

**DETAILED SYLLABUS FOR THE POST OF WORKSHOP INSTRUCTOR /
INSTRUCTOR GR.II / DEMONSTRATOR / DRAFTSMAN GR.II (COMP.
HARDWARE AND MAINTENANCE) IN TECHNICAL EDUCATION**

(Cat.No: 180/2023)

Sl. No	Contents	Marks
I	COMPUTER ARCHITECTURE	10
	<p>Identify and understand the basic components of a computer - Learn the functions of the CPU, memory, and input/output devices - Explore the architecture of a Central Processing Unit (CPU) - Understand the role of registers, ALU, and control unit - Compare different types of memory (RAM, ROM, Cache) - Understand the principles of volatile and non-volatile memory - Learn about memory addressing and data transfer - Practice memory interfacing with microprocessors - Understand the concept of Instruction Set Architecture - Explore different types of instructions and addressing modes - Write and execute simple assembly language programs - Learn about instruction formats and mnemonics - Introduce the concept of instruction pipelining - Explore stages in a pipeline and their functions - Use simulation tools to design and simulate a simple processor - Understand the impact of different pipeline architectures - Learn about input/output interface design - Connect peripherals to a microprocessor and program their interfaces - Understand interrupt handling mechanisms - Implement and test Direct Memory Access (DMA) controllers - Learn about different bus architectures (e.g., system bus, memory bus) - Connect and configure components using a system bus - Explore bus protocols such as USB, PCI, or I2C - Implement and test bus arbitration mechanisms - Explore the basics of multiprocessor systems - Implement simple parallel processing tasks - Understand the concept of System-on-Chip design - Design a simple SoC and simulate its functionality.</p>	

II	TROUBLESHOOTING AND DIAGNOSTICS OF A COMPUTER SYSTEM	10
	<p>Introduction to systematic troubleshooting approaches - Understanding the importance of diagnostic tools - Familiarization with common diagnostic tools (multimeter, power supply tester, etc.) - Safe handling and usage of tools - Identifying and resolving common operating system problems - Practising system restore and recovery procedures - Introduction to software diagnostic tools (e.g., Task Manager, Event Viewer) - Analysing system logs and error messages - Troubleshooting power supply problems - Identifying symptoms of faulty motherboards - Diagnosing and testing RAM modules - Understanding memory-related error messages - Diagnosing and resolving hard drive and SSD problems - Recovering data from damaged storage devices - Identifying symptoms of overheating - Testing and replacing cooling components - Troubleshooting network adapter problems - Resolving issues with wired and wireless connections - Diagnosing issues with printers, scanners, and other peripherals - Addressing USB and other connectivity problems - Identifying and resolving problems related to the system firmware - Updating BIOS/UEFI - Introduction to advanced diagnostic tools (e.g., hardware diagnostics, POSTcodes) - Analysing diagnostic reports - Identifying symptoms of malware infections - Using antivirus and anti-malware tools for detection and removal - Configuring firewalls and security settings - Implementing best practices for system security.</p>	
III	OPERATING SYSTEM	10
	<p>Understand the basic functions of operating systems - Explore different types of operating systems (Windows, Linux) - Install and configure a basic operating system on virtual machines - Familiarise students with the installation process - Navigate and perform basic operations in the command line - Understand file and directory permissions - Utilise file management tools and utilities - Create, copy, move, and delete files and directories - Learn to create, monitor, and manage processes - Use</p>	

	<p>command-line tools to view and control processes - Implement and test simple multithreading applications - Explore synchronisation mechanisms - Understand memory allocation techniques - Implement dynamic memory allocation and deallocation - Explore virtual memory concepts and paging - Implement simple virtual memory management - Understand device drivers and their role - Install and configure device drivers for peripherals - Implement simple I/O operations - Understand interrupt-driven I/O - Explore system calls and their usage - Implement programs using system calls - Understand APIs and how they interact with the operating system - Develop simple applications using APIs - Configure and test basic network settings - Implement network-related system calls - Explore security features of operating systems - Configure basic security settings.</p>	
IV	THE STORAGE SYSTEM	10
	<p>Introduction to different types of storage devices (HDD, SSD, Hybrid) - Understanding storage hierarchies and their use cases - Explore various storage interfaces (SATA, SAS, NVMe) - Hands-on experience with connecting and configuring storage devices - Understanding RAID (Redundant Array of Independent Disks) configurations - Implementing different RAID levels and testing fault tolerance - Implementing RAID using both software and hardware controllers - Comparing the advantages and disadvantages of each approach - Using tools like Disk Management (Windows) or Disk Utility (Linux) for partitioning - Formatting and managing file systems - Implementing and managing logical volumes - Dynamic volume resizing and snapshots - Configuring file sharing protocols (e.g., SMB, NFS) - Introduction to Storage Area Networks (SAN) - Configuring Fibre Channel or iSCSI connections - Implementing storage virtualization techniques - Understanding the benefits of virtualized storage environments - Setting up a basic hyperconverged infrastructure - Integrating storage,</p>	

	<p>compute, and networking components - Designing and implementing backup strategies - Exploring incremental, differential, and full backups - Simulating disaster scenarios and implementing recovery plans - Configuring and testing backup restoration - Implementing access controls and permissions - Configuring encryption for data-at-rest - Implementing data deduplication and compression techniques - Assessing the impact on storage efficiency.</p>	
V	COMPUTER NETWORKING	10
	<p>Identify and understand the functions of routers, switches, hubs, and modems - Hands-on configuration of basic settings on networking devices - Learn to create straight-through, crossover, and rollover cables - Practice cable crimping and testing - Configure IP addresses, subnet masks, and default gateways on computers - Practice using command-line tools for IP configuration - Capture and analyse network traffic using Wireshark - Identify and understand common network protocols - Configure a small LAN with multiple computers, switches, and a router - Implement basic security measures for the local network - Configure Virtual LANs (VLANs) on switches - Test VLAN communication and isolation - Connect multiple LANs using routers and simulate a WAN - Implement routing protocols such as RIP or OSPF - Configure a Virtual Private Network (VPN) for secure communication - Understand the principles of tunnelling and encryption - Setup and configure a wireless LAN using Wi-Fi routers and access points - Implement security measures for wireless networks - Diagnose and troubleshoot common issues in wireless networks - Optimise wireless network performance - Configure a network firewall to control incoming and outgoing traffic - Understand the principles of stateful inspection - Set up and configure an Intrusion Detection System (IDS) or Intrusion Prevention System (IPS) - Analyse and respond to simulated security incidents - Configure a Domain Name System (DNS) server -</p>	

	Understand DNS resolution and troubleshooting - Implement Dynamic Host Configuration Protocol (DHCP) for automatic IP address assignment - Troubleshoot DHCP-related issues.	
VI	CONFIGURING AND SETTING UP A NETWORK-ATTACHED STORAGE (NAS)	10
	Understand the concept and advantages of Network-Attached Storage - Explore various NAS devices and their manufacturers - Identify and understand the key components of a NAS system - Explore features such as RAID configurations, file systems, and backup options - Set up physical NAS devices in the - Connect NAS devices to the local network - Access the NAS management interface - Configure basic settings, including network parameters and administrator credentials - Explore storage configurations such as RAID levels - Create and manage storage volumes on the NAS - Understand and configure file systems supported by NAS devices - Explore file-sharing protocols (e.g., SMB, NFS) - Configure user accounts and groups on the NAS - Implement access controls for shared folders - Explore encryption options for data security - Implement security features such as firewalls and access logs - Set up and configure backup solutions for NAS data - Practice data recovery scenarios - Explore multimedia services provided by NAS devices - Configure media streaming and sharing - Configure remote access to NAS devices - Explore cloud integration options - Implement high availability configurations for NAS - Explore options for redundancy and failover - Utilise monitoring tools to track NAS performance - Identify and troubleshoot performance issues - Simulate common NAS-related issues - Diagnose and troubleshoot problems effectively.	
VII	TROUBLESHOOTING AND REPAIRING LAPTOPS	10
	Identify and understand key laptop components - Learn about different laptop form factors and designs - Introduce tools required for laptop disassembly and repair - Practice safe handling of tools and equipment - Understand laptop BIOS/UEFI settings - Perform basic diagnostics using built-in	

	<p>tools - Test and diagnose RAM and storage issues - Learn to replace or upgrade memory and storage components - Troubleshoot power-related problems and charging issues - Replace faulty power supplies and batteries - Identify and troubleshoot common display problems - Replace or repair faulty screens or graphics components - Diagnose and troubleshoot Wi-Fi and Ethernet connectivity issues - Replace or upgrade network adapters - Troubleshoot USB, HDMI, and other peripheral connectivity problems - Replace or repair faulty ports - Diagnose and address overheating problems - Learn to replace or upgrade cooling systems - Troubleshoot sound and webcam-related problems - Replace or repair faulty audio and camera components - Perform laptop memory and storage upgrades - Ensure compatibility and optimise performance - Understand the importance of BIOS/UEFI updates - Practice updating firmware for improved compatibility - Explore data recovery methods for laptops - Practice retrieving data from malfunctioning storage devices - Implement backup solutions for laptops - Understand the importance of regular data backups.</p>	
VIII	INTERNET OF THINGS	8
	<p>Computing boards and sensors to familiarise with IoT gadgets-Simple IoT applications with computing boards and sensors-applications to control sensors through web page, mobile applications-Implement applications to upload data to cloud-Programming concepts of Python – data types, list, tuple, dictionaries etc-control structures in Python-Programs using functions, packages and modules-Use of Python packages for IoT-Simple IoT applications with Raspberry PI to interact with web, mobile applications and cloud</p>	
IX	EMBEDDED SYSTEM AND REAL TIME OPERATING SYSTEM	7
	<p>Familiarise with ATmega32 microcontroller based development system board-Develop simple I/O port programs for input and</p>	

	output-Develop simple I/O port programs to implement logic operation-Develop simple I/O port programs for data conversion and data serialisation-Interface different peripheral systems – LCD, Sensors, ADC, Keyboard etc - with Microcontrollers. Develop programs to verify Timers/Counters -Develop programs using Interrupts	
X	NETWORK ADMINISTRATION	7
	Demonstrate installation of LINUX Server operating system. Demonstrate the working & usage of configuration files inittab, fstab, crontab-Demonstrate the usage of utilities like fdisk, gparted, disks, grub customizer-Demonstrate the usage of commands like adduser, uname, su,sudo-Demonstrate the usage of process scheduling & monitoring commands – TOP, SAR, VMSTAT, IOSTAT, PS-Demonstrate package management in Linux - Synaptic Package Manager, DPKG, RPM-Demonstrate Job scheduling using crontab,-Demonstrate installation of Samba server, WINE-Demonstrate the usage of utilities like TAR, GZIP, COMPRESS-Demonstrate the usage of various IP commands - PING, IFCONFIG, ROUTE, ARP-Demonstrate working & usage of services like SSH, TELNET, FTP, HTTP, RCP, RSYNC	
XI	PROGRAMMING SMART DEVICE	8
	Set up an environment to develop android applications-Make use of user interfaces in Android applications -Develop Android based database applications -Make use of HTML5.0 and JavaScript in mobile applications	

NOTE: - It may be noted that apart from the topics detailed above, questions from other topics prescribed for the educational qualification of the post may also appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.