

CRAFTSMEN TRAINING SCHEME (CTS)

ANNUAL INSTRUCTIONAL PLAN

INFORMATION & COMMUNICATION TECHNOLOGY SYSTEM MAINTENANCE (ICTSM)

1ST YEAR (42 WEEKS)

(Curriculum as per DGT / CSTAR! Guidelines for ICTSM CTS Scheme)

Trade Name	INFORMATION & COMMUNICATION TECHNOLOGY SYSTEM MAINTENANCE (ICTSM)
NSQF Level & Duration	NSQF Level-4 Two Years (First Year - 42 Weeks)
Academic Session	20____ - 20____
Institute Name & Address	
Instructor Name & Designation	
Group Instructor (GI) Name	
Principal / Supt. Name	

WEEKLY INSTRUCTIONAL BREAKUP - ICTSM (1ST YEAR)

Week No.	Trade Practical (Professional Skills)	Trade Theory (Professional Knowledge)
Week 1	- Visit ITI workshops, computer labs, server rooms, store and administrative sections. - Demonstration of general safety precautions, personal safety, and handling delicate IT equipment. - Demonstration of first aid practice, artificial resuscitation, and response to electrical emergencies. - Identification of different types of electrical fuses, switches, connectors, and rating specifications.	- Punctuality, discipline, course structure, and methodology of ICTSM trade training. - General safety precautions, health, safety & environment (OSH&E) guidelines and 5S concept. - Electrical safety, electric shock prevention, emergency response, and first aid procedures. - Classification of electrical fuses, switches, cables, and connectors used in IT hardware.
Week 2	- Identification of analog and digital multimeters, panel meters, and measuring ranges. - Construct a simple electrical circuit using AC/DC power supply, lamp, switch, and fuse. - Measure AC/DC voltages and currents using digital multimeters. - Check continuity of fuses, switches, connecting cables, and PCB tracks using multimeter buzzer.	- Basic electrical concepts: Voltage, current, resistance, power, energy, and frequency. - Measuring instruments: Moving Coil (MC) vs Moving Iron (MI) meters, digital multimeters. - Closed circuits, open circuits, short circuits, and grounding/bonding significance. - Continuity testing and measuring techniques using analog and digital multimeters.
Week 3	- Identify different types of fixed and variable resistors from physical appearance. - Determine resistance value and tolerance using 4-band and 5-band color coding tables. - Measure resistance values using digital multimeter; verify Ohm's Law and Kirchhoff's Laws (KCL & KVL). - Practice soldering and de-soldering techniques on tag boards and general-purpose PCBs.	- Resistors: Carbon film, metal film, wire wound, cermet, and surface mount (SMD) resistors. - Resistor color coding, tolerance, power wattage ratings, and specific resistance. - Ohm's Law and Kirchhoff's Laws in series, parallel, and series-parallel networks. - Soft soldering: Soldering irons, solder composition, flux types, and de-soldering pump tools.
Week 4	- Experiment with temperature-dependent resistors (PTC & NTC thermistors) under heat. - Test Voltage Dependent Resistors (VDR / Varistors) and Light Dependent Resistors (LDR). - Test potentiometers, trimpots, and presets (linear vs logarithmic variations). - Identify different types of inductors, chokes, and measure inductance using an LCR meter.	- Non-linear resistors: PTC and NTC thermistors, temperature coefficients, and sensor uses. - VDR (Varistor) surge suppression action; LDR photo-conductive working principle. - Variable resistors: Wire-wound vs carbon potentiometers, linear vs logarithmic response. - Inductors: Self and mutual inductance, air-core, ferrite-core, and iron-core chokes.
Week 5	- Calculate and measure inductive reactance (XL) at different input AC signal frequencies. - Verify turns ratio, step-down operation, voltage regulation, and winding continuity of transformers. - Test iron losses and copper losses in power transformers; identify high-frequency pulse transformers.	- Inductive reactance (XL): Mathematical formula, phase angle, lead-lag concepts, and power factor. - Transformers: Mutual induction principle, turns ratio, step-up/step-down transformers. - Transformer losses (hysteresis, eddy current, copper losses) and efficiency determination. - High-frequency ferrite transformers and pulse transformers used in SMPS circuits.
Week 6	- Identify different types of capacitors (electrolytic, ceramic, polyester, tantalum, mica, SMD). - Test working condition of capacitors using multimeter; measure capacitance using RLC meter. - Measure capacitive reactance (XC) at various frequencies; verify series and parallel capacitor grouping. - Find resonance frequency of LC series and parallel tuned circuits using signal generator and oscilloscope.	- Capacitors: Dielectric materials, working principle, unit of capacitance, and breakdown voltage. - Capacitive reactance (XC): Frequency dependence, phase relationship between voltage and current. - Capacitors in series and parallel combinations: Calculation of equivalent capacitance. - Resonance circuits: Series and parallel resonance, resonant frequency formula, and Q-factor.
Week 7	- Identify terminals (Anode, Cathode) of P-N junction diodes, LEDs, and Schottky diodes. - Plot forward and reverse V-I characteristics of silicon and germanium semiconductor diodes. - Construct and test Half-Wave and Full-Wave center-tapped rectifier circuits on breadboard. - Construct Bridge Rectifier circuit with capacitive filter; measure DC output voltage and ripple factor.	- Semiconductor physics: Intrinsic and extrinsic semiconductors, P-type, N-type, and P-N junctions. - Diode characteristics: Forward bias, reverse bias, barrier potential, and reverse breakdown. - Rectifiers: Half-wave, full-wave, bridge rectifiers; ripple factor, efficiency, and PIV ratings. - Filter circuits: Capacitor input filter, inductor filter, LC and Pi filters.

Week No.	Trade Practical (Professional Skills)	Trade Theory (Professional Knowledge)
Week 8	- Plot reverse breakdown characteristics of Zener Diode; build simple Zener shunt voltage regulator. - Identify NPN and PNP bipolar junction transistors (BJT), pin configuration (Emitter, Base, Collector). - Quick test transistors using multimeter to detect open, shorted, and leaky junctions. - Wire and measure voltage gain of BJT amplifiers in Common Base (CB), Common Emitter (CE), and Common Collector (CC).	- Zener Diode: Reverse breakdown mechanism (Zener and Avalanche breakdown) and voltage regulation. - Bipolar Junction Transistors (BJT): Working principle of NPN and PNP transistors. - Transistor configurations: CB, CE, CC comparison, input/output characteristics, alpha and beta gains. - Transistor biasing methods: Fixed bias, collector feedback bias, voltage divider bias, and thermal runaway.
Week 9	- Construct and test JFET and MOSFET switching/amplifier circuits. - Construct and test a relaxation oscillator circuit using Uni-Junction Transistor (UJT). - Construct and test phase-control application circuits using Silicon Controlled Rectifier (SCR) and TRIAC/DIAC.	- Field Effect Transistors (FET): JFET and MOSFET (depletion/enhancement) working principles. - UJT: Construction, negative resistance region, and relaxation oscillator operation. - Thyristors: Operating principle of SCR, two-transistor analogy, gate triggering, and commutation. - Bidirectional thyristors: DIAC and TRIAC operating characteristics and AC phase control.
Week 10	- Assemble and test fixed DC voltage regulator circuits using 78xx (positive) and 79xx (negative) series ICs. - Assemble and test variable voltage regulator using LM317 IC with short-circuit protection. - Inspect parts of Uninterruptible Power Supply (UPS); practice switch-on/off sequences and backup testing.	- Linear DC power supplies: Unregulated vs regulated power supplies, line and load regulation. 3-Terminal fixed voltage regulator ICs (78xx / 79xx) and adjustable regulators (LM317). - Inverters and Converters: Working principles, square wave vs pure sine wave output. - UPS systems: Offline, online, and line-interactive UPS architectures and transfer switches.
Week 11	- Identify digital IC pinouts (7400, 7402, 7404, 7408, 7432, 7486) using IC data sheets. - Verify truth tables of basic and universal logic gates: AND, OR, NOT, NAND, NOR, XOR, XNOR. - Realize basic logic gates (AND, OR, NOT) using only universal NAND and NOR gates. - Verify Boolean algebra theorems, De Morgan's laws, and simplify logic expressions using Karnaugh Maps (K-Maps).	- Number systems: Binary, octal, decimal, hexadecimal systems, and inter-conversions. - Digital logic gates: Truth tables, symbols, Boolean algebra, and De Morgan's theorems. - Universal gates: NAND and NOR gates implementation; logic families (TTL vs CMOS). - Simplification of logic functions: SOP, POS forms, and 2-variable to 4-variable Karnaugh Maps.
Week 12	- Construct and test Half Adder, Full Adder, Half Subtractor, and Full Subtractor circuits using logic gates. - Verify 4-bit binary parallel adder IC 7483; test digital encoders, decoders, multiplexers, and demultiplexers. - Verify operation of RS, JK, D, and Master-Slave JK flip-flops; build asynchronous ripple counter.	- Combinational logic: Adders, subtractors, parallel adders, magnitude comparators. - Multiplexers (MUX) and Demultiplexers (DEMUX), BCD to 7-segment decoders. - Sequential logic: Latches vs Flip-Flops, clock triggering (edge and level triggering). - Digital counters (synchronous/asynchronous, up/down) and Shift Registers (SISO, SIPO, PISO, PIPO).
Week 13	- Inspect lead-acid storage batteries; prepare electrolyte, measure specific gravity with hydrometer. - Practice constant current and constant voltage battery charging; connect batteries in series and parallel. - Identify Cathode Ray Oscilloscope (CRO) and Digital Storage Oscilloscope (DSO) front panel controls. - Measure AC/DC peak-to-peak voltages, time periods, and frequencies using calibrated oscilloscope probes.	- Secondary storage cells: Lead-acid battery construction, chemical reactions, state of charge. - Maintenance-free (SMF), Lithium-ion, and Ni-Cad batteries: Specifications and charging cycles. - Oscilloscopes: Block diagram of CRO/DSO, CRT construction, horizontal & vertical deflection systems. - DSO features: Digital sampling rate, storage memory, auto-measurements, and probe attenuation.
Week 14	- Inspect and test electromechanical relays, reed relays, solid-state relays (SSR), and contact ratings. - Interface and control stepper motors using stepper motor driver circuits. - Test proximity sensors, infrared (IR) sensors, optical encoders, and thermal sensors. - Identify Intel and AMD microprocessor chips (Pentium, Core i3/i5/i7/i9, Ryzen) and pin architecture.	- Relays: Electromagnetic relays, coil resistance, NO/NC contacts, and relay driver circuits. - Stepper motors: Permanent magnet, variable reluctance, step angle, unipolar and bipolar drives. - Industrial sensors: Inductive, capacitive, optical sensors used in computer peripherals. - Microprocessor evolution: 8085/8086 basics, x86 architecture, multi-core processors, cache levels.

Week No.	Trade Practical (Professional Skills)	Trade Theory (Professional Knowledge)
Week 15	• Create, format, edit, and save document files using Word Processing software. • Adjust page setup, margins, paper size, orientation, line spacing, tabs, and paragraph indents. • Insert tables, images, shapes, header/footer, page numbers, and create multi-column newsletters. • Practice Mail Merge to generate personalized letters, mailing labels, and envelopes; print documents.	1. Word Processing: Features, document creation, editing, font formatting, and text alignments. 2. Page layouts, margins, headers, footers, footnotes, and standard document templates. 3. Table creation: Inserting rows/columns, merging, splitting, borders, and shading. 4. Mail Merge concepts: Data source, main document, merge fields, and batch printing.
Week 16	• Create and format worksheets using Spreadsheet software; enter labels, numbers, and dates. • Practice cell formatting, alignment, text wrapping, borders, number formats, and cell styles. • Apply arithmetic formulas and built-in functions: SUM, AVERAGE, COUNT, MIN, MAX, IF, VLOOKUP. • Generate column, bar, pie, and line charts; configure page breaks and print spreadsheet reports.	1. Spreadsheet software: Workbook, worksheet grid, cell addressing (relative, absolute, mixed). 2. Mathematical and statistical formulas, conditional logic functions, and cell referencing. 3. Data management: Sorting, auto-filtering, data validation, and chart types/customization. 4. Page setup options, print area selection, gridline printing, and exporting to PDF.
Week 17	• Practice PC workshop safety: Handling anti-static mats, wrist straps, and avoiding electrostatic discharge (ESD). • Identify desktop PC chassis/cabinets (ATX, Micro-ATX, Mini-ITX) and motherboard form factors. • Identify front and rear panel I/O ports: USB (2.0/3.0/Type-C), HDMI, DisplayPort, VGA, audio jacks, LAN port. • Identify internal PC cables: 24-pin ATX, 4/8-pin EPS, SATA power/data, front panel headers.	1. Computer classification, functional block diagram (CPU, ALU, Control Unit, Memory, I/O). 2. Electrostatic Discharge (ESD): Causes, damage to sensitive CMOS ICs, and ESD grounding precautions. 3. PC cabinets and form factors: Full tower, mid tower, mini tower, desktop, and all-in-one chassis. 4. External and internal I/O ports, communication bus standards, data transfer bandwidths.
Week 18	• Practice safe disassembly of desktop PC: Disconnect mains power, open side panels, disconnect internal cables. • Remove and install RAM memory modules into DIMM slots; observe key notch alignment and latches. • Remove and install mechanical Hard Disk Drives (3.5" HDD) and 2.5" Solid State Drives (SSD) into drive bays.	1. PC disassembly and assembly safety procedures: Proper tool selection, screw tray management. 2. RAM slots: Dual Inline Memory Module (DIMM), single-channel vs dual-channel memory architecture. 3. Storage device form factors: 3.5-inch HDD, 2.5-inch SATA SSD, mounting brackets, and vibration damping. 4. Data cable connections: SATA revision 1.0/2.0/3.0 cables, transfer speeds (up to 6 Gbps).
Week 19	• Remove and install M.2 NVMe SSD directly on motherboard M.2 slot; secure with standoff screw. • Remove and re-install dedicated PCI Express (PCIe x16) graphics card and add-on expansion cards. • Remove and reinstall CPU cooler heatsink fan assembly; clean and re-apply thermal conductive paste.	1. Solid State Drive technologies: NAND flash, SATA SSD vs NVMe PCIe M.2 SSD performance. 2. Expansion slots: PCI Express (PCIe x1, x4, x8, x16) architecture, lanes, and throughput. 3. Processor thermal management: Heatsinks, heat pipes, thermal grease/paste, and fan CFM ratings. 4. Case ventilation airflow dynamics: Intake fans, exhaust fans, positive vs negative air pressure.
Week 20	• Remove CPU from motherboard ZIF (Zero Insertion Force) socket / LGA socket; inspect socket pins. • Re-install CPU observing Pin 1 orientation triangle mark; secure retention arm and latch. • Remove and replace 3V CR2032 lithium CMOS coin battery; check battery voltage with multimeter.	1. CPU socket types: Pin Grid Array (PGA - ZIF) vs Land Grid Array (LGA) sockets. 2. Processor architecture: Clock speed, base/boost frequency, hyper-threading, and TDP ratings. 3. Real-Time Clock (RTC) and CMOS memory: Function, battery lifespan, symptoms of CMOS failure. 4. BIOS/UEFI settings retention, system date/time preservation, and clearing CMOS via jumper.
Week 21	• Remove motherboard completely from PC cabinet; inspect standoffs, screw mountings, and backplate. • Re-install motherboard into cabinet; connect front panel switch headers (Power SW, Reset, HDD LED, Power LED). • Reassemble desktop PC, verify all power and data connections, and perform first power-on self test (POST).	1. Motherboard mounting rules: Standoff positioning, avoiding short-circuit with cabinet metal chassis. 2. Front panel header pinouts: Polarity of LED indicators and non-polarized momentary push buttons. 3. Power-On Self-Test (POST): Sequence of hardware diagnostics executed by BIOS upon boot-up. 4. POST beep codes and numerical diagnostic codes on motherboard debug displays.

Week No.	Trade Practical (Professional Skills)	Trade Theory (Professional Knowledge)
Week 22	• Configure BIOS/UEFI setup: Set system date/time, verify detected CPU, RAM, and storage devices. • Configure boot sequence priority (USB drive, SSD, optical drive); toggle Secure Boot and TPM 2.0. • Create bootable USB installation media using Rufus / official media creation tools for Windows 10/11.	1. BIOS vs UEFI: Legacy BIOS limitations, UEFI advantages, GPT vs MBR partition table support. 2. Secure Boot, Trusted Platform Module (TPM 2.0), and modern operating system security criteria. 3. Bootable media creation methods: ISO images, FAT32 vs NTFS file systems, UEFI bootloaders. 4. Pre-installation hardware compatibility checks and minimum system requirements.
Week 23	• Perform step-by-step clean installation of Windows 10/11 OS on unallocated SSD storage. • Partition storage drive during setup: Create OS system drive (C:), recovery, and data partitions. • Complete Out-of-Box Experience (OOBE) setup: Regional settings, user account, password, privacy options.	1. Windows OS architecture: Kernel mode vs User mode, HAL, system services, and shell. 2. Partition schemes: Primary partitions, EFI system partition (ESP), MSR, and Windows recovery partition. 3. Windows OOBE configuration: Microsoft account vs Local offline user accounts. 4. File systems: Comparison between FAT32, exFAT, and NTFS (security, journaling, file size limits).
Week 24	• Create disk images and system partition backups using built-in Windows Backup and third-party tools. • Practice restoring Windows OS partition from bootable recovery image media. • Configure BitLocker drive encryption on local fixed data partitions and USB flash drives.	1. Disk imaging vs file backup: Sector-by-sector cloning, system image preservation. 2. Disaster recovery planning: Recovery drive creation, System Restore points, and recovery environments. 3. Data security: BitLocker drive encryption, TPM key storage, and recovery key management. 4. Virtualization concepts: Introduction to Virtual Machines (Hyper-V, VirtualBox) and benefits.
Week 25	• Setup Dual-Boot system on single computer: Install Ubuntu Linux alongside Windows OS. • Configure GRUB bootloader: Set default operating system and boot selection timeout. • Access Windows NTFS partitions and user data files from Linux OS desktop environment.	1. Multi-boot architecture: Windows Boot Manager (BCD) vs Grand Unified Bootloader (GRUB). 2. Linux root file system (/), swap space, and ext4 file system characteristics. 3. Partitioning strategies for dual-boot systems: Shrinking volumes and avoiding bootloader conflicts. 4. Software licensing: Proprietary commercial licenses, open-source (GPL), freeware, and copyleft.
Week 26	• Implement automated local backups using Windows File History to external backup drives. • Practice manual data backup and restore operations using command-line tools (XCOPY and ROBOCOPY). • Create an exact bit-by-bit clone of an existing hard drive to a new SSD using disk cloning utilities.	1. Backup strategies: Full backup, incremental backup, differential backup, and 3-2-1 backup rule. 2. Removable storage devices: External USB HDDs, SSDs, flash pen drives, and memory cards. 3. Command-line backup utilities: Syntax, switches, file attributes, and automated batch scripts. 4. Disk cloning: Cloning vs image backup, target drive capacity, and sector alignment for SSDs.
Week 27	• Test RAM memory for hardware faults using Windows Memory Diagnostic and MemTest86 tools. • Check hard drives for bad sectors and filesystem integrity using CHKDSK command utility. • Monitor HDD/SSD health, temperature, and S.M.A.R.T. parameters using diagnostic utilities.	1. Hardware fault diagnostics: System freezes, Blue Screen of Death (BSOD), and memory errors. 2. Hard drive failure modes: Mechanical head crash, motor seizure, read/write errors, and bad sectors. 3. Self-Monitoring, Analysis and Reporting Technology (S.M.A.R.T.): Attributes and threshold warnings. 4. Preventative cleaning: Compressed air, anti-static brushes, and thermal paste reapplication.
Week 28	• Manage disk storage using Disk Management utility: Initialize disks, create simple volumes, format drives. • Shrink, extend, and delete partitions; assign and change drive letters and paths. • Implement software RAID configurations (RAID 0 striping, RAID 1 mirroring) using dynamic disks in Windows.	1. Storage partitioning: Basic disks vs Dynamic disks, MBR (up to 2TB) vs GPT (above 2TB). 2. Redundant Array of Independent Disks (RAID): Levels 0, 1, 5, 10; performance vs fault tolerance. 3. Disk formatting: Quick format vs Full format, allocation unit size (cluster size), and disk wipe. 4. File recovery techniques: Undeleting files from FAT/NTFS partitions, recovering corrupted data.

Week No.	Trade Practical (Professional Skills)	Trade Theory (Professional Knowledge)
Week 29	• Scan and remove malware, trojans, adware, and spyware using Windows Defender and anti-virus utilities. • Troubleshoot web browser hijack issues: Clear malicious extensions, reset default search engine and homepage. • Fix Windows Master Boot Record (MBR) and rebuild BCD store using BOOTREC commands in Windows RE.	1. Malware classification: Viruses, worms, trojans, ransomware, rootkits, spyware, and keyloggers. 2. Anti-virus vs Anti-spyware software: Signature databases, heuristic scanning, and real-time shields. 3. Master Boot Record (MBR) structure: Partition table, boot signature (55AA), and BCD store corruption. 4. Windows Recovery Environment (WinRE): Startup Repair, Command Prompt, and recovery commands.
Week 30	• Use Task Manager to monitor CPU, memory, disk, network utilization, and manage startup programs. • Analyze system errors, warnings, and hardware crash events using Windows Event Viewer. • Create and configure local Standard and Administrator user accounts; set User Account Control (UAC) levels. • Configure folder redirection: Relocate personal folders (Documents, Downloads) to a secondary data drive.	1. Windows system utilities: Task Manager, Resource Monitor, Performance Monitor, and Event Viewer. 2. User account management: User privileges, permissions, group accounts, and parental controls. 3. User Account Control (UAC): Security purpose, elevation prompts, and preventing unauthorized changes. 4. Windows services: Starting, stopping, disabling background services, and system optimization.
Week 31	• Check current operating system version, build number, and edition using WINVER and System Information. • Perform Windows Update; view update history and uninstall problematic quality updates. • Download and install official device drivers (chipset, audio, graphics, LAN, Wi-Fi) from manufacturer portals. • Use Device Manager to inspect hardware status, update drivers, rollback drivers, and disable devices.	1. Operating system servicing: Feature updates vs Quality updates, Service Packs, and patches. 2. Device drivers: Role of drivers in hardware abstraction, digitally signed WHQL drivers. 3. Device Manager: Hardware tree, identifying unknown devices (Hardware ID), error codes (Code 10, 43). 4. Driver rollback mechanism: Preserving system stability after incompatible driver installations.
Week 32	• Scan and repair corrupted Windows system files using System File Checker (SFC) and DISM command utilities. • Clean junk files, temporary folders (%temp%), and system cache using Disk Cleanup and Storage Sense. • Clear browser cache, cookies, and history in Chrome, Edge, and Firefox; create Linux Live USB drive. • Configure Microsoft Outlook email account (IMAP/POP3), backup Outlook PST files, and restore emails.	1. Windows system integrity tools: SFC (/sfcnow) and Deployment Image Servicing and Management (DISM). 2. Disk space management: Temporary files, Windows old installations, recycle bin, and cache cleaning. 3. Web browser architecture: Cookies, browser cache, session data, and privacy management. 4. Email client configuration: POP3, IMAP, SMTP protocol ports, Outlook PST vs OST data files.
Week 33	• Identify laptop external ports, display panel, touchpad, keyboard, battery pack, and AC power adapter. • Measure laptop AC adapter output DC voltage and charging current with digital multimeter. • Practice safe disassembly of laptop PC: Remove base enclosure, disconnect battery, heatsink, and fan. • Clean laptop cooling fan, unclog heatsink exhaust fins, and replace dried thermal paste on CPU/GPU.	1. Laptop vs Desktop PC architecture: Compact packaging, power saving states, mobile processors. 2. Laptop power delivery: AC-DC power adapter ratings, lithium-ion battery packs, charging controller circuits. 3. Laptop cooling systems: Centrifugal blowers, copper heat pipes, thermal pads, and passive cooling. 4. Laptop disassembly tools: Spudgers, precision screwdriver bits, anti-static tweezers, suction cups.
Week 34	• Upgrade laptop SO-DIMM RAM memory modules and replace 2.5" HDD with 2.5" SATA / M.2 NVMe SSD. • Replace laptop keyboard, touchpad module, internal Wi-Fi/Bluetooth WLAN card, and display panel. • Troubleshoot common laptop faults: Laptop not powering on, no display, battery not charging, overheating.	1. Laptop memory: Small Outline Dual Inline Memory Module (SO-DIMM) types, pins, and voltages. 2. Laptop internal expandability: M.2 slots (Key B, Key M), Mini PCIe slots, and internal antennas. 3. Common laptop failure symptoms: Power jack damage, broken hinges, display backlight failure, CMOS reset. 4. Laptop diagnostic procedures: Power button signal, charging LED status, and external monitor testing.
Week 35	• Remove Switch Mode Power Supply (SMPS) from desktop PC cabinet; inspect internal cooling fan. • Identify SMPS output connectors: 24-pin ATX, 4/8-pin CPU, 6/8-pin PCIe, 15-pin SATA, 4-pin Molex. • Identify DC output voltage levels using standard wire color coding (+12V, -12V, +5V, -5V, +3.3V, +5VSB). • Test SMPS standalone operation by jumpering PS_ON (green wire) to COM ground (black wire).	1. Switch Mode Power Supply (SMPS): Working principle, high-frequency switching, efficiency over linear supplies. 2. SMPS form factors and ratings: ATX12V standard, wattage ratings (450W to 1000W+), 80-Plus certifications. 3. ATX cable wire color codes: Yellow (+12V), Red (+5V), Orange (+3.3V), Blue (-12V), Purple (+5VSB), Green (PS_ON). 4. Power Good (PG / grey wire) signal: Significance in motherboard reset and startup stabilization.

Week No.	Trade Practical (Professional Skills)	Trade Theory (Professional Knowledge)
Week 36	• Measure all DC output voltage lines of SMPS under load using digital multimeter and dedicated SMPS tester. • Troubleshoot SMPS faults: Blown mains fuse, swollen filter capacitors, noisy cooling fan, voltage drop. • Inspect motherboard using PCI / PCIe POST debug card; record hex error codes and identify faulty subsystems.	1. Voltage tolerance limits in ATX power supplies (+/-5% on positive rails, +/-10% on negative rails). 2. Common SMPS defects: Power surges, capacitor bulging, shorted switching transistors, open optocouplers. 3. Hardware diagnostic tools: SMPS testers, PCI/PCIe debug card indicators, logic probes. 4. Safety rules when servicing power supplies: High voltage reservoir capacitors discharge hazard.
Week 37	• Identify motherboard components: Chipset (Northbridge/Southbridge or unified PCH), CPU socket, VRM section. • Identify memory slots, PCIe slots, SATA ports, M.2 slots, Super I/O chip, audio codec, and Gigabit LAN IC. • Check motherboard Voltage Regulator Module (VRM): MOSFETs, chokes, and solid-state capacitors. • Inspect and identify Trusted Platform Module (TPM 2.0) chip and front panel audio/USB headers.	1. Motherboard architecture: Chipset functionality, direct CPU PCIe lanes vs PCH chipset lanes. 2. Voltage Regulator Module (VRM): Multi-phase buck converter, regulating 12V to CPU VCore voltages. 3. Motherboard buses: System bus, DMI link, PCIe bus speeds, and bandwidth generations (Gen 3/4/5). 4. Integrated onboard controllers: Audio codecs, Realtek/Intel Ethernet PHY, and Super I/O monitoring.
Week 38	• Identify motherboard jumpers: Clear CMOS jumper (CLRTC), chassis intrusion, and audio select jumpers. • Reset forgotten BIOS supervisor/user passwords by jumper shorting and CMOS battery pull method. • Update motherboard BIOS/UEFI firmware using manufacturer flash utility from USB drive (EZ Flash/Q-Flash). • Identify RAM memory types: DDR3, DDR4, DDR5 modules, pin count, operating voltages, and memory timing (CL).	1. BIOS/UEFI firmware update: Importance, fixing hardware bugs, adding CPU microcode, flashing precautions. 2. CMOS configuration setup: Boot order, XMP/DOCP memory profiles, virtualization (VT-x/AMD-V) enabling. 3. Memory hierarchy: CPU registers, L1/L2/L3 cache, primary RAM, virtual memory (paging file). 4. DDR memory generations: DDR3 (240-pin, 1.5V), DDR4 (288-pin, 1.2V), DDR5 (288-pin, 1.1V with on-die ECC).
Week 39	• On the Job Training (OJT) / Group Project	1. On the Job Training (OJT) / Group Project
Week 40	• On the Job Training (OJT) / Group Project	1. On the Job Training (OJT) / Group Project
Week 41	• On the Job Training (OJT) / Group Project	1. On the Job Training (OJT) / Group Project
Week 42	• On the Job Training (OJT) / Group Project	1. On the Job Training (OJT) / Group Project

APPROVAL & SIGNATURES

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Sign of Instructor	Sign of Group Instructor (GI)	Sign of Superintendent / Principal