

SS3 FIRST TERM E-NOTE: COMPUTER HARDWARE AND GSM REPAIRS 🔧📱

This curriculum represents the final stage of the course, focusing on integrating advanced troubleshooting skills, networking, cybersecurity, and professional ethics necessary for a career in ICT repairs.

WEEK 1: Review of SS1 and SS2 Concepts 📚

Objective: To consolidate core knowledge of the entire Computer Hardware and GSM Repairs syllabus covered in the Junior and Senior Secondary levels (SS1 & SS2).

1. Computer Hardware (SS1 & SS2 Recap)

- **Core Components:** Quick revision on the functions, maintenance, and common faults of the **Motherboard**, **CPU**, **RAM**, **HDD/SSD**, and **Power Supply Unit (PSU)**.
- **Advanced Hardware:** Reviewing the roles of **GPU** (Graphics Cards) and **Servers** in high-performance and networked environments.
- **System Firmware:** Re-examining how to access and configure **BIOS/UEFI** settings for advanced boot and hardware troubleshooting.

2. GSM Repairs (SS1 & SS2 Recap)

- **Fundamentals:** Recap of the **evolution of mobile networks (2G-5G)** and the importance of **SIM** and **IMEI**.
 - **Hardware and Software Faults:** Rehearsing the process of identifying faults related to the **Charging Port**, **Screen/Display**, **Battery**, and diagnosing software issues like **Boot Loops** and **OS Corruption**.
 - **Repair Techniques:** Reviewing the procedures for a **Factory Reset (Formatting)** and **Flashing** (re-installing firmware) of an Android device.
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WEEK 2: In-Depth Troubleshooting of Computer Hardware and Software 🖥️

Objective: To master advanced diagnostic and repair techniques that go beyond simple component replacement.

1. Advanced Hardware Diagnostics

- **Intermittent Faults:** Learning to diagnose problems that occur randomly, such as random shutdowns or blue screens (**BSOD** - Blue Screen of Death). This requires systematic testing of **RAM modules**, **PSU voltage stability**, and **CPU/GPU thermal throttling**.
- **Component Testing Tools:** Using specialized software like **Memtest86** (for RAM) and **CrystalDiskInfo** (for HDD/SSD health) to confirm hardware failure before replacement.
- **Peripheral Troubleshooting:** Advanced diagnosis of external device issues, particularly problems with **USB controllers** and **PCIe slots** using **Device Manager** in Windows.

2. Operating System (OS) and Driver Issues

- **System File Checker (SFC):** Utilizing the command-line utility `sfc /scannow` to scan and repair critical Windows system files.
- **Driver Rollback and Update:** Learning when to update drivers (for new features/bug fixes) versus when to roll back to a previous version (for stability) via **Driver Manager**.
- **OS Reinstallation Strategies:** Understanding the difference between a **clean install**, a **repair install**, and system **image restoration**.

WEEK 3: Advanced Troubleshooting of GSM Hardware and Software 📱

Objective: To develop expertise in micro-soldering concepts and complex software repairs, particularly for non-booting devices.

1. Component Level (Micro-Soldering) Troubleshooting

- **Diagnosis with Multimeter:** Using a **digital multimeter** to trace voltage paths, check for **short circuits**, and measure resistance on the phone motherboard to pinpoint faulty **ICs (Integrated Circuits)** like the **PMIC (Power Management IC)** or a damaged **diode/capacitor**.
- **Common Board-Level Faults:** Detailed analysis of non-charging issues caused by faulty **charging ICs** and "no service" issues caused by faulty **RF (Radio Frequency) ICs**.

2. Dead Boot and EMMC/UFS Repair

- **Dead Boot Repair:** Understanding and using **JTAG/eMMC Tools** (like EasyJTAG, UFI Box) to communicate directly with the phone's **eMMC/UFS storage chip** when the phone cannot boot.
- **Firmware Backup and Restoration:** Learning to extract and write firmware dumps to fully recover a bricked (non-functional) device.
- **Security and Locking:** Addressing advanced locks such as **FRP (Factory Reset Protection)** and **Carrier Locks** using professional flashing tools, ensuring compliance with legal and ethical standards.

WEEK 4: Networking Devices and Setup Basics 🌐

Objective: To acquire practical skills in configuring and maintaining common networking hardware used in SOHO (Small Office/Home Office) environments.

1. Networking Devices

- **Routers:** Understanding their function in connecting different networks (e.g., LAN to WAN), assigning **IP addresses (DHCP)**, and enabling **NAT (Network Address Translation)**.
- **Switches:** Learning their role in connecting devices within a single **LAN (Local Area Network)** and how they use **MAC addresses** to direct traffic efficiently.
- **Modems:** Explaining the function of a modem as the device that converts digital signals to analog signals (and vice versa) for transmission over phone lines or cables.

2. Network Configuration and Cabling

- **IP Addressing:** Differentiating between **Static** and **Dynamic IP addresses** and the basic concepts of **subnetting**.
- **Cabling:** Practical demonstration of creating and testing **Ethernet (RJ-45) straight-through** and **cross-over** cables using a **crimp tool** and **cable tester**.
- **Wi-Fi Setup:** Configuring a basic wireless access point, including setting up **SSID**, choosing a strong **encryption type (WPA2/WPA3)**, and creating a **Guest Network**.

WEEK 5: Cybersecurity Awareness in ICT Repairs 🛡️

Objective: To integrate security best practices into the repair workflow to protect client systems and data.

1. Malware and Virus Removal Strategies

- **Advanced Malware:** Identifying and dealing with complex threats like **Rootkits** and **Ransomware**.
- **Bootable Scanners:** Using live operating systems (e.g., **Linux Live CDs/USBs**) or specialized bootable antivirus software to scan and clean an infected system *before* the malware can fully load.
- **Repair Pitfalls:** Understanding that simply deleting infected files may not be enough; sometimes a **full system reformat** is the only safe solution for deeply rooted infections.

2. Securing the Repair Environment

- **Isolated Network:** The importance of repairing infected systems on an **isolated local network** (or completely offline) to prevent the spread of malware to the workshop's own network or other customer devices.
 - **USB Media Hygiene:** The procedure for scanning all repair USB drives (e.g., flash drives with OS images or tools) for viruses after every job to maintain a clean toolkit.
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WEEK 6: Data Privacy and Protection for Customers

Objective: To understand the ethical and legal responsibilities associated with handling sensitive customer data during repair.

1. Ethical Responsibilities

- **The Prime Directive:** The principle that a technician must **never access, view, copy, or share** a customer's personal files (photos, documents, messages) under any circumstance.
- **Non-Disclosure:** Stressing the ethical obligation to maintain **strict confidentiality** about the contents of the customer's device and the nature of the repair.
- **Pre-Repair Agreement:** The necessity of having a written agreement (a waiver) that asks the customer to **back up their data** before the repair and authorizes the technician to perform a system format if necessary.

2. Data Erasure and Disposal

- **Secure Deletion:** Explaining that a simple 'Delete' command does not erase data permanently. Learning to use specialized software to perform **secure, multi-pass data wiping (DOD-standard)** before disposing of old customer hard drives or phones.
 - **Physical Destruction:** The final option for high-security data; physically destroying the storage media (shredding, drilling) to make data recovery impossible.
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WEEK 7: Practical: Network Setup in a Small Office

Environment

Objective: Hands-on application of networking knowledge to configure a functioning small office network from scratch.

Practical Steps:

1. **Topology Design:** Sketching a simple network layout (e.g., 5 PCs, 1 Printer, 1 Router).
2. **Cabling and Punch-Down:** Cutting, crimping, and testing **straight-through Ethernet cables** for each PC connection.

3. **Router Configuration:** Accessing the router's web interface (usually via 192.168.1.1 or 192.168.0.1):
 - Changing the default **admin password**.
 - Configuring the **WAN (Internet)** connection type.
 - Setting up the **DHCP range**.
 4. **Wireless Security:** Configuring the **SSID** and a strong **WPA3-PSK** passphrase.
 5. **Testing:** Pinging between client PCs (ping 192.168.x.x) to verify local connectivity and testing internet access on all devices.
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WEEK 8: Case Study: Common ICT Repair Challenges in Nigeria NG

Objective: To discuss real-world scenarios and localized challenges unique to the Nigerian ICT repair market.

1. Challenges Related to Infrastructure

- **Power Fluctuation:** The impact of unstable electricity on electronic devices (PSU failure, battery degradation) and the necessity of using **UPS** and **stabilizers**.
- **Parts Sourcing:** Discussing the challenges of sourcing genuine, high-quality replacement parts versus dealing with substandard imported components, and the importance of supplier integrity.

2. Socio-Economic and Ethical Challenges

- **Customer Education:** Dealing with customer expectations and educating them on the true cost and complexity of repairs (e.g., convincing a customer a faulty **PMIC** is not the same as a loose battery).
 - **Price Negotiation:** Navigating the local repair market's flexible pricing structure and establishing fair, transparent pricing models based on diagnostics and labor.
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WEEK 9: Project: Diagnose and Repair a Complete ICT Setup (PC + GSM) 🎯

Objective: The culmination of all practical skills in a comprehensive, integrated project simulating a real repair job.

Project Requirements:

1. **Scenario Creation:** Students are given two faulty devices: a desktop PC with an OS issue (e.g., unbootable Windows) and a GSM phone with a hardware fault (e.g., non-charging).
 2. **Diagnosis Report:** A formal report detailing:
 - Initial Fault Symptoms.
 - Diagnostic Tools/Methods Used.
 - Specific Component/Software Identified as Faulty.
 3. **Repair Action:** Execution of the necessary repairs:
 - **PC:** Reinstalling the OS/Repairing the Boot Sector.
 - **GSM:** Replacing the faulty charging flex cable or IC.
 4. **Final Documentation:** A professional-level invoice and repair guarantee for the completed job.
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WEEKS 10 & 11: Revision and Examination

The final weeks are dedicated to a comprehensive revision of all topics from SS1 to SS3, followed by the end-of-term **Examination** to assess mastery of the entire syllabus.