LONDON METROPOLITAN UNIVERSITY

FIRST-SIT QUESTION PAPER **Year Long 2021**

Module Code:	**CT4005NI**
Module Title:	**Computer Hardware and Software Architectures**
Module Leader:	**Puranjan Acharya (Islington College)**

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Day / Evening:	**Day**
Start Time:	**09:00 AM**
Duration:	**12 hours**

Test Type:	**SEEN TEST**
Materials supplied:	None
Materials permitted:	Writing equipment only
Warning:	Candidates are warned that possession of unauthorized materials in a test is a serious assessment offence.

Instructions to candidates:	This test accounts for **20%** of your total module grades. You are to **submit this test paper**, in the google classroom.

Last Name : Giri

First Name : Karmaraj

Id. No : 20048909

Question A:

Answer the following in your own words. [10]

1. Explain what happens to the data after we remove it from the hard disk. How a file recovery software works.

Answer:

Data is stored as files – the computer equivalent of files stored in a filing cabinet. Files are stored in folders and folders are stored within drives. A storage device is a device that is capable of storing and retaining data even when the computer has been switched off. When we no longer need the data, we can simply delete it from the computer. But, simply deleting the data from computer does not mean that it has been completely removed from the whole system of computer. It gets moved to the recycle bin or trash after its deletion. After deleting the specific data from the recycle bin/ trash then only it is deleted. But the complete removal of data from the hard drive or memory card has not been yet completed but the directory for the file name and the space taken by it is removed. So a new files can be moved in that specific space occupied by the older files.

File recovery can be defined as the process of rebuilding or recovering the lost or damaged files from a disk or hard drive. When users accidently delete photos, videos, documents or any other important files their first instinct may be to use recovery software to retrieve what their phone or computer considers to be lost. This action is an irreversible mistake that will overwrite the erases files with the downloaded software. Different approaches are used to regain the missing files, yet only one the condition that their content is present somewhere within the storage. When the recycle bin is emptied, what is actually being deleted is something known as the master file table reference, which is essentially a map that points to where the data is stored on the drive. But the data itself, stored as a series of 0s and 1s, is still physically there and can be accessed again as long as it isn't overwritten. When the master file table reference is deleted, the portion of the drive where the data is stored is marked as free, ready to have a new data written. As long as no data is overwritten, data recovery is still possible. This is how the file recovery software works.

2. Why SSDs are getting so much popular. What is the difference between HDD and SSD? Explain in detail. [10]

Answer:

A Solid-State Drive (SSD) is an electronic, non-volatile random access new generation of storage device used in computer that uses integrated circuit assemblies to store data persistently by using flash-based memory, which is significantly faster. They are getting much more popular and replacing the use of HDD due is its different useful features. Some of them are described below:-

1. Durability and resistance
   SSDs are more resistant and durable. For example: If a person happened to drop his/her laptop on the ground and it had a Solid State Drive installed, the screen would probably break before the SSD. That's what it mean by SSD durability and resistance.

2. Speed
   SSD has access speed of 35 to 100 micro- seconds which delivers 100 times the performance of HDDs. This results in instant load performance, which equals faster boot times, faster application loading times and better system responsiveness.

3. Easy to carry
   Since SSDs have light weight components, they are more mobile-friendly and are much better suited for constant travelling.

4. Efficiency and reliability
   The SSDs uses flash memory to store data, which provides a better reliability and efficiency over hard disk drives. Moreover, since SSDs don't have any moving parts, they use less power to function. Respectively, users can benefit from longer battery life for their laptops.

5. Easy Installation
   Installing a SSDs is easy and does not require any previous experience. Just a screwdriver perhaps.

- The Difference between HDD and SSD are given below:-

Solid State Drive (SSD)	**Hard Disk Drive (HDD)**
1. SSD stores data in flash memory, enables quick loading and processing.	1. HDD stores data in moving parts, which makes running and processing operations slow.
2. It takes less time for retrieving data.	2. It takes somehow more time in comparison to SSD to retrieve data.
3. It allows computers to remain cool as they use less energy.	3. It consumes more energy and makes the computers turn hot.
4. It is more safer, dropping a laptop may not lead to loss of data.	4. Dropping a laptop may lead to data loss as HDD contains moving parts in motion.
5. It does not generate any vibrations.	5. It generates vibrations because it contains moving parts.
6. SSD is always preferred choice because of less loading and running time.	6. HDD is not a preferred choice because of the slow speed.

3. What happens once you power on your computer. Explain all the booting process from pressing on power button to fully loaded OS. [5]

Answer:

When once the computer is powered on, the computer system receives a power signal from the power supply and the CPU will seek instructions from the BIOS about initializing the system and the BIOS will start interfacing with the hardware.

The booting process from pressing on power button to fully loaded OS in explained below:-

Booting is the initial set of operations that a computer system performs when a electrical power is switched on. The process begins when a computer that has been turned off is re-energized and ends when the computer is ready to perform its normal operations. In order for a computer to successfully boot, its BIOS, operating system and hardware components must all be working properly. Failure of any one of these three elements will likely result in a failed boot sequence. When the computer's power is first turned on, the CPU initializes itself, which is triggered by a series of clock ticks generated by the system clock. Part of the CPU's initialization

is to look to the system's ROM BIOS for its first instruction in the startup program. The ROM BIOS stores the first instruction, which is the instruction to run the power-on self test (POST), in a predetermined memory address. POST begins by checking the BIOS chip and then tests CMOS RAM. If the POST does not detect a battery failure, it then continues to initialize the CPU, checking the inventoried hardware devices, secondary storage devices, such as hard drives and floppy drives, ports and other hardware devices, such as the keyboard and mouse to ensure they are functioning properly.

Once the POST has determined that all components are functioning properly and the CPU has successfully initialized, the BIOS looks for an OS to load.

The BIOS typically looks to the CMOS chip to tell it where to find the OS, and it most PCs, the OS loads from the C drive on the hard drive even though the BIOS has the capability to load the OS from the floppy disk, CD or ZIP drive. The order of drives that the CMOS looks to in order to locate the OS is called the boot sequence, which can be changed by altering the CMOS setup. Looking to the appropriate boot drive, the BIOS will first encounter the boot record, which tells it where to find the beginning of the OS and the subsequent program file that will initialize the OS.

Once the OS initializes, the BIOS copies its files into memory and the OS basically takes over control of the boot process. Now in control, the OS performs another inventory of the system's memory and memory availability (which the BIOS already checked) and loads the device drivers that it needs to control the peripheral devices, such as printer, scanner, optical drive, mouse and keyboard, This is the final stage in the boot process after which the user can access the system's applications to perform tasks.

4. **Case Study**

Objectives

Build a custom PC for yourself.

Background

make a custom-made PC for your personal purpose. The requirements are:

1. Run all the office package
2. Run all basic multimedia package like adobe photoshops etc.
3. Run all the programming package like java and python.
4. Run all the Email/Internet package in a WIFI connection.

Give a detailed information on following topics:

- **Part1: Precautions and safety measures before building a PC [10]**

  Answer:

  When building a PC there are a lot of important things that need to keep in mind during the process. Some of the necessary guides and checklists are explained below in order to make the building process as easy as possible and safe.

  Electricity is an important issue to consider with dangerous implications for those who ignore it. When building the computer, be 100% sure that the power supply is disconnected from the mains. As static electricity is a real hazard so, PC builder must wear an antistatic wrist. Right tools for specific components must be used properly for the job. Sensitive components should be kept in the antistatic bags that they came with. All the cables, peripheral devices, internal components should be handled with care. Having a fire extinguisher and first-aid kit in the case of fire or injury is a great practice. The power supply or a CRT monitor should never be opened because various chemicals and different others sensitive components are attached which requires a experienced technicians in order to cope with these parts. The working are must be clean, wide, dust free and an organized. The PC builder must not have the habit of drinking and eating foods while working in the work place. A simple mistake can cause a damage in the parts of the computer. Electrical devices have certain power requirements so the manual should be read and work accordingly. Computers and their peripherals contain different chemicals and metals which is extremely dangerous and handled with care. The printer should be cooled before attempting to repair it. While lifting any heavy objects and other computer parts we should bend our knees to avoid back injury. Sharp edges and other pointed knife can make injury so they must be cover and handled with care. The MSDS is the most important to watch before it deals with the various safety measures and other important information that one should have before building a PC.

- **Part2: Parts purchased, their specifications and current cost in npr [10]**

  Answer:

  Following are the parts purchased, their specifications and current cost that were used during the PC building process:-

- Computer Case
    - Model – ATX RGB Strip
    - Specifications – Type: Mid-Tower, Material: Steel, tempered glass, Weight: 10 kg, slots 4, Form Factor: E-ATX, 3 fans included
    - Current Price – Rs 20,300
- Motherboard
    - Model – Asus ROG Strix X570-E
    - Specifications – PCIe 4.0, WIFI 5, Aura Sync RGB
    - Current Price – Rs 45,000
- CPU
    - Model – AMD Ryzen 9 5900X
    - Specifications – 12-core, 24-thread, Clock Speed: 3.7 Ghz base, 4.8Ghz boost
    - Current Price -Rs 85,000
- Power Supply Unit
    - Model – PS1000
    - Specifications – 1000Wt
    - Current Price –19,000
- RAM
    - Model – HyperX Fury RGB
    - Specifications – DDR4 @ 3733MHz, 16 GB
    - Current Price –18,000
- HDD
    - Model – Toshiba X3oo
    - Specifications – 2 TB SATA
    - Current Price –15,000
- Heat Sink
    - Model – NZXT Kraken X62
    - Specifications – 280mm, Liquid Cooler
    - Current Price – Rs 19,000
- Monitor
    - Model – BenQ PD2700U
    - Specifications – 28inch, 4K, 90Hz
    - Current Price –35,000

- Keyboard
    - Model – Logitech K400 Plus Wireless
    - Specifications – 85 keys, backlight floating-keys
    - Current Price –35,000
- Mouse
    - Model – Logitech MX Master 3
    - Specifications –7D Macro Programmable, RGB 16.8 million colours
    - Current Price –25,000
- Wi-Fi Card
    - Model – FebSmart Wireless Dual Band N600
    - Specifications – 2.4 GHz 300Mbps
    - Current Price –15,000

- **Part3: Build process** **[15]**

Answer:

First of all, we should buy all the required hardware, peripheral devices and other useful equipment for the purpose of building a PC. All the precautions, safety measures should be kept in mind before assembling the PC. Essential equipment like screwdrivers, anti-static mat, gloves, fire-extinguisher and so other required things should be gathered and must be kept in the place in the proper way. The working place must be clean, dust free, good ventilation and comfortable. First, the case of the CPU should be opened by removing the screws which is placed in the back side of the CPU. Most of the power supply can only fit one way. First, the power supply should be inserted by aligning the holes in the case.

The CPU and the CPU fan can be installed on the motherboard before or after placing the motherboard in the case. The CPU and motherboard are sensitive to ESD therefore antistatic tools must be used properly. The CPU socket holder should be located and the latch lever should be lifted up to open the CPU socket holder. The CPU should be handled gently by its sides and placed in the socket. The latch level should be lowered to secure the CPU. A small amount of thermal paste can be applied onto the CPU socket by aligning it with the holes.

RAM must be compatible with the specific motherboard. Depending on the motherboard, RAM modules are usually installed in corresponding slots (unless you're only installing a single stick). Manuals for motherboards usually state which slots you should use. The RAM should be lined up on the notch with the mounting slot and pressed firmly down until the side tabs click into place.

The HDD should be aligned and inserted into the drive bay so that the screw holes in the drive line up with the screw holes in the motherboard. Finally, the HDD is secured using proper screws. The drive should be connected to the motherboard using SATA cable and the power capable should be plugged into the storage drive. It is the same process for the SSD also.

The standoffs should be installed in the computer case. After that, the I/O connectors should be aligned on the back of the motherboard with the opening in the back of the case. The screw holes of the motherboard should be aligned with the standoffs and inserted. Finally, the screws should be tightened.

Wi-Fi card are installed to add the feature of wi-Fi in the PC which must be compatible with the motherboard. The Wi-Fi card should be aligned to the appropriate expansion slot in the motherboard by pressing down firmly until the card is fully seated. The screws should be placed and tightened to secure the card.

Graphics card are also installed so that the quality view can be obtained. It should be also compatible with the motherboard and must be aligned to the appropriate expansion slot. The screws should be placed and tightened to secure the graphics card as Wi-Fi card.

All the cables for each components must be connected in a proper way to the motherboard in their respective slots.

Now, the side cover is placed back on and secured with the case screws. The screws should be tightened. Then, the external cables are connected to the back of the computer case for different devices.

When the PC is booted for the first time, the BIOS performs a check on all the components. This process is called Power on Self-Test (POST). During the Post process, if there are errors, a beep sound is produced . There are different beep sounds to indicate different problems. If no errors are detected then the BIOS set up screen is shown. In the BIOS set up screen, proper setting is set for the PC and rebooted.

We haven't installed any Operating System in ou PC so we need to install an OS. After the OS is installed. We need to create a user account and enter the product key for the operating system. Now the computer is ready to use and any user any interact with the computer.

- **Part4: Future upgrades [10]**

Answer:

As the world is being globalized, more reliable and most efficient equipment are required. So, in coming future we need to upgrade our computer system according to our need. If we need more storage in our PC we should upgrade our hard disk. Similarly, we need to get the latest CPU, graphics card and other different components for the system. We can completely upgrade anything on a PC. Since, applications like Adobe Photoshop and Adobe Premiere Pro are CPU intensive programs, we might need to upgrade our CPU in the future. CPU having greater clock speeds, cores and threads than our current CPU. It has 10 Cores, 20 threads and turbo boost up to 4.3 Ghz. Since, upgrading the RAM can improve the CPU Performance We can add another 16 GB or just 8 GB RAM to make it a dual channel RAM. Since, dual channel RAM perform better than a single channel RAM. If we need to upgrade our graphics card, we should also upgrade our monitor to a higher color accuracy 100% SRGB monitor If we are using photo editing or video editing software. The software and drivers should be kept on our computer by cleaning the hardware once a week. The software and drivers should be kept up to date as it can enhance the performance of our computer system. A monitor with a higher refresh rate, great viewing angle and high color accuracy should be used if we want to paly higher quality games.

Those were some of the parts of the PC that can be upgraded for a super high performance. Since, upgrading everything might make us broke, we can upgrade only the ones we need the most right now and the others at a later date.

5. Write your Troubleshooting steps to carry out in the given cases. **[10 X 3 = 30]**

I. Internet is very slow in the PC.

Answer:

Following are the steps that should be taken in order to solve the problem of the internet being slow:-

1. Sometimes the internet connection may be slow because of paying for crappy internet. Log onto the provider's web site and find out what plan you have.
2. Running of unnecessary programs in background can make internet slow. So, be ensure that the unnecessary files are not running as it limits the bandwidth.
3. There can be problems with the router as well. So, check the router performance as well. If the router is not working properly, try to manage the cables or try to connect it with multiple devices.
4. Check for any worms or malware which can damage the PC and cause internet speed slow

II. Your Personal Computer is Overheating.

Answer:

Following are the steps that should be taken to solve the over-heating problem in the PCs:-

1. Most of the times, PCs get over heated due to its continues running so make habit of taking some interval gap while working with PCs.
2. Place the laptop on the surface which can somehow absorbs heat like towel.
3. Look for any damage to the fans on the laptop. If a fan was running very loud, this is an indication of a damaged or failing of fan or that the system needs to be cleaned.
4. Purchase a new fan if it is damaged and replace it with new ones and be ensure that the new fan is working properly without any obstacles.
5. Clean the rest of the internals of the PCs in a similar way as you did the fan.
6. Replace the access panels and screws. Reinsert the battery and power cord and turn on the computer.
7. If still the Pcs does not stop over-heating, purchase a PCs cooler with a fan to increase the airflow to the PCs.

III. PC Blue screen of death

Answer:

Following are the steps that should be taken to solve the PC Blue screen of death problem:-

1. Restart your computer because sometimes due to the minor problem this problem may arise.
2. Scan your computer for Malware and Viruses. Most of the times they may be the reason for BSOD.
3. Check that the RAM is properly connected to the motherboard.
4. Be ensure that your hard drive is working properly.
5. Update windows and apply any service packs and security updates available.
6. Check if a newly installed Device causing Blue Screen of Death.

IV. Computer keeps restarting automatically frequently

Answer:

Following are the steps that should be taken to solve the frequently restarting problem in the PCs:-

1. Problems with the RAM can lead to various issues, including sudden and recurring reboots. So be sure that the RAM is working properly and is fitted in a correct way in the slot.
2. If you determine that there is no fault in the RAM, another area to look is the power supply. Just like RAM, any problems in the power supply can cause the computer to restart again and again.
3. An overheated processor is one of the most common issues with a computer that keeps restarting. So, check the processor fan is working properly or not.
4. Sometimes, virus in the computer could be the culprit for such PCs restarting problem. If the problems is caused by the virus infection then turn on the boot time scan feature. It deletes the viruses before they load.

V. You cannot find 64-bit option in virtual box while installing ubuntu 64-bit OS

Answer:

Following are the steps that should be taken to solve the problem of not finding 64-bit option in virtual box while installing ubuntu 64-bit:-

1. This problem may arise due to the older version of Virtual box. So be sure that the version you are using is latest and updated.
2. Reboot your computer into BIOS and enable hardware virtualization.
3. Make sure the ‘Intel Virtualization Technology’ and ‘VT-d’ are enabled.
4. Check whether the host has a 64 bit OS.

VI. HDMI Port is not working

Answer:

Following are the steps that should be taken to solve the problem of HDMI port not working properly:-

1. Please ensure that all HDMI connections are seated firmly and in the correct orientation of their corresponding ports.
2. Try booting up your PC/laptop with the HDMI cable connected to a TV that is on.
3. Ensure that your PC’s output resolution and refresh rate are supported by your display.
4. Sometimes a recently installed software can cause the HDMI ports to stop working properly. So, remove the recently installed software if the problem started after the software was installed.
5. Update or reinstall the graphics driver as it is used to communicate the data between the device and system.
6. Check whether the HDMI device is set as the default device or not.

VII. PC keeps disconnecting wi-fi

Answer:

Following are the steps that should be taken to solve the Problem of PC that keeps disconnecting wi-fi:-

1. Sometimes Wi-Fi driver software might be the reason for disconnection of Wi-Fi. So be ensure that your drivers are always up to date in order to fix any bugs, compatibility issues and so forth.
2. Power management setting disables Wi-Fi adapter from time to time. You can turn off power management for adaptor through device manager.
3. The user can try resetting their Wi-Fi auto configuration. After resetting, the user must restart their PC once. If it still does not solve the problem, the user should run network troubleshooter.

VIII. Computer crashes before loading OS

Answer:

Following are the steps that should be taken to solve the computer crashing problem before loading OS:-

1. Most of motherboard problems result in a BSOD. This can lead in a fatal exception error so be ensure that there is not any problem in the motherboard.
2. If drivers aren’t working in a defined manner, they can cause Windows crash even if the hardware is working properly.
3. A virus or trojan can cause a severe harm to computer. So your Computer must be virus free.
4. The components of computer systems are heat sensitive. Too much temperature can cause damage to the parts as well as windows crash. So computer must be cooled.

IX. Graphical errors like your computer screen is jumbled

Answer:

Following are the steps that should be taken to solve the graphical errors like our computer is jumbled:-

1. Adjust the screen resolution and other changes required to solve the problem.
2. Check the graphics connection between the CPU and monitor of the PC.
3. Update the computer's graphic drivers.
4. If any error is still there, switch to open source graphics drivers.

X. Website is running when you give IP address but not working from domain name.

Answer:

Following are the steps that should be taken to solve the problem of website is running when we give IP address but not working from domain name:-

1. Use custom DNS.
2. Check if the Wi-Fi and other devices are able to open from domain name.
3. Check your domain registration: Make sure your registration is up to date or not.
4. Run troubleshoot in Windows network.
5. Check your name servers: Make sure that your domain is using the correct name servers or not.
6. Switch to a different browser.

END