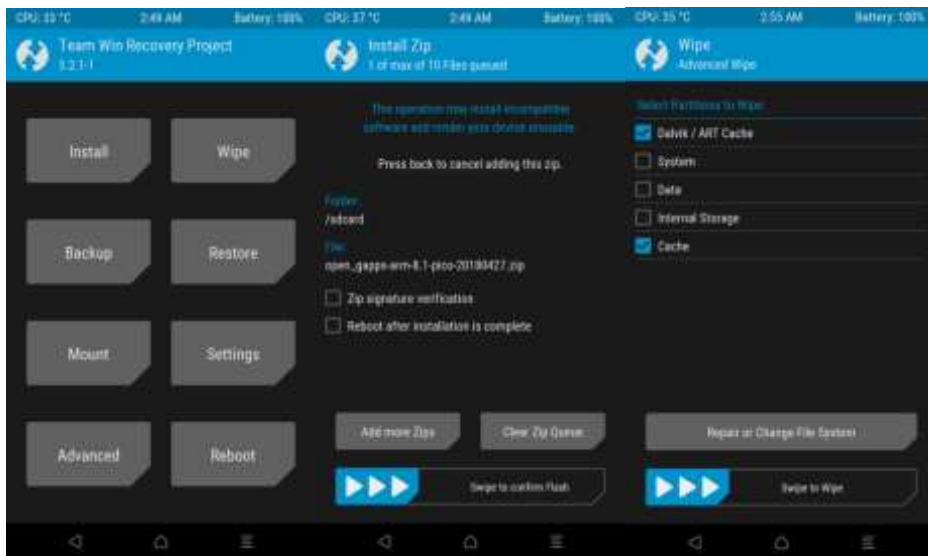
4. **Wipe Data:** In recovery mode, wipe the data partition (factory reset) to ensure a clean slate.



5. **Flash Custom ROM:** Use the recovery tool to flash the custom ROM image onto your device.



6. **Flash Gapps (Optional):** If the custom ROM doesn't include Google apps, you'll need to flash a Gapps package.



7. **Reboot:** Reboot your device, and the custom ROM should now be installed.



Points to Remember

Perform Mobile Phone Software Repair

- ✓ Mobile software repair involves understanding key terms, procedures, and tools to diagnose and fix software-related issues

Key Terms and Concepts

- ✓ Rooting: Gaining administrative control over the device.
- ✓ Flashing: Reinstalling the device's operating system.
- ✓ ROM: The device's operating system software.
- ✓ Bricking: Rendering the device unusable.
- ✓ Factory Reset: Restoring the device to its original state.
- ✓ Custom Recovery: Advanced recovery mode for system modifications.
- ✓ Stock ROM: Original device software.
- ✓ Custom ROM: Modified version of the device software.

Repair Process

- ✓ Diagnosis: Identify the software issue through user reports, testing, and log analysis.
- ✓ Backup: Create a backup of essential data before proceeding.
- ✓ Flashing (if necessary): Reinstall the device's software using specialized tools.
- ✓ Verification: Ensure the device functions correctly after the repair.

Requirements

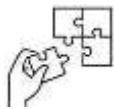
- ✓ Correct firmware: Specific software for the device model.
- ✓ Flashing tool: Software to install firmware.
- ✓ USB drivers: For computer-device communication.
- ✓ Fully charged battery: To prevent interruptions.
- ✓ Backup: To protect user data.

Flasher Box Features

- ✓ Device compatibility: Supports various models.
- ✓ Flash memory support: Compatible with different memory types.
- ✓ User interface: Easy-to-use software.
- ✓ Security: Protects against data corruption and unauthorized access.
- ✓ Advanced functions: Additional features for specific repair

Steps for Mobile Phone Software Repair

1. Download Required Files
2. Transfer Files to the computer
3. Boot into Recovery Mode
4. Wipe Data
5. Install the Custom ROM
6. Reboot the Device
7. Initial Setup



Application of learning 3.3.

Sarah, a mobile technician, is approached by a customer whose smartphone has been experiencing frequent app crashes and slow performance. The customer attempted a factory reset, but the issues persisted. Sarah suspects that the device may require a software repair, possibly involving flashing the firmware or installing a custom ROM. Your task is to diagnose the root cause of the failure and repair the phone.



Indicative content 3.4: Repair Report



Duration: 2 hrs



Theoretical Activity 3.4.1: Introduction to Repair Report



Tasks:

- 1: You are invited to answer the following questions related to the Repair Report:
Discuss the key components of a repair report and why each is important
- 2: Present your findings to the whole class and Trainer
- 3: you are directed to read the key readings 3.4.1. for more clarifications on basic concept of repair report



Key readings 3.4.1: Introduction to Repair Report

Repair Report: After completing the software repair process, generate a repair report documenting the following:

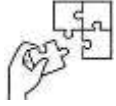
- Device model and variant.
- Details of the software issue or fault encountered.
- Steps taken to diagnose and resolve the issue.
- Firmware or ROM used for flashing.
- Any additional repairs or modifications performed.
- Recommendations for preventing similar issues in the future. By following these guidelines and procedures, you can effectively diagnose and repair software faults on mobile devices, ensuring optimal performance and functionality.



Points to Remember

Repair report

- A repair report should detail the device,
- Software problem,
- Diagnostic steps,
- Repair solutions (including firmware/ROM used),
- Additional work done, and preventive measures. This documentation is essential for effective software repair and device performance optimization



Application of learning 3.4.

You are a mobile repair technician working at a service center for a popular smartphone brand. A customer brings in their phone, reporting that it is stuck on the boot screen and unable to start properly. Your task is to diagnose the issue, perform the necessary software repair, and generate a detailed repair report afterward.



Learning outcome 3 end assessment

Theoretical assessment

A. Multiple-Choice Questions

Choose the letter corresponding to the correct answer

1. Which of the following is a cleaning tool used in phone repair?
 - A) Screwdriver
 - B) Brush
 - C) Multimeter
 - D) SIM ejector
2. What is the main purpose of ESD tools?
 - A) To diagnose faults
 - B) To prevent electrostatic discharge
 - C) To update phone software
 - D) To clean phone components
3. Which of these is NOT considered a hardware fault in phones?
 - A) Charging circuit issues
 - B) SIM card fault
 - C) Flash programming issues
 - D) Display fault
4. Flasher boxes are used for which purpose?
 - A) To repair faulty screens
 - B) To flash phone software
 - C) To fix charging circuits
 - D) To test network signals
5. Which tool is essential for diagnosing hardware issues?
 - A) Hand tool
 - B) Cleaning tool
 - C) Diagnostic tool
 - D) Flasher box
6. What kind of equipment is used to test mobile phones for faults?
 - A) Flasher boxes
 - B) SIM ejectors
 - C) Testing equipment
 - D) Hand tool
7. What type of fault can lead to random restarting or rebooting of phones?
 - A) Charging circuit faults
 - B) PCB or motherboard faults

- C) SIM card faults
 - D) Audio faults
8. Which of the following is a common fault related to audio issues?
 - A) Charging circuit fault
 - B) Switch fault
 - C) Audio and alert fault
 - D) Network fault
 9. What is the first step in diagnosing software faults?
 - A) Running a diagnostic tool
 - B) Flashing the phone
 - C) Replacing the SIM card
 - D) Testing the network
 10. Which of the following causes water damage in mobile phones?
 - A) Faulty SIM card
 - B) Faulty PCB
 - C) Overheating
 - D) Exposure to moisture

B. Fill in the Blank

11. _____ tools are used to clean mobile phone components.
12. The _____ is the main component that controls all functions in a mobile phone.
13. A _____ fault can cause the phone to fail to produce sound or alerts.
14. ESD tools help to prevent _____ when repairing phones.
15. When diagnosing a network issue, you would check the _____ card first.

C. Answer by True if the statement is correct and False if the statement is wrong

16. Hand tools like screwdrivers are not necessary for phone repairs.
17. SIM and memory card faults are considered hardware issues.
18. Water damage can affect the motherboard of a phone.
19. Diagnostic tools are used for software repairs only.
20. Flashing tools are primarily used to repair phone hardware.

C. Closed Questions

21. Can faulty charging circuits lead to battery issues?
22. Is flashing required to fix a video/graphic fault in a phone?
23. Is a flasher box used for diagnosing hardware faults?
24. Do ESD tools protect against static electricity during phone repairs?
25. Are switches' faults related to software issues?

Practical assessment

You are a technician at a mobile repair center. A customer brings in a smartphone with multiple issues, including problems with charging, sound alerts, display glitches, and

occasional rebooting. The customer also reports that the phone was briefly exposed to water, and the SIM card is not working properly. Your task is to:

1. Diagnose the hardware faults using appropriate tools and equipment.
2. Repair the phone's hardware, including faulty circuits, audio system, and SIM card issues.
3. Perform a software repair by flashing the phone using a flasher box.
4. Provide a detailed repair report outlining all steps taken, tools used, and the results of the repair.

END



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