

Module 1: Introduction to Mobile Hardware (Classes 1–3)

Module Duration: 6 Hours (3 Classes × 2 Hours)

Module Overview

This module introduces students to the fundamentals of mobile phone hardware technology and repair. Students will learn about smartphone architecture, internal components, repair tools, workplace safety, and career opportunities in the mobile servicing industry. By the end of this module, students will be able to identify major smartphone hardware components, understand how mobile devices function, and safely use essential repair tools.

Module Learning Objectives

After completing this module, students will be able to:

- Understand the evolution and types of mobile phones.
 - Explain the basic architecture of smartphones.
 - Differentiate between Android and iOS platforms.
 - Identify the internal and external components of a mobile phone.
 - Understand the functions of CPU, RAM, storage, battery, and motherboard.
 - Identify professional mobile repair tools and their uses.
 - Follow ESD (Electrostatic Discharge) safety procedures.
 - Prepare a safe mobile repair workstation.
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Class 1 (2 Hours)

Introduction to Mobile Phone Technology

Learning Outcomes

After completing this class, students will be able to:

- Explain the evolution of mobile phone technology.
 - Differentiate between feature phones and smartphones.
 - Compare Android and iOS operating systems.
 - Distinguish between mobile hardware and software.
 - Understand career opportunities in mobile repairing.
 - Follow basic safety procedures.
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1.1 Introduction to Mobile Phones

A **mobile phone** is a portable electronic communication device that allows users to make calls, send messages, access the internet, capture photos and videos, and run applications.

Evolution of Mobile Phones

1st Generation (1G)

- Analog communication
- Voice calls only

2nd Generation (2G)

- Digital communication
- SMS support
- Basic internet (GPRS/EDGE)

3rd Generation (3G)

- Mobile internet
- Video calling
- Faster data transfer

4th Generation (4G LTE)

- High-speed internet
- HD video streaming
- Online gaming

5th Generation (5G)

- Ultra-fast internet
- Low latency
- IoT support
- AI-powered mobile applications

1.2 Types of Mobile Phones

Feature Phone

Characteristics:

- Physical keypad
- Basic operating system
- Calling and SMS
- Long battery life
- Limited applications

Smartphone

Characteristics:

- Touchscreen display
- Android or iOS operating system
- Internet connectivity
- App installation
- High-resolution cameras
- GPS, Bluetooth, NFC, and biometric security

1.3 Android vs iOS Overview

Android

- Developed by Google
- Open-source platform
- Used by Samsung, Xiaomi, Vivo, Oppo, Realme, Motorola, Nokia, and many others
- Highly customizable
- Wide variety of devices

iOS

- Developed by Apple
- Closed ecosystem
- Exclusive to iPhone devices
- Optimized performance
- High security and privacy

Comparison

Feature	Android	iOS
Developer	Google	Apple
Source Code	Open Source	Closed Source
Customization	High	Limited
Device Manufacturers	Many	Apple Only
App Store	Google Play	Apple App Store

1.4 Mobile Hardware vs Software

Hardware

Physical parts of the phone such as:

- Display
- Battery
- Motherboard
- Camera
- Speaker
- Charging Port
- Microphone

Software

Programs that control the device, including:

- Android
 - iOS
 - System Applications
 - User Applications
 - Firmware
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1.5 Mobile Repair Industry & Career Opportunities

Career options include:

- Mobile Hardware Technician
- Smartphone Repair Engineer
- Service Center Technician

- Mobile Software Technician
- Freelance Repair Specialist
- Mobile Shop Owner
- Field Service Engineer

Required Skills

- Hardware troubleshooting
 - Soldering
 - Circuit analysis
 - Software flashing
 - Customer communication
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1.6 Mobile Repair Safety & ESD Protection

Safety Rules

- Switch off the phone before repair.
- Disconnect the battery.
- Wear an anti-static wrist strap.
- Keep liquids away from the workbench.
- Organize screws and components carefully.
- Work in a clean, well-lit environment.

ESD Protection

Electrostatic Discharge (ESD) can permanently damage sensitive electronic components.

ESD Protection Methods

- Anti-static wrist strap
 - ESD mat
 - Anti-static tweezers
 - Proper grounding
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Practical Exercise

Students will:

- Identify external smartphone parts.
- Compare Android and iPhone designs.

- Identify buttons, ports, cameras, speakers, microphones, SIM trays, and charging ports.
 - Practice proper ESD safety procedures.
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Assignment

Prepare a comparison chart between a feature phone and a smartphone.

Class 2 (2 Hours)

Smartphone Architecture & Internal Components

Learning Outcomes

Students will be able to:

- Explain smartphone architecture.
 - Identify motherboard components.
 - Understand CPU, RAM, storage, and battery technologies.
 - Identify SIM and memory card slots.
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2.1 Mobile Phone Architecture

A smartphone consists of integrated hardware and software that work together to perform communication and computing tasks.

Main Sections

- Display Assembly
- Motherboard (PCB)
- Battery
- Cameras
- Charging Circuit
- Audio Circuit
- RF (Radio Frequency) Circuit
- Antenna System

2.2 Main Components of a Smartphone

Major hardware components include:

- Motherboard (PCB)
- CPU (Application Processor)
- RAM
- Internal Storage (eMMC/UFS)
- Battery
- Display
- Camera Modules
- Charging Port
- Speaker
- Microphone
- Vibration Motor
- Fingerprint Sensor
- SIM Tray

2.3 PCB (Motherboard) Overview

The Printed Circuit Board (PCB) is the main electronic board that connects all hardware components.

Functions

- Power distribution
- Data communication
- Signal processing
- Component interconnection

2.4 CPU (Processor)

The CPU is the "brain" of the smartphone.

Functions

- Executes applications
- Controls hardware
- Processes data

- Manages communication between components

Popular manufacturers:

- Qualcomm Snapdragon
 - MediaTek
 - Apple A-Series
 - Samsung Exynos
 - Google Tensor
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2.5 RAM (Random Access Memory)

RAM temporarily stores data while applications are running.

Common Capacities

- 4 GB
 - 6 GB
 - 8 GB
 - 12 GB
 - 16 GB
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2.6 Internal Storage

eMMC

- Lower speed
- Used in entry-level smartphones

UFS (Universal Flash Storage)

- High-speed storage
 - Used in modern smartphones
 - Faster app loading and file transfers
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2.7 Battery Types

Most smartphones use **Lithium-Ion (Li-ion)** or **Lithium-Polymer (Li-Po)** rechargeable batteries.

Battery Specifications

- Voltage
 - Capacity (mAh)
 - Charging Speed
 - Battery Health
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2.8 SIM & Memory Card Slots

SIM Types

- Standard SIM
- Micro SIM
- Nano SIM
- eSIM

Memory Cards

- microSD
 - microSDHC
 - microSDXC
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Practical Exercise

Students will:

- Open a demonstration smartphone.
 - Identify motherboard components.
 - Locate CPU, RAM, storage, battery connector, and camera connectors.
 - Identify SIM and memory card slots.
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Assignment

Draw and label the major internal components of a smartphone.

Class 3 (2 Hours)

Mobile Repair Tools & Equipment

Learning Outcomes

Students will be able to:

- Identify professional repair tools.
- Explain the function of each tool.
- Use repair equipment safely.
- Prepare a professional repair workstation.

3.1 Mobile Repair Toolkit

Essential tools include:

- Precision Screwdriver Set
- Plastic Opening Picks
- Metal Pry Tools
- Suction Cup
- Tweezers
- SIM Ejector Tool
- Magnetic Screw Mat

3.2 Multimeter Basics

A multimeter measures:

- Voltage
- Current
- Resistance
- Continuity
- Diode Testing

Applications

- Check battery voltage
 - Detect short circuits
 - Test charging lines
 - Verify continuity
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3.3 DC Power Supply

A DC regulated power supply is used to:

- Power mobile motherboards safely
 - Diagnose no-power faults
 - Measure current consumption
 - Detect short circuits
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3.4 Microscope

A digital or optical microscope is used to inspect:

- SMD components
 - IC pins
 - PCB tracks
 - Solder joints
 - Water damage
 - Corrosion
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3.5 Soldering Station

Functions

- Replace connectors
 - Repair PCB tracks
 - Install components
 - Remove damaged parts
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3.6 Hot Air Rework Station

Uses

- Remove ICs
 - Replace charging ports
 - Replace USB connectors
 - Rework SMD components
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3.7 Safety Procedures

Always:

- Wear ESD protection.
 - Disconnect battery before repair.
 - Use proper ventilation while soldering.
 - Handle hot tools carefully.
 - Keep liquids away from electronic components.
 - Organize screws and small parts properly.
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Practical Exercise

Students will:

- Identify each repair tool and explain its purpose.
 - Practice using screwdrivers and opening tools.
 - Measure voltage and continuity with a multimeter.
 - Set up and safely operate a DC power supply.
 - Observe soldering and hot-air rework station operation under supervision.
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Software & Tools Used

- Digital Multimeter
- DC Regulated Power Supply
- Precision Screwdriver Set
- Plastic Opening Tools
- Metal Pry Tools
- Tweezers
- Suction Cup
- SIM Ejector Tool

- Digital Microscope
 - Soldering Station
 - Hot Air Rework Station
 - ESD Wrist Strap
 - ESD Mat
 - Magnetic Screw Mat
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Module Assessment

Assessment	Marks
Quiz	10
Practical Exercises	30
Tool Identification & Safety Assessment	20
Component Identification Project	30
Viva	10
Total	100

Module Learning Outcomes

After successfully completing **Module 1: Introduction to Mobile Hardware**, students will be able to:

- Explain the evolution and architecture of modern mobile phones.
- Differentiate between feature phones and smartphones, and compare Android and iOS platforms.
- Identify and describe the functions of key smartphone hardware components, including the motherboard, CPU, RAM, storage, battery, and connectors.
- Safely use professional mobile repair tools and equipment.
- Apply ESD protection and workplace safety practices during repair procedures.
- Prepare a mobile repair workstation and confidently identify external and internal smartphone components for further practical training.