Final Practical Projects

The **Final Practical Project** is designed to evaluate students' ability to apply the knowledge and skills gained throughout the **48-Hour Computer Hardware Course**. Students will complete hands-on tasks that simulate real-world computer hardware and IT support scenarios.

Project 1: Desktop PC Assembly

Objective

Assemble a complete desktop computer from individual hardware components while following proper safety procedures and manufacturer guidelines.

Components Required

- Computer Case (Cabinet)
- Motherboard
- CPU (Processor)
- CPU Cooler
- Thermal Paste
- RAM
- SSD/HDD
- Power Supply Unit (PSU)
- Graphics Card (Optional)
- Monitor
- Keyboard
- Mouse

Tasks

- Wear an anti-static wrist strap.
- Install the motherboard into the computer case.
- Install the CPU correctly.
- Apply thermal paste.
- Install the CPU cooler.
- Install RAM modules.
- Install SSD/HDD or NVMe SSD.
- Install the Power Supply Unit.
- Connect all power cables.
- Connect front panel cables.
- Perform cable management.
- Verify all hardware connections.

Expected Outcome

The computer powers on successfully and completes the POST process without errors.

Project 2: Windows Installation & Configuration

Objective

Install and configure Microsoft Windows on the assembled computer.

Tasks

- Create a bootable Windows installation USB.
- Configure BIOS/UEFI boot order.
- Install Windows 10 or Windows 11.
- Partition and format the storage drive.
- Create a local or Microsoft user account.
- Configure date, time, and regional settings.
- Install Windows updates.
- Enable Windows Security.

Expected Outcome

Windows installs successfully, boots correctly, and operates without errors.

Project 3: Driver Installation

Objective

Install and verify all required hardware drivers.

Drivers to Install

- Chipset Driver
- Graphics Driver
- Audio Driver
- LAN Driver

- Wi-Fi Driver (if available)
- Bluetooth Driver (if available)
- Printer Driver (optional)

Tasks

- Download or install the latest compatible drivers.
- Verify hardware detection using Device Manager.
- Resolve any missing or unknown device issues.
- Restart the computer after installation.

Expected Outcome

All devices function correctly with no driver errors in Device Manager.

Project 4: Network Setup

Objective

Configure a functional wired or wireless network connection.

Tasks

- Connect the computer to a switch or wireless router.
- Configure IPv4 settings using DHCP or a static IP address.
- Set the subnet mask, default gateway, and DNS server.
- Verify Internet connectivity.
- Test communication using `ping` and `ipconfig`.
- Share files between computers (optional).

Expected Outcome

The computer communicates successfully with other devices and accesses the Internet.

Project 5: Laptop RAM/SSD Upgrade

Objective

Upgrade a laptop by replacing or adding RAM and/or replacing an HDD with an SSD.

Tasks

- Power off the laptop and disconnect the charger.
- Remove the battery (if removable).
- Open the laptop safely.
- Identify RAM and storage slots.
- Install compatible RAM or SSD.
- Reassemble the laptop.
- Boot the system and verify the upgrade.

Expected Outcome

The laptop detects the new hardware and operates correctly with improved performance.

Project 6: Hardware Troubleshooting

Objective

Diagnose and resolve common hardware and software issues.

Sample Problems

- Computer does not power on.
- No display on the monitor.
- Continuous BIOS beep codes.
- Boot device not found.
- Slow system performance.
- Overheating CPU.
- No Internet connection.
- USB device not detected.

Tasks

- Identify the root cause of the problem.
- Perform systematic troubleshooting.
- Repair or replace faulty components if necessary.
- Verify that the issue has been resolved.
- Document the troubleshooting process.

Expected Outcome

The computer functions normally after successful troubleshooting.

Project 7: Preventive Maintenance

Objective

Perform preventive maintenance to improve system reliability and lifespan.

Tasks

- Clean internal computer components.
- Remove dust from fans, heat sinks, and air vents.
- Clean RAM contacts if required.
- Replace thermal paste on the CPU.
- Check cable connections.
- Inspect power supply and cooling fans.
- Verify system temperatures after maintenance.

Expected Outcome

The computer runs more efficiently with improved cooling and stable operation.

Project 8: Complete PC Build & Testing

Objective

Build, configure, optimize, and test a fully functional computer system ready for daily use.

Tasks

Hardware

- Assemble all hardware components.
- Verify hardware compatibility.
- Configure BIOS/UEFI settings.

Software

- Install Windows.
- Install all device drivers.
- Configure Windows updates.

- Install essential utility software.

Networking

- Configure Internet access.
- Test wired or wireless connectivity.
- Configure basic network settings.

Performance Testing

- Benchmark CPU performance.
- Benchmark RAM performance.
- Benchmark storage performance.
- Monitor CPU and storage temperatures.
- Verify system stability under load.

Final Verification Checklist

- Successful POST
- Stable Windows startup
- CPU functioning correctly
- RAM detected correctly
- Storage detected correctly
- Drivers installed successfully
- Internet connection working
- USB ports functioning
- Audio functioning
- Display functioning
- Stable system temperatures
- No hardware or software errors

Expected Outcome

A fully operational computer system that passes all functional tests and is ready for end-user deployment.

Final Project Evaluation Rubric

Evaluation Criteria	Marks
Hardware Assembly	20
Windows Installation & Configuration	15
Driver Installation	10

Evaluation Criteria	Marks
Network Configuration	10
Laptop Upgrade	10
Troubleshooting Skills	15
Preventive Maintenance	10
Final System Testing & Documentation	10
Total	**100**

Viva (Oral Examination)

Students may be asked questions on topics such as:

- Identify motherboard components and explain their functions.
- Explain the difference between HDD, SSD, and NVMe SSD.
- Describe the purpose of BIOS/UEFI.
- What is POST and why is it important?
- Explain the causes and solutions for common boot errors.
- Demonstrate how to configure a static IP address.
- Explain the role of thermal paste.
- Describe the difference between DDR4 and DDR5 RAM.
- Explain RAID levels and their uses.
- Demonstrate safe ESD handling procedures.
- Describe the steps to install Windows and device drivers.
- Explain how to diagnose an overheating computer.

Final Learning Outcomes

Upon successful completion of the **Final Practical Projects**, students will be able to:

- Assemble a desktop computer using industry-standard safety procedures.
- Install and configure Windows, device drivers, and essential software.
- Configure wired and wireless network settings.
- Upgrade laptop RAM and storage devices safely.
- Diagnose and resolve common hardware and software faults using structured troubleshooting techniques.
- Perform preventive maintenance to improve computer reliability and longevity.
- Benchmark and validate system performance after assembly and upgrades.
- Produce professional service documentation and communicate technical solutions effectively.

- Demonstrate the practical competencies expected of a **Computer Hardware Technician**, **Desktop Support Technician**, or **IT Support Engineer** in a real-world work environment.