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EXPERT COMPUTER COURSE

PC MAINTENANCE, SECURITY & TROUBLESHOOTING

Topics Covered:

#	Topic
1	Overview of Computer Maintenance and Security
2	Inbuilt PC Security Tools & Securing Documents
3	Antivirus Software & Upgrading OS/Applications
4	Cleaning the PC — Monitor, Keyboard, CPU
5	Deleting Unnecessary Files — Disk Cleanup, Defrag
6	Computer Maintenance Programs (CCleaner, MyDefrag, SpinRite)
7	Basic Troubleshooting
8	Windows Installation and Upgrades
9	Hardware Maintenance — CPU, Memory, Expansion Cards, Storage
10	Ports, Connectors, Cables, Printers, Display Devices
11	Portable Computers, Networking, Security & PC Environment
12	Quick Revision + Important MCQ Questions

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SECTION 1: OVERVIEW OF COMPUTER MAINTENANCE AND SECURITY

1.1 Why is Computer Maintenance Important?

> *Computer maintenance is the practice of keeping a computer in good working condition — both hardware and software. Regular maintenance prevents problems, improves performance, extends hardware life, and protects data.*

Type	Description	Examples
Preventive Maintenance	Done regularly to PREVENT problems before they occur	Weekly virus scan, monthly disk cleanup, cleaning dust
Corrective Maintenance	Done to FIX a problem after it has occurred	Replacing a failed HDD, removing virus, reinstalling OS
Predictive Maintenance	Monitoring system health to predict failures	SMART monitoring of HDD, temperature alerts
Adaptive Maintenance	Updating software to work with new environments	Upgrading OS, updating drivers after hardware change

1.2 Overview of Computer Security

> *Computer security (also called Cybersecurity) is the protection of computer systems, networks, and data from unauthorized access, theft, damage, viruses, and other threats.*

Security Threat	Description	Example
Virus	Malicious program that attaches to files and spreads; corrupts or deletes data	ILOVEYOU virus, Melissa virus
Worm	Self-replicating malware that spreads over networks WITHOUT needing a host file	WannaCry, SQL Slammer
Trojan Horse	Appears to be legitimate software but secretly harms the system	Fake antivirus, banking trojans
Spyware	Secretly monitors user activity and sends data to attacker	Keyloggers recording passwords
Adware	Displays unwanted advertisements; often bundled with free software	Popup ads, browser redirects
Ransomware	Encrypts user files and demands payment for decryption key	WannaCry, Petya, CryptoLocker
Phishing	Fake emails/websites that trick users into giving login credentials	Fake bank login pages
Rootkit	Hides malware deep in OS, very difficult to detect and remove	NTRootkit, TDSS
Keylogger	Records all keyboard strokes to steal passwords and sensitive data	Hardware or software keyloggers
DoS / DDoS	Floods server with requests to make it unavailable to real users	Overloading a website server

> **Exam Tip:** Virus = attaches to file. Worm = spreads by itself over network. Trojan = disguised as good software. Ransomware = locks files and demands money.

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SECTION 2: INBUILT PC SECURITY TOOLS & SECURING DOCUMENTS

2.1 Windows Built-in Security Tools

Security Tool	Location	Purpose
Windows Defender Antivirus	Settings → Privacy & Security → Windows Security → Virus & Threat Protection	Built-in antivirus and anti-malware protection. Scans files in real-time.
Windows Firewall	Settings → Privacy & Security → Windows Security → Firewall & Network Protection	Blocks unauthorized incoming/outgoing network connections
Windows Update	Settings → Windows Update	Patches security vulnerabilities; keeps OS protected against new threats
User Account Control (UAC)	Control Panel → User Accounts → Change UAC settings	Alerts user when programs try to make changes to the system — prevents silent installs
BitLocker Drive Encryption	Control Panel → System & Security → BitLocker Drive Encryption	Encrypts entire hard drive to protect data if PC is stolen or lost
Windows Hello	Settings → Accounts → Sign-in Options	Biometric login: fingerprint or face recognition instead of password
Secure Boot (UEFI)	BIOS/UEFI Settings	Prevents unauthorized OS or malware from loading during startup
SmartScreen Filter	Built into Edge browser and Windows	Warns before opening suspicious files or websites
Controlled Folder Access	Windows Security → Ransomware Protection	Protects specific folders from unauthorized changes by ransomware
Task Manager	Ctrl + Alt + Delete → Task Manager	Monitor running processes; end suspicious programs

2.2 User Account Security

- **Administrator (full control) vs Standard User (limited — cannot install software or change system settings):** Types of Accounts
- Strong Password: At least 8 characters, mix of uppercase, lowercase, numbers, and symbols (e.g., Ajay@2024!)
- Password Best Practices: Never share, change every 90 days, never reuse old passwords, don't use birthdays
- Screen Lock: Set computer to lock automatically after inactivity: Settings → Personalization → Lock Screen → Screen Saver → On Resume, display logon screen
- Two-Factor Authentication (2FA): Requires password + second verification (OTP on phone) — much more secure
- Guest Account: Limited account for temporary users — should be disabled if not needed

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2.3 Securing Documents

Method	How To	Level of Security
Password-Protect MS Word/Excel File	File → Info → Protect Document → Encrypt with Password → enter password → OK	Medium — file cannot be opened without password
Mark as Final (Read-Only)	File → Info → Protect Document → Mark as Final	Low — advisory only; can be undone easily
Restrict Editing	File → Info → Protect Document → Restrict Editing	Medium — limits what others can change in the doc
PDF Password	Save As PDF → Options → Encrypt document with password	Medium — PDF cannot be opened without password
BitLocker (Drive Level)	Encrypt entire drive using BitLocker	High — all files on drive protected
File/Folder Encryption (EFS)	Right-click file → Properties → Advanced → Encrypt contents	High — only your Windows account can open it
Hidden Files	Right-click → Properties → Hidden checkbox	Very Low — hides from casual view only
Compressed (Zipped) with Password	Right-click → Send to → Compressed folder, use 7-Zip for password protection	Medium — requires 7-Zip or WinRAR for password

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SECTION 3: ANTIVIRUS & UPGRADING OS/APPLICATIONS

3.1 Antivirus Software

> *Antivirus software detects, prevents, and removes malicious software (malware) from a computer. It compares files and programs against a database of known virus signatures and also uses heuristic analysis to detect new threats.*

Feature	Description
Real-Time Protection	Continuously monitors files and processes as they are accessed — stops threats instantly
On-Demand Scan	Manual scan: Quick Scan (common areas), Full Scan (entire PC), Custom Scan (specific folder)
Scheduled Scan	Automatically scans at set times (e.g., every Sunday 2:00 AM)
Virus Definition Updates	Regular updates to virus database to recognize new threats — must be kept current
Quarantine	Suspicious files moved to isolated quarantine area — cannot harm system but not deleted yet
Firewall Integration	Many antivirus suites include firewall and network protection
Email Scanning	Scans email attachments for malware before they are opened
Web Protection	Blocks access to known malicious websites and phishing pages

Popular Antivirus Software

Software	Type	Key Feature
Windows Defender	Free — Built into Windows 10/11	Automatic, no installation needed, integrates with OS deeply
Avast Antivirus	Free / Paid versions	Good real-time protection, Wi-Fi scanner, sandbox
AVG Antivirus	Free / Paid versions	Lightweight, good detection rate, acquired by Avast
Kaspersky	Paid	Excellent detection rates, strong parental controls
Norton 360	Paid	Comprehensive suite: antivirus + VPN + password manager + backup
Quick Heal	Paid — Indian company	Popular in India; good regional support
Bitdefender	Free / Paid	Top detection rates, minimal system impact
Malwarebytes	Free / Premium	Excellent for removing existing malware; good with other antivirus

> **Exam Tip:** Keep antivirus virus definitions updated daily. Windows Defender is free and built-in. Never install two antivirus programs simultaneously — they conflict with each other.

3.2 Upgrading Operating System and Application Software

> *Software upgrades fix security vulnerabilities, add new features, improve stability, and ensure compatibility with new hardware. Keeping software updated is one of the most important security practices.*

Update Type	Description	How to Update
Windows OS Security Update	Critical patches fixing security holes. Released on 'Patch Tuesday' (2nd Tuesday each month).	Settings → Windows Update → Check for updates
Feature Update	Major Windows updates adding new features (e.g., Windows 10 → 11)	Settings → Windows Update → Feature updates
Driver Update	Updates for hardware device drivers (graphics, audio, printer, network)	Device Manager → right-click device → Update driver OR manufacturer website
Application Update	Updates for installed programs (Office, Chrome, etc.)	Within the app: Help → Check for Updates OR Microsoft Store
Firmware Update	Update to hardware's built-in software (BIOS/UEFI, printer firmware, router firmware)	Manufacturer's website or BIOS/UEFI update utility
Automatic Updates	Windows downloads and installs updates automatically	Settings → Windows Update → Advanced Options → Automatic (recommended)

- Before upgrading: Create a System Restore Point or full backup of important data
- Check hardware compatibility before major OS upgrade (e.g., Windows 10 to 11 requires TPM 2.0 chip)
- Uninstall old/unused programs before upgrading to free up space and reduce conflicts

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SECTION 4: CLEANING THE PC — MONITOR, KEYBOARD, CPU

4.1 Why Physical Cleaning is Important

> *Dust, dirt, and grime inside and outside the PC can cause overheating, hardware failures, key sticking, screen glare, and reduced performance. Regular physical cleaning extends hardware life significantly.*

Problem	Cause	Solution
CPU/GPU Overheating	Dust blocks airflow and insulates heat sinks	Clean fans and heatsinks with compressed air
System Crashes / Throttling	CPU gets too hot, automatically slows down (throttles)	Clean thermal paste, improve airflow
Keyboard Keys Sticking	Dust, crumbs, and debris under keys	Clean with compressed air; remove keycaps for deep clean
Blurry / Smudgy Monitor	Fingerprints and dust on screen	Clean with microfiber cloth and screen cleaner
Noisy Fans	Dust on fan blades causes vibration and noise	Clean fan blades with compressed air or soft brush
Slow Performance	Thermal throttling due to heat	Clean heatsinks; reapply thermal paste

4.2 Cleaning the Monitor/Screen

- Turn OFF the monitor before cleaning — easier to see dust/smudges on dark screen
- Use a dry or slightly damp microfiber cloth (NOT regular cloth — scratches screen)
- Wipe gently in circular or horizontal motion — do not press hard
- For stubborn smudges: dampen cloth with distilled water or screen cleaning solution
- NEVER use: paper towels, tissues, household glass cleaner (Windex), alcohol directly on LCD
- Clean the screen bezel and stand with a slightly damp cloth
- Frequency: Once a week for dusty environments; every 2-4 weeks normally

4.3 Cleaning the Keyboard

- Turn off computer or disconnect keyboard before cleaning
- Shake gently upside down to dislodge loose debris and crumbs
- Use compressed air can to blow dust from between keys — hold can upright, use short bursts
- Wipe key surfaces with a slightly damp cloth or isopropyl alcohol (70%) on a cotton swab
- For deep clean: remove keycaps (use keycap puller tool), clean underneath, wash keycaps in soapy water, dry completely before replacing
- NEVER spray liquid directly onto keyboard
- Spill recovery: Immediately disconnect, turn upside down, dab (don't rub) liquid, let dry 48 hours minimum

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4.4 Cleaning the CPU Cabinet (Desktop PC)

- Turn OFF and UNPLUG the PC from power before opening
- Wear anti-static wrist strap before touching any internal component
- Use compressed air can to blow dust off: CPU heatsink and fan, GPU fans and heatsink, power supply fan, case fans, RAM slots, motherboard surface
- Hold fans still while blowing — free-spinning fans can generate electricity and damage components
- Use soft brush for stubborn dust on heatsink fins
- Wipe outer case with slightly damp cloth; clean front panel vents with brush
- CPU Thermal Paste: Replace thermal paste every 2-3 years or when CPU temperatures rise abnormally
- Frequency: Every 3-6 months for dusty environments; every 6-12 months for clean environments

> **Safety Rules:** Always: Power OFF + Unplug before cleaning inside PC. Use anti-static wrist strap. Use compressed air — not vacuum cleaner (generates static). Never use wet cloth inside PC.

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SECTION 5: DELETING UNNECESSARY FILES — DISK CLEANUP AND DEFRAG

5.1 Why Delete Unnecessary Files?

- Frees up valuable disk space — low disk space slows down the computer
- Removes temporary files that can slow down startup and performance
- Removes cached data that may be outdated or corrupted
- Removes leftover files from uninstalled programs
- Improves privacy by deleting browsing history and temp files

5.2 Disk Cleanup (Built-in Windows Tool)

> *Disk Cleanup scans and removes temporary files, system files, and other unnecessary data to free up hard disk space. It is a safe, built-in Windows tool.*

Step 1: Open Disk Cleanup — Search 'Disk Cleanup' in Start OR right-click C: drive in File Explorer → Properties → Disk Cleanup button

Step 2: Select Drive — Choose the drive to clean (usually C:) → click OK → wait for scan

Step 3: Select File Types — Check the types of files to delete: Temporary Internet Files, Downloaded Program Files, Recycle Bin, Temporary Files, Delivery Optimization Files

Step 4: Clean System Files — Click 'Clean up system files' button for more options including Windows Update cleanup, Previous Windows installations

Step 5: Delete — Click OK → 'Delete Files' to confirm deletion

File Type Cleaned	Description	Typical Size Freed
Temporary Internet Files	Cached web pages and images from browser visits	50 MB – 1 GB+
Downloaded Program Files	ActiveX controls and Java applets (mostly obsolete)	A few MB
Recycle Bin Contents	Files previously deleted but still in Recycle Bin	Variable — can be GBs
Temporary Files	Files created by programs during operation; should auto-delete but often don't	100 MB – 500 MB
Windows Update Cleanup	Old Windows Update installation files no longer needed	500 MB – 5 GB
Previous Windows Installation	Old Windows folder kept after upgrade (Windows.old)	Up to 20 GB
Delivery Optimization Files	Windows Update files downloaded for sharing with other PCs on network	100 MB – 2 GB
Thumbnails	Cached thumbnail images for file icons — recreated automatically	50 MB – 200 MB

5.3 Deleting Toolbars and Unwanted Programs

> *Toolbars are browser extensions that install (often without clear consent) with free software. They slow down the browser and may track your activity. They should be removed.*

Step 1: Open Programs List — Settings → Apps → Apps & Features OR Control Panel → Programs → Uninstall a Program

Step 2: Find Unwanted Programs — Look for unfamiliar toolbars, browser helpers, or software you didn't intentionally install

Step 3: Uninstall — Click the program → Uninstall button → follow the uninstaller steps

Step 4: Remove Browser Extensions — Open browser → Extensions/Add-ons → remove unwanted extensions

Step 5: Reset Browser — If browser still behaves oddly: Browser Settings → Reset to default settings

- Common unwanted toolbars: Ask Toolbar, MyWebSearch, Babylon Toolbar, Conduit toolbar
- Prevention: Choose 'Custom Install' when installing free software; uncheck bundled extras

5.4 Disk Defragmentation

> *Fragmentation occurs when files are broken into pieces and scattered across different locations on an HDD. Defragmentation reorganizes these pieces, placing file parts back together to improve access speed.*

Feature	HDD (Hard Disk Drive)	SSD (Solid State Drive)
Needs Defragmentation?	Yes — fragmentation reduces read speeds significantly	NO — SSDs have no moving parts; defragging REDUCES SSD lifespan
Windows Tool	Defragment and Optimize Drives	Windows uses 'TRIM' command instead (automatic)
Frequency	Once a month for HDDs (Windows schedules automatically)	Never defrag manually — Windows handles SSD optimization
Access Time Impact	Fragmented HDD is 20-50% slower	SSD reads all locations at same speed — fragmentation irrelevant

Step 1: Open Defrag Tool — Search 'Defragment' in Start → 'Defragment and Optimize Drives' OR right-click C: → Properties → Tools → Optimize

Step 2: Analyze — Select the HDD drive → click 'Analyze' to see fragmentation percentage

Step 3: Optimize — If fragmentation is above 10%, click 'Optimize' — may take 30 mins to several hours

Step 4: Schedule — Enable scheduled optimization: every week (default) for HDDs

> **Remember:** NEVER defrag an SSD. Only defrag HDDs. Windows 10/11 automatically schedules optimization weekly. SSDs benefit from TRIM, which Windows runs automatically.

SECTION 6: COMPUTER MAINTENANCE PROGRAMS

6.1 CCleaner

> *CCleaner (Crap Cleaner) is a popular free system optimization and privacy tool for Windows and Mac. It cleans temporary files, fixes registry issues, manages startup programs, and uninstalls software.*

Feature	Description
PC Cleaner	Removes temporary files, cache, cookies, browser history, recent file lists from Windows and browsers
Registry Cleaner	Scans and fixes invalid/broken Windows Registry entries left by uninstalled programs
Software Updater	Checks all installed programs for available updates and updates them
Startup Manager	Shows all programs that start with Windows; disable or remove unnecessary startup items to speed up boot
Uninstall Manager	Clean uninstaller that removes programs completely including leftover files
Disk Analyzer	Shows which files and folders are using the most disk space
Duplicate Finder	Finds duplicate files to free up disk space
Browser Plugin Manager	View and manage browser extensions and plugins

- Download from: ccleaner.com. Free version is sufficient for most users.
- Run weekly for best results; always back up Registry before cleaning it
- Caution: Do not blindly delete all cookies — you will be logged out of all websites

6.2 MyDefrag (Previously JKDefrag)

> *MyDefrag (formerly JKDefrag) is a free, fast, and low-overhead disk defragmentation program for Windows. It offers more advanced defragmentation strategies than the built-in Windows tool.*

- Features: Multiple defragmentation methods (Consolidate, Sort by Name, Sort by Date, etc.)
- Runs as screensaver — defrags your disk while you are idle
- Command-line support for automated/scheduled defragmentation
- Much faster than built-in Windows Defragmenter for heavily fragmented drives
- Note: Only use on HDD — NOT on SSD
- Download: mydefrag.com (freeware). Now largely replaced by built-in Windows optimization

6.3 SpinRite

> *SpinRite is a professional hard disk recovery and maintenance utility by Gibson Research Corporation (GRC). It can recover data from failing hard drives and refresh magnetic data on aging drives.*

Feature	Description
Data Recovery	Recovers data from HDDs that Windows cannot read due to bad sectors

Feature	Description
Drive Testing	Performs thorough, in-depth testing of hard drive health
Magnetic Refreshing	Re-writes and verifies magnetic data on old drives, extending lifespan
Bad Sector Detection	Finds and maps bad sectors; marks them so OS avoids writing to them
Works Below OS Level	Boots from USB/CD and works directly on drive hardware — works even if Windows won't start
Supported Drives	Works on HDDs (SATA, SCSI, IDE). NOT designed for SSDs.

- SpinRite is a paid tool (~$89 one-time). Available from grc.com
- Used by IT professionals for data recovery when standard tools fail

6.4 Other Useful Maintenance Tools

Tool	Purpose	Free/Paid
CrystalDiskInfo	Monitors HDD/SSD health using SMART data — shows temperature, errors, lifespan	Free
CrystalDiskMark	Benchmarks disk read/write speeds	Free
CPU-Z	Detailed information about CPU, RAM, motherboard, and GPU	Free
HWMonitor	Real-time monitoring of CPU/GPU temperatures, voltages, fan speeds	Free
Malwarebytes	Removes existing malware, even when antivirus missed it	Free/Paid
BleachBit	Open-source alternative to CCleaner for deep cleaning	Free
Recuva	Recovers accidentally deleted files from HDD, USB, memory cards	Free
AIDA64	Comprehensive system information and diagnostics tool	Paid
MemTest86	Tests RAM for errors by running from USB before OS loads	Free
HDDScan	Tests HDD health, surface scan for bad sectors	Free

SECTION 7: BASIC TROUBLESHOOTING

7.1 Troubleshooting Methodology

> *Troubleshooting is the process of diagnosing and fixing problems with a computer. Follow a systematic approach: identify the problem → establish a theory → test → fix → verify → document.*

Step	Action	Details
1	Identify the Problem	Ask: What exactly is not working? When did it start? What changed recently?
2	Establish a Theory	Think of possible causes — hardware or software? Recent changes?
3	Test the Theory	Try simple fixes first (restart, check cables). Test one thing at a time.
4	Implement the Fix	Apply the solution — uninstall program, replace component, update driver
5	Verify Full Functionality	Confirm the original problem is fixed AND no new problems created
6	Document the Solution	Record what the problem was and how it was fixed for future reference

7.2 Basic Troubleshooting Steps

Problem	Most Likely Cause	Solution
Computer won't turn on	No power, loose power cable, dead SMPS	Check power cable, try different outlet, check SMPS
Computer turns on but no display	Monitor not connected, GPU issue, RAM not seated	Check monitor cable, reseat RAM, test with another monitor
Computer is very slow	Too many startup programs, low RAM, virus, full hard disk	Disable startup programs, run disk cleanup, virus scan, check disk space
Blue Screen of Death (BSOD)	Driver error, RAM failure, overheating, corrupted files	Note error code, update/roll back driver, run MemTest86, check temps
Internet not working	Network cable loose, Wi-Fi off, IP conflict, DNS issue	Check cables, restart router/modem, run Network troubleshooter
Application not opening	Corrupted install, missing DLL file, compatibility issue	Reinstall the application, run as Administrator, update .NET/Visual C++
Printer not printing	Cable disconnected, offline status, paper jam, wrong default printer	Check cables, set printer online, check paper, set as default
Keyboard/Mouse not working	USB disconnected, driver issue, dead battery (wireless)	Reconnect USB, try different port, replace batteries, update driver
Computer overheating	Dust blocking fans, dried thermal paste, blocked vents	Clean fans, reapply thermal paste, improve airflow
PC making noise	Failing HDD (clicking), loose fan (rattling), coil whine (GPU)	Backup data immediately if HDD clicks, tighten fan screws, check GPU

7.3 Restart the Computer

> *Restarting clears RAM, ends all processes, flushes system caches, and allows pending updates to install. It is the FIRST step to try for almost any software problem.*

- Proper Restart: Start Menu → Power → Restart (NOT Shutdown and power on — Windows Fast Startup may not fully reset)
- Force Restart: Hold power button 5-10 seconds (only if computer is completely frozen)
- Soft Reboot: Ctrl + Alt + Delete → Power icon → Restart
- Fixes many issues: slow performance, application crashes, update installation, network glitches

7.4 Checking Cables

- Power Cable: Ensure power cable is firmly connected to both PC and wall socket / UPS
- Monitor Cable: HDMI/VGA/DisplayPort cable securely connected at both monitor and PC ends
- LAN Cable: RJ45 cable clicked firmly into port — check link light (green/orange LED on port)
- Internal Cables (after opening PC): SATA data cable and power cable properly connected to HDD/SSD
- Keyboard/Mouse: USB firmly inserted; try a different USB port to rule out bad port
- Audio cables: 3.5mm jack fully inserted in correct color-coded port (green=speakers, pink=mic)

7.5 Uninstalling a Software

Step 1: Open Apps — Settings → Apps → Apps & Features OR Control Panel → Programs → Uninstall a Program

Step 2: Find the Program — Scroll through list or use search box to find the program to remove

Step 3: Uninstall — Click the program → click 'Uninstall' button → follow uninstall wizard

Step 4: Restart — Restart the computer if prompted — ensures all components are fully removed

- Leftover files: Some programs leave files in C:\Program Files and registry entries — use CCleaner or Revo Uninstaller for complete removal
- Cannot uninstall: Try Safe Mode, or use Microsoft's 'Program Install and Uninstall Troubleshooter' tool

7.6 Starting Windows in Safe Mode

> *Safe Mode starts Windows with only the minimum drivers and programs needed. It is used for troubleshooting — if a problem doesn't occur in Safe Mode, it is caused by a program or driver that loads normally.*

Safe Mode Type	What Loads	Use Case
Safe Mode	Minimal drivers only — no internet	Diagnose driver/software issues, remove viruses

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Safe Mode Type	What Loads	Use Case
Safe Mode with Networking	Minimal drivers + network drivers	Download updates/tools needed for repair while in Safe Mode
Safe Mode with Command Prompt	Minimal + opens CMD instead of Explorer	Advanced repairs using command line tools

Step 1: **Modern Method (Windows 10/11) —** Settings → System → Recovery → Advanced startup → Restart now → Troubleshoot → Advanced Options → Startup Settings → Restart → Press 4 (Safe Mode) or 5 (Safe Mode with Networking)

Step 2: **Alternative Method —** Hold Shift while clicking Restart from Start menu → same path as above

Step 3: **F8 Method (Windows 7 and earlier) —** Press F8 repeatedly during boot before Windows logo appears → Advanced Boot Options → Safe Mode

- Exit Safe Mode: Simply restart normally — Windows boots normally after restart

7.7 System Restore

> *System Restore returns Windows to a previous state (restore point) without affecting personal files. Useful when a driver or program installation causes problems.*

Step 1: **Open —** Search 'System Restore' → 'Create a restore point' → System Restore button

Step 2: **Choose Point —** Select a restore point from before the problem started → click Next

Step 3: **Confirm —** Review and click Finish → PC restarts and restores system files

- Create restore point manually: System Properties → System Protection → Create → give it a name
- Does NOT affect personal documents, photos, music — only Windows settings and programs

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SECTION 8: WINDOWS INSTALLATION AND UPGRADES

8.1 Preparing for Windows Installation

- Check System Requirements: CPU speed, RAM, storage space, TPM version (Windows 11 needs TPM 2.0)
- Back Up All Data: Copy important files to external drive or cloud before installation
- Get Product Key: Windows 10/11 license key (can be purchased from Microsoft or retailers)
- Create Bootable USB: Download Windows ISO from microsoft.com → use Media Creation Tool or Rufus to create bootable USB (minimum 8 GB)
- Set Boot Order: Enter BIOS → change Boot Priority to USB Drive first

8.2 Windows Installation Steps

Step 1: Boot from USB — Insert bootable Windows USB → restart PC → press F12 (or F8/F11 — varies by brand) for Boot Menu → select USB

Step 2: Language & Region — Select Language, Time format, Keyboard layout → click Next → click Install Now

Step 3: Enter Product Key — Enter Windows license key OR click 'I don't have a product key' to skip (activates later)

Step 4: Select Version — Choose Windows edition (Home, Pro) — must match your license

Step 5: Accept License — Accept Microsoft License Terms → click Next

Step 6: Installation Type — Choose 'Custom: Install Windows only' for clean install OR 'Upgrade' to keep files and programs

Step 7: Select Partition — Select the partition to install Windows on → format it (for clean install) → click Next

Step 8: Installation — Windows copies files and installs — PC restarts multiple times automatically

Step 9: Initial Setup — After restart: choose region, keyboard, network, create account, set privacy settings

8.3 Windows Upgrade vs Clean Install

Feature	Upgrade Install	Clean Install
Personal Files	All files, apps, and settings are kept	Everything is deleted — fresh start
Programs	All installed programs remain	All programs must be reinstalled
Settings	Windows settings are preserved	All settings reset to defaults
Issues Carried Over	Old problems and bloatware may carry over	Clean slate — no old problems
Time Required	Faster (1-2 hours)	Longer (2-3 hours including reinstalling programs
When to Use	Routine upgrade; no major issues with current install	PC is slow, infected, or heavily corrupted

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SECTION 9: HARDWARE MAINTENANCE

9.1 CPU and Motherboard Maintenance

Maintenance Task	How Often	Steps
Clean CPU Heatsink & Fan	Every 6-12 months	Remove cooler → clean fins with compressed air → reinstall
Reapply Thermal Paste	Every 2-3 years or when temps rise	Remove old paste with isopropyl alcohol → apply pea-sized amount of new paste → reinstall cooler
Check CPU Temperature	Monthly (use HWMonitor or Core Temp)	Ideal: below 70°C under load. Over 90°C = danger zone
BIOS/UEFI Update	When manufacturer releases critical update	Download from motherboard manufacturer website → flash using BIOS update utility
Check Motherboard Capacitors	During physical cleaning	Look for bulging or leaking capacitors (cylindrical components) — replace board if found

9.2 Memory (RAM) Maintenance

- Reseat RAM: If PC crashes or doesn't recognize RAM — shut down, remove, clean gold contacts with pencil eraser gently, reinsert firmly
- Test RAM: Run MemTest86 (from USB, before OS loads) to check for memory errors — any errors = faulty RAM
- Check RAM in BIOS: On startup, BIOS shows RAM size — verify it matches what's installed
- Enable XMP/DOCP: In BIOS settings, enable XMP (Intel) or DOCP (AMD) profile so RAM runs at rated speed
- Maximum RAM: Check motherboard specs for maximum supported RAM capacity and speed
- Mixing RAM: Avoid mixing RAM from different brands, speeds, or sizes — can cause instability

9.3 Expansion Cards Maintenance

- Clean GPU Fans: Use compressed air to clean GPU heatsink and fans every 6 months
- Driver Updates: Keep GPU driver updated — Settings → Device Manager → Display Adapters → Update driver OR download from nvidia.com / amd.com
- Reseat Cards: If device not detected, power off, remove card, clean PCIe contacts, firmly reinsert
- GPU Temperature: Use MSI Afterburner or HWMonitor — should stay below 85°C under gaming load
- PCIe Slot: Check slot for bent pins or debris before inserting expansion card

9.4 Data Storage Device Maintenance

Task	HDD	SSD
Health Monitoring	CrystalDiskInfo — check SMART data (Reallocated Sectors, Spin Retry Count)	CrystalDiskInfo — check wear level, power-on hours, uncorrectable errors
Performance Optimization	Defragment monthly — improves read speed	TRIM command (automatic in Windows) — no manual action needed
Error Check	Right-click drive → Properties → Tools → Check (chkdsk /f)	Same — chkdsk /f finds and fixes file system errors
Temperature	Keep below 55°C — improve case airflow if hot	Keep below 70°C — generally runs cool
Warning Signs	Clicking sounds, slow access, frequent errors — backup immediately!	Sudden speed drop, increased errors, file corruption

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SECTION 10: PORTS, CONNECTORS, PRINTERS, DISPLAY DEVICES

10.1 Maintaining Ports and Connectors

- USB Ports: Clean with compressed air if debris inside. Do not force connections — align before inserting
- HDMI/DP Ports: Never hot-plug while PC is running (can damage port). If loose, use cable clip/support
- RJ45 (LAN) Port: Ensure the plastic locking tab on RJ45 plug is not broken — replace cable if so
- Audio Jacks: Clean with compressed air if audio is cutting out — may be debris in jack
- USB Not Detected: Try different port, update USB driver, check Device Manager for errors

10.2 Printer Maintenance

Maintenance Task	Inkjet Printer	Laser Printer
Regular Cleaning	Run built-in printhead cleaning utility (Print Quality Maintenance in printer software)	Clean drum unit and toner area with dry lint-free cloth every 6 months
Ink/Toner Management	Replace cartridges when low warning appears. Use genuine or quality compatible cartridges.	Shake toner cartridge gently side-to-side to redistribute toner when low
Paper Handling	Use correct paper type. Fan paper before loading to prevent jams. Don't overfill tray.	Same. Ensure paper guides are set correctly to paper size.
Paper Jam Removal	Open all access doors, gently remove jammed paper in direction of paper path	Same — never pull paper against direction of feed (tears paper, damages rollers)
Print Quality Test	Print test page: Control Panel → Devices and Printers → right-click printer → Printer Properties → Print Test Page	Same — also check drum for streaks or lines
Driver Maintenance	Update driver from manufacturer website if print quality issues after OS update	Same

10.3 Display Device Maintenance

Issue	Cause	Fix
Dead Pixels	Pixel permanently stuck on one color (usually bright red/green/blue or black)	Run dead pixel fixing software (flashes colors rapidly). If permanent, warranty claim.
Screen Flickering	Loose cable, bad refresh rate, driver issue	Check monitor cable, set correct refresh rate in Display Settings, update GPU driver

Issue	Cause	Fix
Burn-In (OLED/Plasma)	Same static image displayed for very long time	Enable screensaver or automatic screen timeout; vary content on screen
Color Inaccuracy	Monitor not calibrated, wrong color profile	Use Windows Color Calibration: Settings → Display → Color Calibration
Blurry Display	Wrong resolution setting, wrong scaling	Set native resolution in Display Settings; adjust DPI scaling
No Signal	Monitor cable disconnected, wrong input selected	Check cable, press Input/Source button on monitor to select correct input (HDMI 1/2, DP, VGA)]

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SECTION 11: PORTABLE COMPUTERS, NETWORKING, SECURITY & PC ENVIRONMENT

11.1 Portable Computer Maintenance

Task	Description
Battery Care	Keep charge between 20%-80% for maximum lifespan. Avoid full 0% discharge regularly.
Thermal Management	Ensure laptop vents (bottom and sides) are not blocked. Use on hard flat surfaces, not beds/sofas.
Clean Laptop Keyboard	Use compressed air between keys. Wipe with slightly damp microfiber cloth.
Clean Laptop Screen	Same as monitor — microfiber cloth, no harsh chemicals
Update Drivers	Device Manager or manufacturer's support page for laptop-specific drivers (audio, touchpad, display)
Check Battery Health	powercfg /batteryreport in CMD — generates battery health report showing design vs current capacity
Cooling Pad	Use a cooling pad for gaming/heavy-use laptops to improve airflow
Safe Carrying	Use padded laptop bag. Never stack heavy items on top of laptop. Avoid carrying by screen.
Lid Hinge Care	Open laptop from center of screen, not from corner — prevents hinge damage over time

11.2 Networking Maintenance

- Router/Modem Restart: Restart monthly — clears cache, reconnects to ISP, often fixes slow internet
- Wi-Fi Password: Change default router password to a strong custom password to prevent unauthorized access
- Update Router Firmware: Log in to router admin panel (usually 192.168.1.1) → check for firmware updates
- Network Troubleshooter: Settings → System → Troubleshoot → Other troubleshooters → Internet Connections
- IP Config Commands: CMD → ipconfig (see IP) | ipconfig /release then /renew (refresh IP) | ping 8.8.8.8 (test internet connectivity)
- Network Cable Check: Replace damaged or bent RJ45 cables; cables over 100 metres lose signal
- Forget and Reconnect Wi-Fi: Settings → Network → Wi-Fi → Manage known networks → Forget → reconnect

11.3 Advanced Security Practices

Practice	Description
Regular Backups (3-2-1 Rule)	Keep 3 copies of data, on 2 different storage types, with 1 copy offsite (cloud)

Practice	Description
Strong Unique Passwords	Different password for every account. Use a password manager (Bitwarden, LastPass, KeePass).
Two-Factor Authentication	Enable 2FA on all important accounts — email, banking, social media
Phishing Awareness	Never click suspicious links in emails/SMS. Verify sender address. Banks never ask for OTP via email.
Public Wi-Fi Safety	Avoid banking/sensitive tasks on public Wi-Fi. Use VPN (Virtual Private Network) if needed.
Software Whitelisting	Only install software from official/trusted sources. Avoid cracked software — full of malware.
Firewall	Keep Windows Firewall enabled. Enterprise: use hardware firewall/UTM appliance.
Data Encryption	Encrypt sensitive files. Use BitLocker for full drive encryption.
Regular Security Audit	Check for weak passwords, unused accounts, unnecessary network shares monthly
Incident Response Plan	Have a plan for if PC is infected: disconnect from network, backup, scan, restore/reinstall

11.4 Maintaining the PC Environment

Environmental Factor	Ideal Condition	Why It Matters
Temperature	15°C – 25°C (room temperature)	High temps cause overheating and premature hardware failure
Humidity	30% – 60% relative humidity	Too dry = static electricity (ESD risk). Too humid = condensation, corrosion on circuits.
Dust	Clean, dust-free environment	Dust insulates heat and clogs fans — causes overheating
Power Quality	Stable voltage via UPS/AVR (Automatic Voltage Regulator)	Voltage spikes destroy power supplies and motherboards
Ventilation	Adequate airflow around and inside case	Prevents hot air recycling; ensures cool air intake
Lighting	Adequate but not direct sunlight on monitor	Direct sunlight fades screen and causes glare
Positioning	Not on carpet (static), not in enclosed cabinet	Carpet generates static; enclosed spaces trap heat
Cable Management	Cables organized and not blocking airflow	Neat cables improve airflow and make maintenance easier
Ergonomics	Monitor at eye level, 50-70cm away; keyboard at elbow height	Reduces eye strain, back pain, and wrist injuries (RSI)

SECTION 12: QUICK REVISION POINTS

Key Points for Exam

Security Threats

- Virus = attaches to files | Worm = self-replicating via network | Trojan = disguised as good software
- Ransomware = encrypts files, demands payment | Spyware = secretly monitors user | Phishing = fake sites/emails
- Antivirus: keep updated, run weekly scan, never install two AV programs simultaneously

Maintenance

- Disk Cleanup: removes temp files, update backups, recycle bin. Path: Search 'Disk Cleanup'
- Defrag: ONLY for HDD, NOT SSD. Windows schedules weekly automatically.
- CCleaner: cleans junk files, registry, manages startup programs
- SpinRite: HDD recovery tool. MemTest86: RAM testing tool. CrystalDiskInfo: SMART HDD health

Troubleshooting

- First step: ALWAYS restart the computer
- Safe Mode: Settings → Recovery → Advanced startup → Troubleshoot → Startup Settings → F4/F5
- System Restore: returns Windows to earlier state without deleting personal files
- Uninstall: Settings → Apps → Apps & Features → select app → Uninstall

Environment & Hardware

- Ideal PC room: 15-25°C, 30-60% humidity, dust-free, stable power (UPS/AVR)
- Thermal paste: replace every 2-3 years. CPU should stay below 70°C under load
- 3-2-1 Backup: 3 copies, 2 media types, 1 offsite

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SECTION 13: IMPORTANT MCQ QUESTIONS

Multiple Choice Questions (MCQs)

> *20 important exam questions. Correct answer marked with ✓ and explanation provided.*

Q1. Which type of malware encrypts user files and demands money for decryption?

(a) Virus
(b) Spyware
(c) Ransomware ✓
(d) Adware

Explanation: *Ransomware encrypts victim's files and demands a ransom (payment) for the decryption key. Examples: WannaCry, CryptoLocker, Petya. Regular backups are the best defense.*

Q2. What is the FIRST step to try when troubleshooting most computer problems?

(a) Reinstall Windows
(b) Format the hard disk
(c) Restart the computer ✓
(d) Buy a new computer

Explanation: *Restarting clears RAM, ends all processes, and often resolves software glitches, update issues, and performance problems. It is always the first troubleshooting step.*

Q3. Windows Defender is:

(a) A paid third-party antivirus
(b) A built-in free antivirus included with Windows 10/11 ✓
(c) A firewall hardware device
(d) A type of virus

Explanation: *Windows Defender (now called Microsoft Defender) is a free antivirus built into Windows 10 and 11. It provides real-time protection and is automatically updated via Windows Update.*

Q4. Disk Defragmentation should ONLY be performed on:

(a) SSD (Solid State Drive)
(b) USB Flash Drive
(c) HDD (Hard Disk Drive) ✓
(d) CD-ROM

Explanation: *Defragmentation is only for HDDs — it reorganizes scattered file fragments to improve speed. NEVER defrag an SSD — it has no moving parts and defragging reduces its lifespan.*

Q5. CCleaner is primarily used for:

(a) Creating virus protection
(b) Cleaning junk files, managing registry, and startup programs ✓
(c) Installing new hardware drivers
(d) Partitioning hard drives

Explanation: *CCleaner cleans temporary files, browser cache, Windows junk, fixes registry issues, and manages startup programs to improve PC performance. Available free from ccleaner.com.*

Q6. Safe Mode in Windows starts with:

(a) All programs and drivers
(b) Only minimum essential drivers and programs ✓

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(c) Full internet access and all services
(d) Maximum graphics and audio

Explanation: *Safe Mode loads only the minimum drivers and services needed to run Windows. If a problem doesn't appear in Safe Mode, it's caused by a third-party program or driver.*

Q7. SpinRite is best known for:

(a) Cleaning browser history
(b) Testing internet speed
(c) Hard disk recovery and maintenance ✓
(d) Defragmenting SSDs

Explanation: *SpinRite by Gibson Research Corporation (GRC) recovers data from failing HDDs, performs deep drive testing, and refreshes magnetic data. It works below the OS level, booting from USB/CD.*

Q8. When cleaning inside a desktop PC, which tool should you use to blow out dust?

(a) Regular vacuum cleaner
(b) Compressed air can ✓
(c) Damp cloth
(d) Hair dryer

Explanation: *A compressed air can safely blows dust from heatsinks, fans, and motherboard without risk. Vacuum cleaners generate static electricity. Damp cloth and hair dryer can damage components.*

Q9. The 3-2-1 Backup Rule means:

(a) Backup 3 times per day at 2am and 1pm
(b) 3 copies of data, 2 different media types, 1 offsite copy ✓
(c) 3 files, 2 folders, 1 drive
(d) Back up 3 files every 21 hours

Explanation: *3-2-1: Keep 3 total copies of data, on 2 different storage types (e.g., HDD and USB), with 1 copy kept offsite (cloud or different location). This protects against hardware failure, fire, and theft.*

Q10. To start Windows in Safe Mode in Windows 10/11, you go to:

(a) Control Panel → Safe Mode
(b) Settings → System → Recovery → Advanced startup ✓
(c) Task Manager → Safe Mode
(d) Device Manager → Boot Options

Explanation: *Settings → System → Recovery → Advanced startup → Restart now → Troubleshoot → Advanced Options → Startup Settings → Restart → Press 4 for Safe Mode.*

Q11. What does UAC (User Account Control) do in Windows?

(a) Updates antivirus definitions
(b) Alerts user when programs try to make system changes ✓
(c) Manages Wi-Fi connections
(d) Checks disk for errors

Explanation: *UAC (User Account Control) displays a prompt asking for permission or administrator password whenever a program tries to make changes to the system. It prevents silent installation of malware.*

Q12. CPU thermal paste should typically be replaced:

(a) Every week
(b) Every month
(c) Every 2-3 years or when temperatures rise abnormally ✓
(d) Never — it lasts forever

Explanation: *Thermal paste dries and loses effectiveness over 2-3 years, causing CPU temperatures to rise. Replace it during deep cleaning or when idle temperatures are noticeably higher than normal.*

Q13. Which command in CMD shows your computer's IP address and network configuration?

(a) netstat
(b) tracert
(c) ipconfig ✓
(d) ping

Explanation: *ipconfig shows IP address, subnet mask, and gateway. ipconfig /all shows full details including MAC address and DNS. ipconfig /release and /renew refreshes the IP address from DHCP.*

Q14. BitLocker in Windows is used for:

(a) Scanning for viruses
(b) Encrypting the entire hard drive ✓
(c) Defragmenting the disk
(d) Managing startup programs

Explanation: *BitLocker encrypts the entire hard drive. If the laptop is stolen, the thief cannot access data without the BitLocker password or recovery key. Available in Windows Pro, Enterprise, and Education editions.*

Q15. MemTest86 is a tool used to:

(a) Test internet speed
(b) Check hard disk health
(c) Test RAM (memory) for errors ✓
(d) Clean browser cache

Explanation: *MemTest86 is a free tool that tests RAM modules for errors. It boots from USB before Windows loads and runs thorough memory tests. Any errors indicate faulty RAM that should be replaced.*

Q16. What is the ideal humidity range for a PC environment?

(a) 0% - 10%
(b) 30% - 60% ✓
(c) 80% - 100%
(d) Any humidity is fine

Explanation: *30%-60% relative humidity is ideal. Too dry (below 30%) causes static electricity buildup (ESD risk). Too humid (above 70%) causes condensation and corrosion on circuit boards.*

Q17. System Restore in Windows:

(a) Deletes all personal files and photos
(b) Returns Windows system files to a previous state without affecting personal files ✓
(c) Formats and reinstalls Windows
(d) Permanently removes all installed programs

Explanation: *System Restore reverts Windows system files, registry, and programs to a restore point — without deleting personal documents, photos, or music. It's ideal when a driver or program installation causes problems.*

Q18. Which antivirus tool is specifically effective at removing EXISTING malware that other AV software missed?

(a) CCleaner
(b) Malwarebytes ✓
(c) SpinRite

(d) CrystalDiskInfo

Explanation: *Malwarebytes specializes in detecting and removing malware that may have slipped past standard antivirus. It is commonly used alongside another antivirus for cleanup of existing infections.*

Q19. When should you AVOID defragmenting a drive?

(a) When the HDD is more than 10% fragmented

(b) When the SSD shows high fragmentation in Windows ✓

(c) When using Windows 7 or older

(d) When the PC has less than 4GB RAM

Explanation: *NEVER defragment an SSD. SSDs have no moving parts — fragmentation doesn't affect access speed. Defragging an SSD wastes write cycles and reduces the drive's lifespan significantly.*

Q20. What is the purpose of a UPS (Uninterruptible Power Supply)?

(a) Increase computer speed

(b) Provide backup battery power during power failures and protect against surges ✓

(c) Clean dust from inside the PC

(d) Improve Wi-Fi signal strength

Explanation: *A UPS provides battery backup power when mains electricity fails — giving time to save work and shut down safely. It also protects against power surges, spikes, and voltage fluctuations.*

Best of Luck for Your Exam!

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