

CRAFTSMEN TRAINING SCHEME (CTS)

ANNUAL INSTRUCTIONAL PLAN BREAKUP (42 WEEKS)

SECOND YEAR — INFORMATION & COMMUNICATION TECHNOLOGY SYSTEM MAINTENANCE (ICTSM)

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

(Curriculum as per DGT / CSTARI Guidelines for ICTSM CTS Scheme - 2nd Year)

Week No.	Trade Practical (Professional Skills)	Trade Theory (Professional Knowledge)
Week 1	- Perform clean installation of Linux operating system (Ubuntu / Red Hat) on PC. - Practice basic Linux terminal commands: pwd, ls, cd, mkdir, rmdir, cp, mv, rm, cat, more, less. - Practice text editing in Linux using VI and Nano editors; create and edit configuration files. - Manage file permissions and ownership using chmod, chown, and chgrp commands.	- Introduction to UNIX and Linux operating systems: Kernel architecture, shell, and file hierarchy (/root, /home, /etc, /bin). - Linux file system concepts: Inodes, hard links, soft links, and standard directory tree. - User security: File access permissions (Read, Write, Execute), octal representation, and umask. - VI editor modes: Command mode, insert mode, ex mode, and essential cursor navigation.
Week 2	- Manage Linux user accounts: useradd, usermod, userdel, groupadd, and passwd. - Practice Linux filter and pipeline commands: grep, awk, sed, sort, cut, head, tail, and wc. - Monitor running processes using ps, top, kill, pkill, and nice commands; automate tasks with cron jobs. - Write and execute basic bash shell scripts using variables, conditional statements, and loops.	- User and group administration in Linux: /etc/passwd, /etc/shadow, and /etc/group files. - Linux pipes, standard input/output redirection (<, >, >>, 2>), and filter commands. - Process management: Process states, PID, background jobs (&), foreground jobs (fg), and signals. - Introduction to Shell Scripting: Shebang (#bin/bash), environment variables, and execution rules.
Week 3	- Identify different types of computer printers: Dot Matrix (DMP), Inkjet, Laser, and Line printers. - Inspect front panel controls, status LEDs, interface ports (USB, Parallel IEEE 1284, Ethernet). - Install printer device drivers on Windows/Linux; print test pages and perform hardware self-tests. - Replace ribbon cassette in Dot Matrix Printer (DMP); refill ribbon tape and lubricate carriage rails.	- Classification of computer printers: Impact vs Non-impact printing technologies. - Dot Matrix Printer (DMP): Working principle, 9-pin and 24-pin print heads, and character formation. - Printer interfaces: Parallel port (Centronics), USB, and network print interfaces. - Preventive maintenance of DMP: Ribbon drive mechanisms, head overheating, and pin testing.
Week 4	- Remove, clean, and re-install print head assembly of Dot Matrix Printer; test coil continuity. - Service carriage drive assembly: Inspect carriage belt, stepper motor, paper feed rollers, and platen. - Trace and inspect printer switch-mode power supply (SMPS) and logic control board. - Troubleshoot common DMP faults: Faint print, paper jam, carriage lock, and missing print dots.	- Print head construction: Solenoid coils, print wires/needles, return springs, and jewel guides. - Stepper motors in printers: Line feed stepper motor, carriage stepper motor, and timing belts. - DMP logic board: CPU, ROM/EPROM, driver transistors, and sensor feedback circuits. - Common mechanical and electrical faults in impact printers and diagnostic procedures.
Week 5	- Study working mechanisms of Laser Printers: Inspect toner cartridge, OPC drum, and laser scanning unit. - Remove, disassemble, refill toner powder, clean waste toner hopper, and replace drum/blade in cartridge. - Inspect, clean, and replace primary charge roller (PCR), magnetic roller, and doctor blade. - Service fuser unit: Replace damaged Teflon sleeve/fuser film, heating ceramic element, and pressure roller.	- Laser Printer electrophotographic process: 6 stages (Charging, Exposing, Developing, Transferring, Fusing, Cleaning). - Toner cartridge components: Organic Photoconductor (OPC) drum, magnetic roller, wipe blade, and toner composition. - Laser scanner assembly: Semiconductor laser diode, polygon mirror, scanner motor, and focusing lenses. - Fusing mechanism: Halogen lamp/ceramic heater, thermistor sensor, thermal fuse, and heat transfer.
Week 6	- Inspect Inkjet / Deskjet printer: Ink tanks/cartridges, timing strip, encoder disk, and purge unit. - Clean clogged print heads using software utility cycles and manual isopropyl alcohol flushing. - Install and configure flatbed scanners, Barcode scanners, and Multifunction Devices (MFDs). - Configure Automatic Document Feeder (ADF), test Optical Character Recognition (OCR), and service passbook printers.	- Inkjet technologies: Thermal bubble (piezoelectric vs bubble jet) print head principles. - Continuous Ink Supply Systems (CISS) and ink cartridge chip resetters. - Scanners: Charge-Coupled Device (CCD) vs Contact Image Sensor (CIS), optical resolution (DPI). - Multifunction Printers (MFD): Scanner, copier, printer integration, and network scan protocols.
Week 7	- Identify computer monitors: CRT, LCD, LED, and OLED displays; inspect video input ports (VGA, DVI, HDMI, DP). - Identify specifications of dedicated Display Driver Cards: GPU chipset, VRAM type, PCIe interface. - Remove and install dedicated PCIe graphics card; install manufacturer display driver software. - Configure display resolution, refresh rate, aspect ratio, multiple monitor setup, and color calibration.	- Display monitor technologies: CCFL-backlit LCD vs LED-backlit LCD, IPS, VA, and TN panels. - Video standards: VGA, SVGA, XGA, Full HD, 4K, refresh rates (60Hz to 144Hz+), and response times. - Graphics processing units (GPU): Video RAM (GDDR5/GDDR6), frame buffers, and graphics pipelines. - Digital video interfaces: HDMI (ARC/eARC), DisplayPort (DP), and HDCP copy protection.

Week No.	Trade Practical (Professional Skills)	Trade Theory (Professional Knowledge)
Week 8	- Inspect internal power supply board and logic inverter board of LCD/LED monitors. - Troubleshoot display faults: Dead monitor (blown fuse/bulged capacitors), no display, dim screen, vertical lines. - Setup, align, connect, and calibrate digital LCD/LED multimedia projectors. - Configure projection throw distance, optical focus, keystone correction, and replace projector lamp modules.	- LCD/LED monitor internal circuits: Power board, scaler board, LED driver, and timing controller (T-Con). - Inverter circuits and LED backlight driver circuits: Over-voltage and open-LED protection. - Multimedia Projectors: 3LCD vs Digital Light Processing (DLP) projection systems, lumens brightness. - Common projector faults: Overheating, lamp life counters, color wheel failure, and dust filters.
Week 9	- Identify specifications of PC sound cards (onboard audio vs dedicated PCIe sound cards). - Remove, install, and configure dedicated sound card; connect audio headers to front panel jacks. - Connect multichannel speaker systems (2.1, 5.1), microphones, and calibrate audio properties. - Test audio sampling rate, bit depth, equalizer settings, audio loopback, and line-in recording.	- PC Audio architecture: Digital-to-Analog Converters (DAC), Analog-to-Digital Converters (ADC). - Audio channels (stereo, 5.1/7.1 surround sound), sampling frequency (44.1 kHz, 48 kHz, 96 kHz). - Audio codecs (Realtek, Creative), signal-to-noise ratio (SNR), and high-definition audio standards. - Troubleshooting audio problems: Driver conflicts, muted channels, distorted sound, and ground hum.
Week 10	- Identify specifications and types of Uninterruptible Power Supply (UPS): Offline, Line-Interactive, Online. - Measure UPS input/output voltages, charging current, and battery terminal voltages under loaded conditions. - Calculate backup duration based on battery Ah rating and inverter efficiency. - Trace UPS inverter circuits, transfer relays, PWM controller ICs, and replace defective sealed lead-acid batteries.	- Uninterruptible Power Supply (UPS): Offline (Standby), Line-Interactive (AVR), and Double Conversion Online UPS. - Static transfer switch operation, transfer time (milliseconds), and pure sine wave inverter circuits. - Battery sizing calculations: Load power (Watts) vs VA rating, battery bank Ampere-hour (Ah) formulas. - Common UPS faults: Battery failure, continuous beeping, overload trips, and inverter MOSFET breakdown.
Week 11	- Install and configure external/internal Modems, 4G/5G USB dongles, and Optical Network Units (ONU / ONT). - Access ONU web configuration interface: Configure WAN settings, PPPoE credentials, and Wi-Fi SSID/passwords. - Inspect and install add-on cards: PCIe USB 3.0 expansion cards, Gigabit Ethernet NICs, and TV tuner cards. - Resolve hardware resource conflicts: Check and assign Interrupt Requests (IRQ), I/O addresses, and DMA channels.	- Data communication devices: Modems, modulation techniques (QAM, FSK), broadband DSL, and Optical Fiber ONUs. - System resources: Interrupt Request (IRQ) lines, Direct Memory Access (DMA) channels, and memory-mapped I/O. - Plug and Play (PnP) architecture: Resource allocation, device enumeration, and arbitration by OS. - Add-on interface standards: PCIe slots, Thunderbolt, USB 3.2, and expansion card bandwidths.
Week 12	- Diagnose startup POST error codes: Decode POST audible beep codes (Award, AMI, Phoenix BIOS). - Connect PCI/PCIe motherboard diagnostic debug cards; analyze 2-digit hex error codes. - Troubleshoot device port failures: Serial COM ports, parallel LPT ports, and USB controller failures. - Resolve Windows startup BSOD errors: Inspect mini-dump files, recover from driver/registry corruption.	- Power-On Self-Test (POST) diagnostic sequences: CPU initialization, RAM test, video check, boot check. - BIOS beep code patterns: Continuous beeps, short/long beeps, and their hardware fault indications. - PCI/PCIe POST debug cards: Reading port 80h hex codes, identifying halt checkpoints. - Windows boot troubleshooting: Blue Screen of Death (BSOD) stop codes (IRQL_NOT_LESS_OR_EQUAL, PAGE_FAULT).
Week 13	- Perform hardware benchmarking and stability testing using PC diagnostic tools (AIDA64, CPU-Z, HWMonitor). - Test CPU and GPU thermal throttling under full synthetic stress loads. - Troubleshoot computer keyboard faults: Sticky keys, broken membranes, broken cables, and USB interface errors. - Troubleshoot optical/laser mouse faults: Erratic cursor movement, dirty sensor lenses, and microswitch failures.	- Preventive and corrective maintenance strategies: Active maintenance vs passive maintenance schedules. - PC benchmarking: Measuring CPU floating-point performance, GPU render rates, and memory bandwidth. - Keyboard internal architecture: Membrane matrix, mechanical switches, keyboard microcontroller, and scan codes. - Optical mouse architecture: LED/laser illumination, digital image sensor, DSP processor, and USB polling rate.
Week 14	- Troubleshoot mechanical Hard Disk Drives: Identify clicking noises, spindle motor seizure, and PCB damage. - Swap identical logic boards (PCBs) on hard drives and transfer BIOS ROM chips for data recovery. - Test and troubleshoot Solid State Drives (SSDs): Firmware corruption, read-only lock, and bad NAND blocks. - Troubleshoot RAM memory modules: Clean gold contacts with pencil eraser, test single/dual-channel configurations.	- Hard disk failure analysis: Head crash, spindle motor bearing wear, pre-amplifier failure on actuator. - Data recovery fundamentals: Clean room environment requirements, board swapping, and firmware restoration. - SSD failure modes: Wear-leveling exhaustion, controller overheating, and firmware bricking. - RAM memory diagnostic techniques: Intermittent memory errors, parity errors, and memory slot oxidation.

Week No.	Trade Practical (Professional Skills)	Trade Theory (Professional Knowledge)
Week 15	- Perform BIOS/UEFI firmware recovery and flashing on corrupt motherboards using manufacturer recovery utilities. - Reset CMOS setup to factory defaults: Jumper shorting (CLRTC), battery pull, and BIOS password removal. - Troubleshoot processor overheating: Clean heatsink fins, reapply thermal grease, and verify fan tachometer RPM. - Update operating system software and application packages to latest secure patch releases.	- BIOS/UEFI firmware structure: Flash ROM chips (SPI flash), dual BIOS systems, and BIOS recovery. - CMOS setup parameters: Advanced voltage settings, XMP profiles, CPU multiplier, and fan speed curves. - Processor thermal protection mechanisms: Digital Thermal Sensors (DTS), thermal throttling, and emergency thermal shutdown. - System software patching: Critical security updates, hotfixes, cumulative updates, and vulnerability management.
Week 16	- Perform preventive maintenance on PC chassis: Clean dust with ESD-safe blower, organize cable bundles. - Inspect and clean power supply exhaust fans, case intake filters, and processor heatsinks. - Prepare a comprehensive PC preventive maintenance log sheet and hardware health report.	- Environmental hazards to computer systems: Dust accumulation, humidity, corrosive vapors, and heat. - Airflow optimization in computer chassis: Positive air pressure vs negative air pressure dynamics. - Preventive maintenance scheduling: Daily, weekly, monthly, and quarterly IT infrastructure checklists. - Electrical power safety: Surge protectors, line conditioners, and earthing voltage verification.
Week 17	- Disassemble tablet computers and smart devices: Remove rear cover using suction cups and plastic prying tools. - Disconnect internal battery connector safely; inspect internal motherboard, flex cables, and antennas. - Test internal lithium-polymer battery voltage, charging port, and power button flex cable with multimeter. - Replace damaged touchscreen digitizer / LCD assembly, battery pack, and USB charging sub-board.	- Smart device hardware architecture: System-on-Chip (SoC - Snapdragon, MediaTek, Apple Silicon). - Lithium-polymer batteries: Chemistry, protection circuit module (PCM), charging cycle lifespan, and safety hazards. - Mobile display technologies: Capacitive touchscreens, AMOLED/OLED displays, and optical bonding. - Precision disassembly tools: Heat guns, suction clamps, spudgers, and ESD tweezers.
Week 18	- Troubleshoot smart devices: Device not turning on, boot-looping, battery draining fast, touch unresponsive. - Backup mobile user data: Contacts, photos, and files to cloud storage and local computer. - Perform device firmware flashing: Download stock ROMs and flash using manufacturer flash tools (Odin, SP Flash Tool). - Perform hardware hard reset, wipe cache partition, and recover from software bricking states.	- Mobile operating systems: Android architecture (Linux kernel, HAL, ART runtime) and Apple iOS architecture. - Android partitions: /boot, /recovery, /system, /vendor, /data, /cache, and bootloader states. - Flashing procedures: Stock firmware vs custom ROMs, flashing tools, and USB VCOM drivers. - Device recovery: Fastboot mode, recovery mode, hard reset, and factory reset protection (FRP).
Week 19	- Configure web browsers: Set homepage, privacy settings, cookie policies, pop-up blockers, and manage extensions. - Practice advanced web searching using search operators (quotes, site:, filetype:, intitle:) on major search engines. - Configure desktop and mobile email accounts: POP3, IMAP, SMTP, configure SSL/TLS port numbers. - Manage cloud storage services (Google Drive, OneDrive, Dropbox): Sync folders, file sharing links, and permission levels.	- World Wide Web (WWW) architecture: Client-server web protocols, HTTP, HTTPS, and TLS encryption. - Web browsers: Rendering engines (Blink, Gecko), browser cache, cookies, and privacy controls. - Electronic Mail protocols: POP3 (port 995), IMAP (port 993), SMTP (port 587/465), and spam filtering. - Cloud computing models: IaaS, PaaS, SaaS; public, private, and hybrid cloud storage architectures.
Week 20	- Identify computer networking hardware: Network Interface Cards (NIC), Hubs, Unmanaged Switches, Managed Switches. - Identify network transmission media: Unshielded Twisted Pair (UTP), Shielded Twisted Pair (STP), and Coaxial cables. - Inspect Fiber Optic cables: Single-mode vs Multi-mode fibers, fiber connectors (SC, LC, ST), and media converters. - Familiarize with network topologies: Physical Star, Bus, Ring, Mesh, and Tree topologies.	- Computer Networks: Definition, advantages, Local Area Networks (LAN), MAN, and Wide Area Networks (WAN). - Network topologies: Comparison of Star, Mesh, Bus, and Ring topologies (reliability, cabling cost, fault tolerance). - Transmission media: UTP categories (Cat5e, Cat6, Cat6a, Cat7), bandwidths, and maximum transmission distances. - Fiber optic communication: Total internal reflection, attenuation, single-mode vs multi-mode fiber characteristics.
Week 21	- Practice cable preparation: Strip outer jacket of Cat6 UTP cable without nicking internal copper pairs. - Practice crimping RJ-45 modular plugs according to TIA/EIA 568A and TIA/EIA 568B color coding standards. - Fabricate Straight-through Ethernet patch cables and Crossover Ethernet cables. - Test continuity, wire map, and pinout of crimped cables using digital LAN cable tester.	- TIA/EIA 568A and 568B wiring standards: Pinout color codes for 8-conductor twisted pair cables. - Straight-through cables vs Crossover cables: Applications in connecting DTE and DCE network devices. - Cable preparation tools: Cable jacket strippers, RJ-45 ratcheting crimping tools, and flush cutters. - LAN cable testing: Detecting open circuits, short circuits, crossed pairs, reversed pairs, and split pairs.

Week No.	Trade Practical (Professional Skills)	Trade Theory (Professional Knowledge)
Week 22	- Practice punching UTP cables into Information Outlet (IO) Keystone jacks using 110/Krone punch-down tool. - Terminate multi-pair UTP network cables onto 24-port rack-mount UTP Patch Panels. - Mount network equipment rack: Install power distribution unit (PDU), cable management horizontal bar, and patch panel. - Interconnect patch panel ports to network switch using factory-molded patch cords; test end-to-end links.	- Structured Cabling System: Horizontal cabling, backbone cabling, work area outlets, and telecommunications rooms. - Punch-down blocks: 110-type and Krone-type insulation displacement connectors (IDC). - Patch panels and Keystone IO boxes: Purpose, labeling standards (ANSI/TIA-606-B), and neat wire dressing. - Equipment racks: 19-inch standard server racks (units - 'U' height), cable managers, and grounding racks.
Week 23	- Study and verify the 7 layers of the ISO/OSI Reference Model in computer communications. - Map real-world networking devices and protocols to corresponding OSI model layers. - Compare the OSI Reference Model with the practical 4-layer TCP/IP Protocol Architecture.	- Open Systems Interconnection (OSI) 7-layer model: Physical, Data Link, Network, Transport, Session, Presentation, Application. - Data encapsulation and de-encapsulation: Bits, Frames, Packets, Segments, and Application Data. - Layer-2 vs Layer-3 switching: MAC addresses (physical) vs IP addresses (logical). - TCP/IP model comparison: Network Access, Internet, Transport, and Application layers.
Week 24	- Build a Peer-to-Peer local area network connecting two computers directly using Ethernet patch cable. - Build an unmanaged Star topology LAN connecting multiple PCs via an Ethernet switch. - Configure static IPv4 addresses, subnet masks, and workgroup names on each workstation. - Verify network connectivity between all connected computers using the PING command.	- Peer-to-Peer networks vs Client-Server domain networks: Architecture, management, and scalability. - Ethernet technology: CSMA/CD access method, collision domains, and broadcast domains. - Workgroups in Windows networking: Workgroup name assignment, computer names, and network discovery. - Packet Internet Groper (PING): ICMP echo request/reply mechanism, round-trip time (RTT), and packet loss.
Week 25	- Install and configure Wireless Access Points (WAP) and Wi-Fi Routers. - Configure Wi-Fi radio parameters: 2.4 GHz vs 5 GHz frequency bands, channel bandwidths (20/40/80 MHz). - Connect laptop PCs, tablets, and smartphones to wireless network; verify wireless signal strength. - Connect computing devices wirelessly using Bluetooth PAN (Personal Area Network).	- Wireless Local Area Networks (WLAN): IEEE 802.11 standards (802.11b/g/n/ac/ax - Wi-Fi 4, 5, 6). - Dual-band wireless operation: 2.4 GHz (longer range, more interference) vs 5 GHz (faster speed, shorter range). - Wireless Access Points (WAP) vs Wireless Routers: Operating modes (AP, client, repeater, bridge). - Bluetooth technology: Frequency hopping, Bluetooth versions, pairing keys, and PAN profile.
Week 26	- Access managed switch Command Line Interface (CLI) via serial console cable and terminal emulator (PuTTY). - Configure basic switch parameters: Hostname, administrative passwords, banner messages, and management IP. - Inspect Spanning Tree Protocol (STP) operation on redundant switch links; observe blocking and forwarding ports. - Configure Power over Ethernet (PoE) ports and connect PoE-powered devices (IP phones, Access Points).	- Managed Ethernet switches: Configuration access methods (Console port, Telnet, SSH, Web GUI). - Switching loops: Broadcast storms, multiple frame copies, and MAC database instability. - Spanning Tree Protocol (STP - IEEE 802.1D): Root bridge election, root ports, designated ports, and blocking ports. - Power over Ethernet (PoE - IEEE 802.3af/at/bt): PoE power budgets, voltage levels, and powered devices (PD).
Week 27	- Connect and configure broadband wireless routers for sharing internet connection in a laboratory. - Configure WAN port with Static IP, Dynamic DHCP, or PPPoE credentials. - Configure Network Address Translation (NAT) and Port Forwarding rules for internal servers. - Verify internet connectivity across all LAN clients; test bandwidth speed using online speed test tools.	- Broadband Routers: Routing functions, WAN vs LAN interfaces, and gateway IP address. - Network Address Translation (NAT): Static NAT, Dynamic NAT, and Port Address Translation (PAT). - Internet Service Provider (ISP) connection types: Fiber-to-the-Home (FTTH), cable broadband, and leased lines. - Dynamic Host Configuration on routers: Distributing IP pools, lease times, and DNS server IPs.
Week 28	- Practice IPv4 addressing: Class A, Class B, Class C address ranges, default subnet masks, and private IP blocks. - Calculate custom subnet masks and assign usable host IP ranges using Variable Length Subnet Masking (VLSM). - Overview of IPv6 addressing: 128-bit hexadecimal notation, link-local, and global unicast addresses. - Configure TCP/IP properties (IPv4 and IPv6) on Windows and Linux workstations.	- IPv4 addressing: 32-bit address structure, network ID, host ID, and subnet masks. - Classful IP addressing (Classes A, B, C, D, E) vs Classless Inter-Domain Routing (CIDR). - Private IP address blocks as per RFC 1918 (10.0.0.0/8, 172.16.0.0/12, 192.168.0.0/16) vs Public IPs. - IPv6 advantages over IPv4: Huge address space, auto-configuration (SLAAC), and elimination of NAT.

Week No.	Trade Practical (Professional Skills)	Trade Theory (Professional Knowledge)
Week 29	- Practice network troubleshooting commands: IPCONFIG /all, /release, /renew, and /flushdns. - Trace network routing hops to remote hosts using TRACERT and PATHPING command utilities. - Query Domain Name System records using NSLOOKUP; inspect active TCP/UDP connections with NETSTAT. - Inspect and modify local ARP cache tables using ARP -a and ARP -d commands.	- TCP/IP diagnostic suite: Functional roles of IPCONFIG, PING, TRACERT, and PATHPING. - Address Resolution Protocol (ARP): Mapping IP addresses to physical MAC addresses and ARP poisoning. - Domain Name System (DNS): Hierarchical namespace, root servers, TLDs, A records, CNAME, and MX records. - Transport protocols: Transmission Control Protocol (TCP - connection-oriented) vs User Datagram Protocol (UDP).
Week 30	- Create and configure Virtual LANs (VLAN) on managed Layer-2 switches using CLI. - Assign switch access ports to specific VLANs (e.g., VLAN 10 for Admin, VLAN 20 for Labs). - Configure 802.1Q VLAN Trunk ports between switches; verify broadcast isolation between different VLANs. - Test Inter-VLAN routing using a Layer-3 switch or router-on-a-stick configuration.	- Virtual Local Area Networks (VLAN - IEEE 802.1Q): Purpose, security, and broadcast containment. - VLAN membership: Static port-based VLANs vs dynamic MAC-based VLANs. - VLAN trunking: 802.1Q frame tagging, Native VLAN, and trunk encapsulation. - Inter-VLAN routing: Role of Layer-3 switches, Virtual Interfaces (SVI), and external routers.
Week 31	- Install and configure a Dynamic Host Configuration Protocol (DHCP) server on Windows Server / Router. - Configure DHCP address pools, exclusion ranges, default gateway, DNS server options, and lease duration. - Configure DHCP Reservations (MAC address binding) for network printers and servers. - Connect clients to network and verify automatic dynamic IP address leasing and renewal.	- Dynamic Host Configuration Protocol (DHCP): DORA process (Discover, Offer, Request, Acknowledge). - DHCP configuration parameters: Scope, address pool, exclusions, lease time, and server options. - Static IP vs DHCP allocation: Scenarios requiring permanent static assignment. - Common application port numbers: HTTP (80), HTTPS (443), DNS (53), DHCP (67/68), Telnet (23), SSH (22).
Week 32	- Configure file and folder sharing on Windows LAN; set standard share permissions and NTFS security permissions. - Map shared network folders as persistent network drives on client computers. - Configure network printer sharing on a host PC and connect client workstations to shared printer. - Setup standalone dedicated Network Print Server for central printing.	- Network Resource Sharing: Server Message Block (SMB) protocol, Network File System (NFS). - Share permissions (Read, Change, Full Control) vs NTFS permissions (Security tab), effective permissions. - Network drive mapping, universal naming convention (UNC) paths (\\server\share). - Network printing architecture: Host-based sharing vs hardware network print servers.
Week 33	- Setup and configure Virtual Private Network (VPN) client connections to remote private networks. - Configure remote desktop access using Windows Remote Desktop Connection (RDP - port 3389). - Practice remote administration using third-party collaboration tools (AnyDesk, TeamViewer, VNC). - Setup Voice over IP (VoIP) softphones and test audio communication across local network.	- Virtual Private Networks (VPN): Purpose, tunneling protocols (PPTP, L2TP/IPsec, OpenVPN, WireGuard). - Remote desktop administration: RDP protocol, security considerations, and network bandwidth. - Voice over IP (VoIP): SIP signaling protocol, RTP media transport, and audio codecs. - Collaboration tools: Screen sharing, instant messaging, file transfer, and teleconferencing.
Week 34	- Install and configure IP Surveillance Cameras on network: Connect via PoE switch. - Configure camera IP address, video resolution, frame rate (FPS), and motion detection zones. - Connect IP cameras to Network Video Recorder (NVR); configure scheduled continuous and motion recording. - Configure mobile app / web browser remote viewing and monitoring for IP cameras.	- IP Surveillance Systems: Network cameras vs analog CCTV, ONVIF compliance standards. - Network Video Recorders (NVR): Storage calculation for video streams, H.264 vs H.265 compression. - Camera features: Wide Dynamic Range (WDR), infrared night vision, IP ratings for weatherproof housings. - Network bandwidth considerations for multi-channel high-definition IP camera streaming.
Week 35	- Perform network cable tracing and fault finding using tone generator and amplifier probe (toner/tracer). - Measure cable length, detect faults (opens, shorts, split pairs) using Time Domain Reflectometer (TDR) / Fluke meter. - Troubleshoot network connectivity issues: Duplicate IP address conflicts, incorrect default gateway, DNS failures. - Practice using Wireshark network protocol analyzer to capture and inspect Ethernet frames and IP packets.	- Structured cabling testing: Wire map, length, propagation delay, delay skew, insertion loss (attenuation). - Crosstalk in copper cabling: Near-End Crosstalk (NEXT), Far-End Crosstalk (FEXT), and Return Loss. - Systematic network troubleshooting methodology: Physical layer checks to application layer diagnosis. - Packet sniffing concepts: Promiscuous mode, capturing traffic with Wireshark, and analyzing TCP handshakes.
Week 36	- Configure perimeter hardware/software Firewalls on network routers and Windows operating systems. - Create inbound and outbound firewall filtering rules based on IP addresses, port numbers, and protocols. - Implement MAC Address Filtering on wireless access points and managed switches (Port Security). - Practice disabling unused switch ports and configuring maximum secure MAC addresses per port.	- Network Security fundamentals: Confidentiality, Integrity, Availability (CIA Triad), threat vectors. - Firewalls: Packet filtering firewalls, stateful inspection firewalls, and Next-Generation Firewalls (NGFW). - Switch Port Security: Static, dynamic, and sticky MAC learning; violation modes (Protect, Restrict, Shutdown). - Common network attacks: Denial of Service (DoS/DDoS), Man-in-the-Middle (MitM), and IP spoofing.

Week No.	Trade Practical (Professional Skills)	Trade Theory (Professional Knowledge)
Week 37	• Configure wireless network security on Wi-Fi routers: Set up WPA2-Personal (AES) and WPA3 authentication. • Change default router administrative login credentials; disable WPS (Wi-Fi Protected Setup) and remote management. • Configure guest Wi-Fi network with isolated VLAN to protect primary internal LAN devices. • Practice symmetric and asymmetric public key encryption concepts; generate SSL/TLS self-signed certificates.	1. Wireless security protocols: WEP vulnerabilities, WPA, WPA2 (CCMP/AES), and WPA3 (SAE). 2. Wi-Fi attack vectors: Evil twin access points, rogue APs, de-authentication attacks, and WPS cracking. 3. Cryptography principles: Symmetric key algorithms (AES) vs Asymmetric public-key algorithms (RSA, ECC). 4. Digital certificates and Public Key Infrastructure (PKI): Certificate Authorities (CA) and SSL/TLS handshakes.
Week 38	• Conduct a comprehensive network security audit: Scan open ports and network services using Nmap scanner. • Implement endpoint security: Deploy anti-malware software, enforce strong password policies, enable automatic OS updates. • Formulate disaster recovery and network incident response plans; backup all router and switch configuration files. • Review complete Second Year syllabus and prepare practical portfolios for All India Trade Test (AITT).	1. Security auditing tools: Network vulnerability scanning, port scanning techniques, and banner grabbing. 2. Endpoint security management: Host-based intrusion prevention, patch management, and USB port control. 3. Disaster recovery in enterprise networks: Configuration archiving (TFTP/SCP), redundancy, and failover. 4. Review of ICTSM trade theory topics and examination preparation.
Week 39	On the Job Training (OJT) / Group Project	On the Job Training (OJT) / Group Project
Week 40	On the Job Training (OJT) / Group Project	On the Job Training (OJT) / Group Project
Week 41	On the Job Training (OJT) / Group Project	On the Job Training (OJT) / Group Project
Week 42	On the Job Training (OJT) / Group Project	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