A V PAREKH TECHNICAL INSTITUTE

COMPUTER ENGINEERING DEPARTMENT

Laboratory Manual

Computer Maintenance & Troubleshooting (4360701)

Diploma Computer Engineering Semester VI

Enrolment No	
Name	
Branch	
Academic Term	
Institute	

Directorate of Technical Education

Gandhinagar–Gujarat

DTE's Vision

- To provide globally competitive technical education.
- Remove geographical imbalances and inconsistencies.
- Develop student friendly resources with a special focus on girls' education and support to weaker sections.
- Develop programs relevant to industry and create a vibrant pool of technical professional.

Institute's Vision

To cater skilled engineers having potential to convert global challenges into opportunities through embedded values and quality technical education.

Institute's Mission

Impart quality technical education and prepare diploma engineering professionals to meet the need of industries and society.

Adopt latest tools and technologies for promoting systematic problem solving skills to promote innovation and entrepreneurship.

Emphasize individual development of students by inculcating moral, ethical and life skills.

Department's Vision

Develop globally competent Computer Engineering Professionals to achieve excellence in an environment conducive for technical knowledge, skills, moral values and ethical values with a focus to serve the society.

Department's Mission

- To provide state of the art infrastructure and facilities for imparting quality education and computer engineering skills for societal benefit.
- Adopt industry-oriented curriculum with an exposure to technologies for building systems & application in computer engineering.
- To provide quality technical professional as per the industry and societal needs, encourage entrepreneurship, nurture innovation and life skills in consonance with latest interdisciplinary trends.

A.V. Parekh Technical Institute
(Department of Technical Education, Gujarat State)

Computer Engineering Department

Certificate

This is to certify that Mr./Ms……. Enrollment No. ……..…….. of 6rd **Semester of Diploma in Computer Engineering Department of A V Parekh Technical Institute (GTU Code: 602)** has completed the term work satisfactorily in Subject **Computer Maintenance & Troubleshooting- 4360701** for the academic year: **2025-2026** Term: **EVEN** as prescribed in the curriculum.

Place:……

Date:……

Subject Faculty

Preface

The primary aim of any laboratory/Practical/field work is enhancement of required skills as well as creative ability amongst students to solve real time problems by developing relevant competencies in psychomotor domain. Keeping in view, GTU has designed competency focused outcome-based curriculum -2021 (COGC-2021) for Diploma engineering programmes. In this more time is allotted to practical work than theory. It shows importance of enhancement of skills amongst students and it pays attention to utilize every second of time allotted for practical amongst Students, Instructors and Lecturers to achieve relevant outcomes by performing rather than writing practice in study type. It is essential for effective implementation of competency focused outcome- based Green curriculum-2021. Every practical has been keenly designed to serve as a tool to develop & enhance relevant industry needed competency in each and every student. These psychomotor skills are very difficult to develop through traditional chalk and board content delivery method in the classroom. Accordingly, this lab manual has been designed to focus on the industry defined relevant outcomes, rather than old practice of conducting practical to prove concept and theory.

By using this lab manual, students can read procedure one day in advance to actual performance day of practical experiment which generates interest and also, they can have idea of judgement of magnitude prior to performance. This in turn enhances predetermined outcomes amongst students. Each and every Experiment /Practical in this manual begins by competency, industry relevant skills, course outcomes as well as practical outcomes which serve as a key role for doing the practical. The students will also have a clear idea of safety and necessary precautions to be taken while performing experiment.

This manual also provides guidelines to lecturers to facilitate student-cantered lab activities for each practical/experiment by arranging and managing necessary resources in order that the students follow the procedures with required safety and necessary precautions to achieve outcomes. It also gives an idea that how students will be assessed by providing Rubrics.

Students are eventually going to become a computer engineer and will be placed in an industry. If he/she only possess the knowledge about the languages and its programming then they would have been lacking in some aspects like how the memory and I/O works as well as how the CPU and its components work inside the hardware. By studying this curriculum and performing various practical / exercises given in this manual they can gain the full knowledge of each component’s working and their interconnection for communication hence providing full internal knowledge.

Programme Outcomes (POs)

Following programme outcomes are expected to be achieved through the practical of the course:

1. **Basic and Discipline specific knowledge:** Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the e*ngineering* problems.
2. **Problem analysis**: Identify and analyse well-defined e*ngineering* problems using codified standard methods.
3. **Design/development of solutions:** Design solutions for e*ngineering* well-defined technical problems and assist with the design of systems components or processes to meet specified needs.
4. **Engineering Tools, Experimentation and Testing:** Apply modern en*gineering* tools and appropriate technique to conduct standard tests and measurements.
5. **Engineering practices for society, sustainability and environment:** Apply appropriate technology in context of society, sustainability, environment and ethical practices.
6. **Project Management:** Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities.
7. **Life-long learning:** Ability to analyse individual needs and engage in updating in the context of technological changes in field of engineering.

Program Specific Outcomes (PSOs)

- Able to apply the knowledge gained from Mathematics, Basic Sciences in general and all computer science courses in particular to identify, formulate and solve real life complex engineering problems faced in industries and society.
- The ability to employ modern computer languages, environments and platforms in creating innovative career paths in Hardware, Networking and Software Development technologies

Practical Outcome - Course Outcome matrix

Course Outcomes (COs):

CO1: Evaluate the evolution of computer system on hardware technology advancement basis.

CO2: Classify various types of motherboards and its components.

CO3: Examine working of processor and BIOS.

CO4: Classify hard disk and various types of peripheral devices

CO5: Test and troubleshoot various faults related to computer hardware and its peripherals.

Sr. No.	Experiment/Practical Outcome	CO1	CO2	CO3	CO4	CO5
1	Identify basic parts/components of a Personal computer and laptop Prepare a Chart of your observation.	√	-	-	-	-
2	Observe various types of ports and its connecting devices of front & back side of the PC.	√	-	-	-	-
3	Explore major components of motherboard including north bridge, south bridge, co-processor, chipset etc.	-	√	-	-	-
4	Test power supply (SMPS) and identify different connectors with various voltage levels.	-	√	-	-	-
5	Study the architecture of Multi Core processors.	-	-	√	-	-
6	Elaborate BIOS settings in detailed.	-	-	√	-	-
7	Demonstrate physical structure of Hard disk.	-	-	-	√	-
8	Demonstrate Logical structure of Hard disk.	-	-	-	√	-
9	Illustrate formatting and partitioning of Hard disk.	-	-	-	√	-
10	Classify various types of secondary storage devices.	-	-	-	√	-
11	Test and troubleshoot working of Laser printer.	-	-	-	-	√
12	Experiment various troubleshooting strategies.	-	-	-	-	√
13	Perform Power on Self-Test (POST).					√
14	Dissembling of PC for troubleshooting purpose.					√

Industry Relevant Skills

The following industry relevant skills of the competency are expected to be developed in the student by undertaking the practical of this laboratory manual.

1. Troubleshooting Motherboard, Peripherals and Networks.
2. Select processors for relevant systems.
3. Partition and making Disks usable.

Guidelines to Faculties.

1. Couse faculty should demonstrate experiment with all necessary implementation strategies described in curriculum.
2. Couse faculty should explain industrial relevance before starting of each experiment.
3. Course faculty should involve & give opportunity to all students for hands on experience.
4. Course faculty should ensure mentioned skills are developed in the students by asking.
5. Utilize 2 hrs of lab hours effectively and ensure completion of write up with quiz also.
6. Encourage peer to peer learning by doing same experiment through fast learners.

Instructions for Students

1. Organize the work in the group and make record of all observations.
2. Students shall develop maintenance skill as expected by industries.
3. Student shall attempt to develop related hand-on skills and build confidence.
4. Student shall develop the habits of evolving more ideas, innovations, skills etc.
5. Student shall refer technical magazines and data books.
6. Student should develop habit to submit the practical on date and time.
7. Student should well prepare while submitting write-up of exercise.

Continuous Assessment Sheet

Enrolment No: _____

Name: _____

Term: 2025-26 Even

Sr. No	Experiment/Practical Outcome	Page	Date Performed	Marks (25)	Sign
1	Identify basic parts/components of a Personal computer and laptop Prepare a Chart of your observation.				
2	Observe various types of ports and its connecting devices of front & back side of the PC.				
3	Explore major components of motherboard including north bridge, south bridge, co-processor, chipset etc.				
4	Test power supply (SMPS) and identify different connectors with various voltage levels.				
5	Study the architecture of Multi Core processors.				
6	Elaborate BIOS settings in detailed.				
7	Demonstrate physical structure of Hard disk.				
8	Demonstrate Logical structure of Hard disk.				
9	Illustrate formatting and partitioning of Hard disk.				
10	Classify various types of secondary storage devices.				
11	Test and troubleshoot working of Laser printer.				
12	Experiment various troubleshooting strategies.				
13	Perform Power on Self-Test (POST).				
14	Dissembling of PC for troubleshooting purpose.				

Rubrics for Continuous Assessment- CA (25 Marks)

Component	Criteria	Marks	Assessment
Laboratory Work and Questionnaire	**Excellent**	**(23-25)**	Demonstrates exceptional proficiency in both laboratory work and questionnaire assessments, consistently applying skills and understanding effectively.
	Proficient	**(18-22)**	Shows a strong command of both laboratory work and questionnaire assessments, with minor areas for improvement.
	Satisfactory	**(13-17)**	Achieves a satisfactory level of performance in laboratory work and questionnaire assessments, with room for improvement in some areas.
	Needs Improvement	**(8-12)**	Demonstrates limited proficiency in both laboratory work and questionnaire assessments, with significant areas for improvement.
	Inadequate	**(0-7)**	Fails to meet acceptable standards in both laboratory work and questionnaire assessments; significant improvement is required.

Practical No. 01:

Identify basic parts/components of a Personal computer and laptop Prepare a Chart of your observation.

A. Objectives:

A desktop computer and Laptop system typically runs a user-friendly operating system and desktop applications facilitate desktop-oriented tasks. There are different types of computer system with different specifications. Hence student will be able to identify the components of Desktop and Laptop system.

B. Relevant Program Outcomes (POs):

- **Basic and Discipline specific knowledge (PO1):** Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the e*ngineering* problems.
- **Problem analysis (PO2)**: Identify and analyse well-defined e*ngineering* problems using codified standard methods.
- **Design/development of solutions (PO3):** Design solutions for e*ngineering* well-defined technical problems and assist with the design of systems components or processes to meet specified needs.
- **Life-long learning (PO7):** Ability to analyse individual needs and engage in updating in the context of technological changes *in field of engineering.*

C. Competency and Practical Skills:

This practical is expected to develop the following skills for the industry-identified competency:

1. Identify Desktop PC & Laptop
2. Write Components/parts of Desktop & Laptop.
3. Handle computer system carefully.

D. Relevant Course Outcomes (COs):

1. Evaluate the evolution of computer system on hardware technology advancement basis.

E. Practical Outcomes:

1. Identify various components/parts of Desktop and Laptop System.

F. Relevant Affective domain Outcomes (ADOs):

1. Understand Desktop system and Laptop System.

G. Prerequisite Theory:

A desktop computer system typically refers to a personal computer (PC) that is designed to be used on a desk or table at a fixed location, as opposed to portable devices like laptops or tablets. The components of a desktop computer system include:

1. **Central Processing Unit (CPU):** Often referred to as the brain of the computer, the CPU carries out instructions from programs and performs calculations.
2. **Motherboard:** The main circuit board that connects and integrates various components, such as the CPU, RAM, storage devices, and peripherals.
3. **Random Access Memory (RAM):** This is the computer's short-term memory, used to store data that is actively being used or processed by the CPU. RAM allows for quick access to information and faster performance.
4. **Storage:** Desktop computers typically have one or more storage drives, such as Hard Disk Drives (HDDs) or Solid State Drives (SSDs), to store the operating system, software applications, and user data.
5. **Power Supply Unit (PSU):** Converts electrical power from an outlet into a form that can be used by the computer components.
6. **Graphics Processing Unit (GPU):** Responsible for rendering images and videos. In some cases, there may be a separate GPU for gaming or graphic-intensive tasks.
7. **Expansion Slots:** These are slots on the motherboard where additional components, such as graphics cards, sound cards, or network cards, can be added to enhance the computer's capabilities.
8. **Input/Output Ports:** These include USB ports, audio jacks, HDMI ports, and other connectors that allow you to connect peripherals like keyboards, mice, monitors, and external devices.
9. **Cooling System:** Desktop computers have fans or other cooling mechanisms to dissipate heat generated by the CPU and other components to prevent overheating.
10. **Case/Chassis:** The housing that contains and protects the internal components. It often includes slots for drives, ports for peripherals, and a power button.
11. **Operating System (OS):** Software that manages hardware resources and provides a user interface, such as Windows, macOS, or Linux.
12. **Peripheral Devices:** These include input devices like keyboards and mice, output devices like monitors and printers, and additional accessories like speakers, webcams, or external storage.

Desktop computer systems offer flexibility, upgradability, and customization options, making them suitable for a wide range of tasks from general productivity to gaming and content creation.

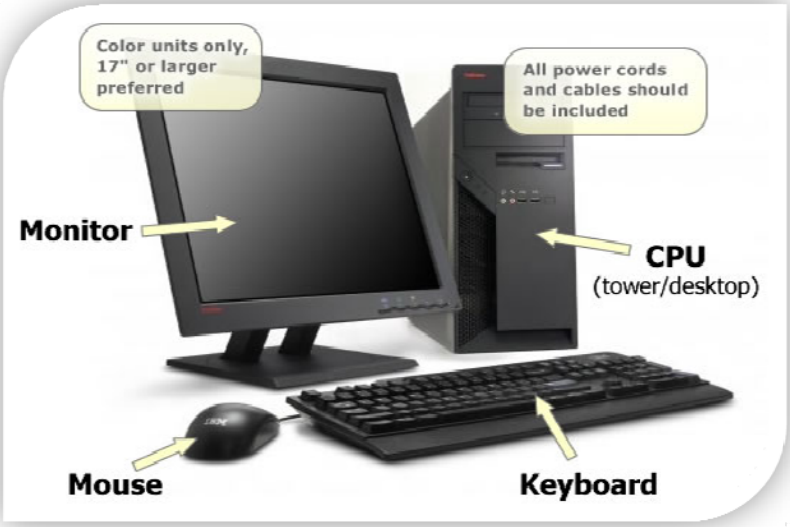
A laptop, also known as a notebook, is a portable personal computer designed for mobile use. Unlike desktop computers, laptops integrate most of their essential components into a single, compact unit. Here are the key components and features of a typical laptop system:

1. **Display:** Laptops have a built-in display screen that serves as the primary output for users. The size and resolution of the screen can vary, but most laptops feature a folding design to protect the screen during transportation.

2. **Keyboard and Touchpad/Trackpad:** Laptops come with an integrated keyboard for input, and many also have a touchpad or trackpad that serves as a pointing device. Some laptops may feature additional input options like a touchscreen.
3. **Central Processing Unit (CPU):** Like desktop computers, laptops have a CPU that acts as the brain of the system, executing instructions and performing calculations.
4. **RAM (Random Access Memory):** Laptops include RAM for temporary data storage, enabling quick access to actively used applications and processes.
5. **Storage:** Laptops use storage devices such as Solid State Drives (SSDs) or Hard Disk Drives (HDDs) to store the operating system, software applications, and user data.
6. **Battery:** Laptops are powered by rechargeable batteries, allowing users to use the device without being tethered to a power outlet. Battery life varies depending on usage and the laptop's specifications.
7. **Motherboard:** The motherboard in a laptop connects and integrates various components, similar to a desktop computer.
8. **Graphics Processing Unit (GPU):** Laptops have integrated graphics or discrete GPUs to handle graphical tasks, including rendering images and videos.
9. **Ports and Connectivity:** Laptops come equipped with a variety of ports for connecting external devices. Common ports include USB, HDMI, audio jacks, and networking ports. Many laptops also feature wireless connectivity options such as Wi-Fi and Bluetooth.
10. **Cooling System:** Laptops include cooling mechanisms, such as fans or heat sinks, to dissipate heat generated by the CPU and GPU.
11. **Operating System (OS):** Like desktop computers, laptops run an operating system (such as Windows, macOS, or Linux) that manages hardware resources and provides a user interface.
12. **Webcam and Microphone:** Many laptops have an integrated webcam and microphone for video conferencing and online communication.

Laptops are popular for their portability and versatility, making them suitable for a wide range of tasks, including work, entertainment, and on-the-go computing. They are particularly favored by users who require mobility and the convenience of computing from different locations.

Computer System: -



Hardware: -

Software: -

H. Work Situation:

a. Faculty will demonstrate different types of computer system.

b. Faculty must form a group of two or three students.

c. Students group will observe different parts of computer system.

I. Resources required:

1.Desktop PC

2.Laptop

J. Procedure:

1.Identify different computer system available in laboratory.

2.Identify and observe different parts of desktop and laptop system.

3.Compare Desktop PC and Laptop.

K. Practical related Question:

1.Explain Computer systems with its functional block diagram.

2.Define Hardware and Software.

3.Explain Input Devices.

4.Explain Output Devices.

5.List Different parts of Desktop Computer Shown in fig 1

Fig. 1 Desktop Computer

6.List Different parts of Laptop System shown in fig.

Fig.2 Laptop

(Space for Answers)

Sr No	Category	Specifications
1	Processor	
2	Processor Speed	
3	Operating System	
4	Memory	
5	Storage (HDD)	
6	Graphics Card	
7	Display/Monitor	
8	CD/DVD Drive	
9	Keyboard	
10	Mouse	
11	Network Adaptor	
12	HDMI Port (If available)	
13	USB Ports	

Table 1: Desktop Specification

Table:2 Laptop Specification

Sr No	Category	Specifications
1	Brand	
2	Model	
3	Processor	
4	RAM	
5	Storage	
6	Display	
7	Operating System	
8	Wireless Connectivity	
9	Webcam	
10	Battery	
11	Ports	
12	Audio	

Signature

Practical No. 02:

Observe various types of ports and its connecting devices of front & back side of the PC.

A. Objectives:

Understand the various types of ports available in given computer system.

Gain hands-on experience of front and back side of given desktop system.

Learn how to connect the devices with its ports.

B. Relevant Program Outcomes (POs):

- **Basic and Discipline specific knowledge (PO1):** Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the e*ngineering* problems.
- **Life-long learning (PO7):** Ability to analyse individual needs and engage in updating in the context of technological changes in field of engineering.

C. Competency and Practical Skills:

This practical is expected to develop the following skills for the industry-identified competency '**observe various ports and connecting devices**:

1. Competency in understanding the front and back side of the computer system

D. Relevant Course Outcomes (COs):

Evaluate the evolution of computer system on hardware technology advancement basis.

E. PracticalOutcomes:

Understand front and back side of the PC.

F. Relevant Affective domain Outcomes (ADOs):

Understand the function of various ports and connecting devices.

G. Prerequisite Theory:

A **port** is basically a physical docking point which is basically used to connect the external devices to the computer, or we can say that A port act as an interface between the computer and the external devices, e.g., we can connect hard drives, printers to the computer with the help of ports. **Features of Computer ports:**

- We can connect external devices to the computer with the help of ports and cables.
- These are basically slots on motherboard where we connect external devices, or we can plug in external devices through cables.
- Mouse, keyboards, printers, speakers are some examples of external devices that connected to the computer through ports.

    - These are basically used for external modems.
    - These are basically available in two versions in market these are 9 pins, 25 pin models.
    - Data travels at a speed of 115 kilo-bits per second.
- These are basically used to connect peripherals such as scanners or printers.
- These are also known as printer ports.
- These are available in a 25-pin model.
- Data travels at a speed of 150 kilobits per second.
- These are basically used by old computers for connecting mouse or keyboard.
- These are called mouse ports.
- These ports are still favoured in organisation for security reason.
- These ports provide no restriction on key rollover.
- Basically, it can connect all types of external devices to the computer such as mouse, keyboard, printers, speakers etc.
- These ports were introduced in 1997.
- Minimum 2 ports are there in every computer system.
- Data basically travels at a speed of 14mb/s which is much faster than serial port.
- The devices that use USB port gets power from a USB port.
- It is used to connect monitor to computer's video card.
- It is 15 pin connectors.
- These were introduced by IBM in 1987.
- VGA basically utilizes analog signal hence it can only be used to lower resolution or we can say VGA is only capable of lowering the resolution.

1. **Modem Port:** These are basically used to connect PC's modem to telephone networks.
2. **Ethernet Port:** These are basically used to connect Ethernet cables to the computer. In this data may travel with a speed of 10mb/s to 100 mb/s based on the network bandwidth.
3. **Game Port:** These ports are available in computer to connect joysticks which are now replaced by USB.
4. Digital Video Interface or we can say DVI Port these are basically used to connect flat panel LCD Monitor to the computer's high end video graphics.
5. **Sockets:** Sockets are basically used to connect microphone or speakers to the sound card of the computer.

H. Work Situation:

a. Faculty will demonstrate different types of ports available in computer system.

b. Faculty must form a group of two or three students.

c. Students group will observe different ports, connectors and its connection.

I. Resources Required:

Desktop PC

J. Procedure:

1**.**Identify different computer system available in laboratory.

2.Identify and observe different ports and connectors of desktop system.

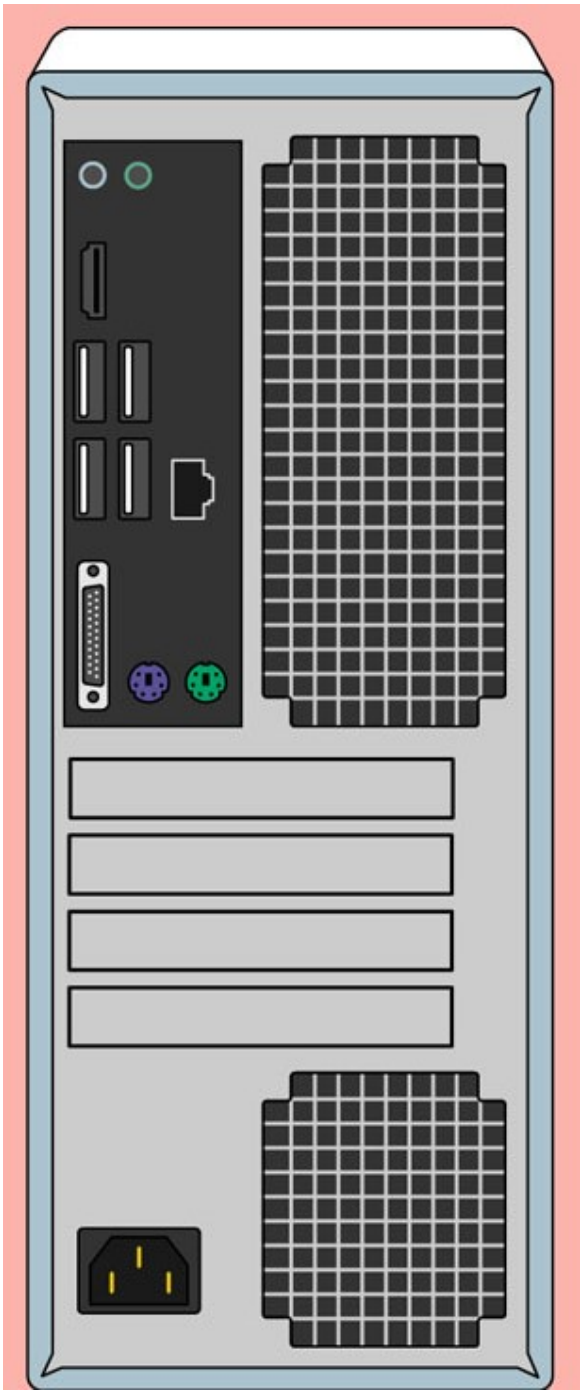
3.Study back and front side of computer system.

K. Practical related Question:

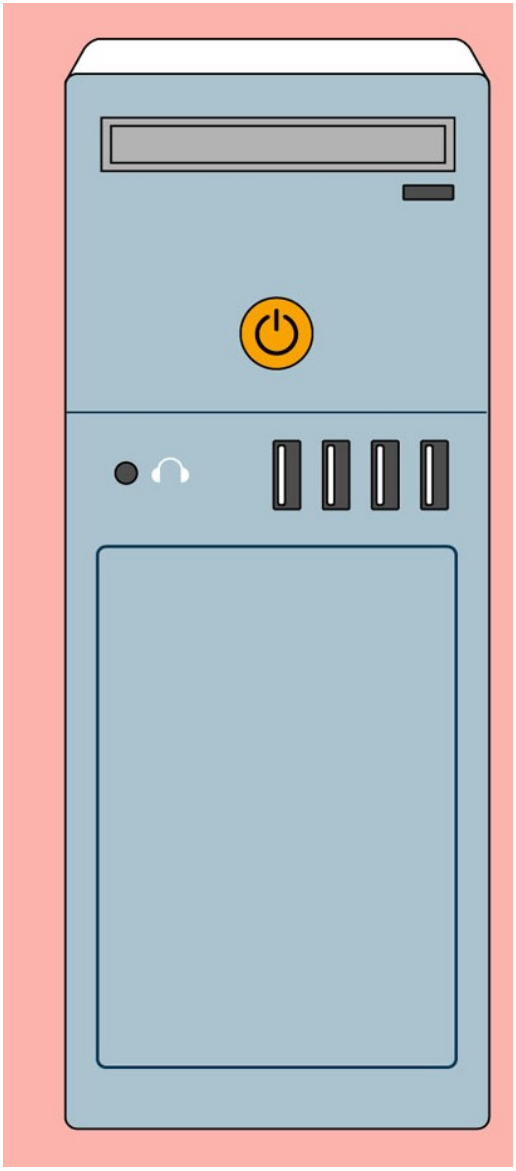
1. Different ports of PC and its use.

2. Different connectors available in PC and it's use**.**

3. Label the Back side of the PC.

- 

4. Label the frontside of the PC.



Signature

Practical No. 03:

Explore major components of motherboard including north bridge, south bridge, co-processor, chipset etc.

A. Objectives:

The primary components on a PC motherboard are the PC chipset, CPU, memory, clock, buses and BIOS. Chipset handles the communication between various components such as CPU, peripherals, and buses. Northbridge and southbridge are two chips in the chipset. Hence students will be able to identify the components of the motherboard.

B. RelevantProgram Outcomes (POs):

- **Basic and Discipline specific knowledge (PO1):** Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the e*ngineering* problems.
- **Life-long learning (PO7):** Ability to analyse individual needs and engage in updating in the context of technological changes in field of engineering.

C. Competency and Practical Skills:

This practical is expected to develop the following skills for the industry-identified competency like

1. Identify components of motherboard.
2. Find chipset available on motherboard
3. Find common faults in motherboard.

D. Relevant Course Outcomes (COs):

1. Classify various types of motherboards and its components.

E. Practical Outcomes:

1. Identify different components on motherboard.
2. Troubleshoot common problems of motherboard.

F. Relevant Affective domain Outcomes (ADOs):

1 Identify and Describe Components:

2 Understand Functionality

3 Installation and Assembly

4 Troubleshooting

G. Prerequisite Theory:

A motherboard, also known as a mainboard or system board, is a crucial component in a computer system. It serves as the central platform that connects and facilitates communication between various hardware components, allowing them to work together harmoniously. The motherboard connects directly or indirectly to every part of the PC. It also controls various data transaction between the CPU and other peripheral connected to it.

Chipset: - A set of chips that provides the interfaces between all of the PC's subsystems. It provides the buses and electronics to allow the CPU, memory and input/output devices to interact. PC chipsets, which are housed on one to four chips, include built-in controllers for almost all common peripherals. The primary components on a PC motherboard are the PC chipset, CPU, memory, clock, buses and BIOS. Chipset handles the communication between various components such as CPU, peripherals, and buses. Northbridge and southbridge are two chips in the chipset.

Types of Chipsets: -

Northbridge: -Northbridge is located in the northern section of the motherboard. It is also known as the host bridge. It is directly connected to the CPU, RAM, AGP, and PCI Express slots. If it is required for the CPU to communicate with AGP or PCI express slots etc., the communication occurs via the northbridge. Usually, northbridge operates at a faster speed as it connects to high-speed components in the computer.

Southbridge: -Southbridge is located in the southern section of the motherboard. It connects the components such as PCI bus slots, BIOS, SATA and IDE connectors and USB ports

H. Work Situation:

1. Faculty will demonstrate different components of motherboard and its function.
2. Faculty must form a group of four or five students**.**
3. Students group will observe different components available on motherboard.

I. Resources required.

1. Motherboard

J. Procedure.

1.Take motherboard from faculty.

2.Identify different components on motherboard.

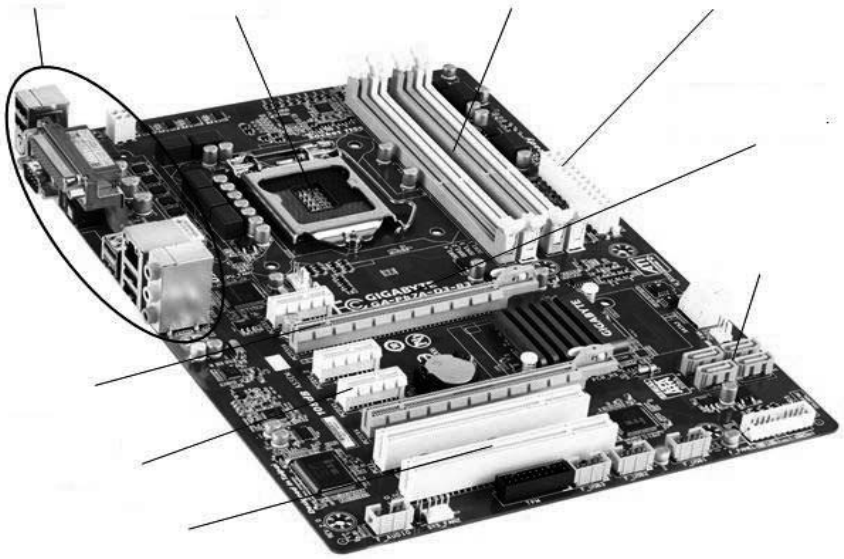
3.Understand the function of different components of motherboard.

K. Practical related Question:

1.Define Chipset. Explain NB and SB.

2.Give the details of buses available on the motherboard.

3.Label components of motherboard given in fig.1



Signature

Practical No. 04

Test power supply (SMPS) and identify different connectors with various voltage levels.

A .Objectives:

Switched Mode Power Supply (SMPS) is a power supply used in Computers that employ a switching regulator to control and stabilize the output voltage by switching the load current ON and OFF. These power supplies offer a great power conversion and reduce the overall power loss. Hence students will be able to identify different voltage level generated by SMPS required to operate computer system.

B .Relevant Program Outcomes (POs):

- **Basic and Discipline specific knowledge (PO1):** Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the e*ngineering* problems.
- **Problem analysis (PO2)**: Identify and analyse well-defined e*ngineering* problems using codified standard methods.
- **Design/development of solutions (PO3):** Design solutions for e*ngineering* well-defined technical problems and assist with the design of systems components or processes to meet specified needs.
- **Engineering Tools, Experimentation and Testing (PO4):** Apply modern en*gineering* tools and appropriate technique to conduct standard tests and measurements.
- **Project Management (PO6):** Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities.
- **Life-long learning (PO7):** Ability to analyse individual needs and engage in updating in the context of technological changes in field of engineering.

C. Competency and Practical Skills:

This practical is expected to develop the following skills for the industry-identified competency like

1. Install SMPS.
2. Measure various output voltage levels.
3. Handle computer system carefully.

D. Relevant Course Outcomes (COs):

a. Classify various types of motherboards and its components.

E. Practical Outcomes:

a. Identify different connectors with various voltage levels.

b. Troubleshoot common problems of SMPS.

F. Relevant Affective domain Outcomes (ADOs):

5 Identify different voltage levels

6 Understand Functionality

7 Installation and Assembly

8 Troubleshooting

G. Prerequisite Theory:

The connectors used in Switched-Mode Power Supplies (SMPS) typically carry various voltage levels depending on the specific design and requirements of the power supply and the connected electronic system. Here are some common types of connectors associated with SMPS, along with their potential voltage levels:

1. **ATX Power Connector (PC Power Supply):**
   - Found in computer power supplies, the ATX power connector includes various voltage levels:
     - +3.3V
     - +5V
     - +12V
     - -12V
2. **EPS Power Connector (PC Power Supply):**
   - Similar to ATX connectors, the EPS connectors are used for additional power to the CPU in computer systems. They also provide various voltage levels, including +12V.
3. **Molex Connectors (Peripheral Connectors):**
   - Molex connectors are commonly used to supply power to peripherals and drives in computers. The voltage levels may include +5V and +12V.
4. **SATA Power Connector (PC Storage Drives):**
   - Used to power SATA hard drives and SSDs in computers, SATA power connectors typically provide +5V and +12V.
5. **PCI Express (PCIe) Power Connector (Graphics Cards):**
   - PCIe connectors supply power to graphics cards in computers. The voltage levels include +12V.
6. **DC Power Jacks (External Power Supplies):**
   - External power supplies, such as those used for laptops and other electronic devices, often have DC power jacks. The voltage level depends on the design and requirements of the specific device but commonly includes +12V or other voltages suitable for the device's power needs.
   -

H. Work Situation:

a. Faculty will demonstrate installation of SMPS.

b. Faculty must form a group of four or five students.

c. Students group will observe different voltage levels generated by SMPS on connectors.

I. Resources required:

d. SMPS

e. Digital multi-meter

J. Procedure.

1.Connect main AC supply to SMPS and switch ON.

2.Check voltage levels in all connectors of SMPS using digital Multi-meter.

3.Note all voltage levels in observation table given below.

4.If voltage levels of all connector are correct, then switch OFF the power supply.

K. Practical related Question:

1. Explain SMPS with its functional block diagram.

2.State how many power connectors on SMPS.

3. Write difference between SMPS vs UPS

Signature

Practical No. 05

Study the architecture of Multi Core processors.

A. Objectives:

To explore the parallel processing capabilities of a multi-core processor and understand how it can enhance performance in various computing scenarios

B. Relevant Program Outcomes (POs):

- **Basic and Discipline specific knowledge (PO1):** Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the e*ngineering* problems.
- **Life-long learning (PO7):** Ability to analyse individual needs and engage in updating in the context of technological changes in field of engineering.

C. Competency and Practical Skills:

This practical is expected to develop the following skills for the industry-identified competency like

1 Understanding Processor functionality.

2 Understanding multi core in processor.

D. Relevant Course Outcomes (COs):

Examine working of processor and BIOS.

E. Practical Outcomes:

1. Understand the architecture of multi core processor.

F. Relevant Affective Domain Outcomes (ADOs):

1. Understand Functionality of multi core processor.

G. Prerequisite Theory:

A multi-core processor is a type of central processing unit (CPU) that integrates two or more independent processing units, known as cores, onto a single chip. Each core within a multi-core processor is capable of executing its own set of instructions independently of the others. This design enhances the overall performance and multitasking capabilities of a computer system.

Key features and concepts related to multi-core processors include:

1. **Parallel Processing:**
   - The primary advantage of multi-core processors is their ability to perform parallel processing. Each core can handle a separate thread or task concurrently, allowing for simultaneous execution of multiple operations. This is particularly beneficial for applications that are designed to take advantage of parallelism.
2. **Cores:**
   - A core is a standalone processing unit within the processor. It includes an arithmetic logic unit (ALU), control unit, and cache memory. Each core operates independently and can execute its own set of instructions.
3. **Simultaneous Multithreading (SMT):**
   - Some multi-core processors support simultaneous multithreading, where each core can execute multiple threads simultaneously. This enhances the overall throughput of the processor by allowing it to work on multiple tasks concurrently.
4. **Improved Multitasking:**
   - Multi-core processors significantly improve multitasking capabilities. In a multi-core system, different cores can handle separate tasks concurrently, leading to smoother and more responsive performance when running multiple applications simultaneously.
5. **Resource Sharing and Coordination:**
   - Cores within a multi-core processor share resources such as memory and input/output interfaces. Efficient coordination is essential to ensure that cores work together seamlessly without contention for resources.
6. **Scalability:**
   - Multi-core processors offer scalability, allowing system performance to scale with the number of cores. As the demand for computational power increases, additional cores can be added to a processor to meet the requirements of more complex tasks and applications.
7. **Energy Efficiency:**
   - Multi-core processors can provide improved performance per watt compared to single-core processors. By distributing the workload across multiple cores, power consumption can be optimized, leading to energy-efficient computing.
8. **Programming Considerations:**
   - Software designed to take advantage of multi-core processors needs to be parallelized. Parallel programming techniques, such as multithreading, must be implemented to fully utilize the processing power of each core.
9. **Task Distribution:**
   - The operating system and software must be capable of distributing tasks across available cores efficiently. Load balancing ensures that each core is utilized optimally, preventing bottlenecks and maximizing overall system performance.
10. **Specialized Cores (Optional):**
    - Some multi-core processors include specialized cores, such as graphics processing units (GPUs) or accelerators, to handle specific types of computations efficiently.

Multi-core processors are widely used in modern computers, servers, and other electronic devices to meet the increasing demand for computational power and to enhance overall system performance. Their design reflects a shift towards parallelism in computing, allowing for more efficient handling of diverse workloads.

H. Work Situation:

Faculty will explain functionality of multi core processor.

I. Resources required.

Computer with Multi core processor

J. Procedure.

Understand the function of multi core.

K. Practical related Question:

1**.**What is a multi-core processor, and how does it differ from a single-core processor in terms of architecture and performance?

2. Explain types of multi-core processors with diagram.

3. Write difference of CISC vs RISC architecture.

Signature

Practical No. 06

Elaborate BIOS settings in detailed.

A. Objectives:

The Basic Input Output System, usually referred to as BIOS, is software stored on a small memory chip on the motherboard. BIOS instruct the computer how to perform a number of basic functions such as booting ,keyboard control and also used to identify and configure the hardware such as hard drive ,optical drive, CPU, memory etc. All available settings in BIOS are configurable via the BIOS Setup Utility.

B. Relevant Program Outcomes (POs):

- **Basic and Discipline specific knowledge (PO1):** Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the e*ngineering* problems.
- **Problem analysis (PO2)**: Identify and analyse well-defined e*ngineering* problems using codified standard methods.
- **Design/development of solutions (PO3):** Design solutions for e*ngineering* well-defined technical problems and assist with the design of systems components or processes to meet specified needs.
- **Engineering Tools, Experimentation and Testing (PO4):** Apply modern en*gineering* tools and appropriate technique to conduct standard tests and measurements.
- **Life-long learning (PO7):** Ability to analyse individual needs and engage in updating in the context of technological changes in field of engineering.

C. Competency and Practical Skills:

This practical is expected to develop the following skills for the industry-identified competency like

1. BIOS configuration
2. Handle computer system carefully

D. Relevant Course Outcomes (COs):

Examine working of processor and BIOS.

E. Practical Outcomes:

1. Configure BIOS settings.

F. Relevant Affective domain Outcomes (ADOs):

1. Managing and maintaining the computer system smoothly.
2. Curiosity and Interest in BIOS configuration.
3. Confidence in dealing with hardware and system level settings.

G. Prerequisite Theory:

BIOS, which stands for Basic Input/Output System, is a fundamental firmware embedded in a computer's motherboard. It is a type of firmware that provides the basic instructions required for the computer to start and initialize hardware components during the boot-up process. BIOS plays a crucial role in the early stages of a computer's operation, acting as an intermediary between the hardware and the operating system.

Here are key aspects of the BIOS:

1. **Initialization and Bootstrapping:**
   - The primary function of the BIOS is to initialize and bootstrap the computer hardware during the system's startup. This process is known as the Power-On Self-Test (POST), where the BIOS checks and initializes critical components such as the CPU, memory, storage devices, and peripherals.
2. **CMOS Setup:**
   - The BIOS includes a configuration utility called the CMOS setup or BIOS setup. Users can access this setup during the boot process (usually by pressing a specific key, such as Del, Esc, F2, or F10) to configure various system settings, such as boot order, system date and time, CPU settings, and hardware parameters.
3. **Boot Loader:**
   - After the hardware initialization, the BIOS locates and loads the boot loader from the designated boot device. The boot loader is a small program responsible for loading the operating system kernel into memory and initiating the operating system's boot process.
4. **Firmware Interface:**
   - In modern systems, the traditional BIOS has been largely replaced by the Unified Extensible Firmware Interface (UEFI), which provides a more advanced and feature-rich interface. UEFI supports larger hard drives, faster boot times, and improved security features compared to traditional BIOS.
5. **System Configuration:**
   - The BIOS allows users to configure various system parameters, such as the system date and time, boot order, enabling or disabling hardware components, and adjusting CPU and memory settings. These configurations are stored in the CMOS memory.
6. **Security Features:**
   - BIOS can include security features such as password protection and secure boot options. Secure boot ensures that only signed and authorized firmware and operating system components are loaded during the boot process, protecting the system from unauthorized modifications.
7. **BIOS Updates:**
   - Manufacturers release BIOS updates to provide bug fixes, support for new hardware, and improvements in system stability and performance. Users can update the BIOS firmware to take advantage of these enhancements, typically through a process known as "flashing" the BIOS.
8. **BIOS Beep Codes:**
   - In case of hardware errors or issues detected during the POST, the BIOS may generate audible beep codes. These beep codes serve as diagnostic indicators to help identify the source of the problem.

9. **Legacy Support:**
    - The BIOS provides compatibility with older hardware and software that may rely on legacy standards. However, modern UEFI implementations offer a more flexible and extensible framework for system initialization.

Understanding and configuring the BIOS is important for system administrators, power users, and anyone involved in system maintenance or troubleshooting. It allows users to customize system settings, diagnose hardware issues, and ensure optimal performance during the boot process.

H. Work situation:

1.Faculty will demonstrate different BIOS settings using projector.

2.Faculty must form a group of two or three students.

3.Students group will practice different BIOS settings.

4.Students must list down the steps to access BIOS setup utility.

I. Resource Required:

Desktop PC

J. Procedure:

Entering the BIOS setup utility varies depending on the computer's manufacturer and model. Here are general steps that can help you access the BIOS setup on most PCs:

1. **Reboot Your Computer:**
    - Save any open files and restart your computer. You can also start from a powered-off state.
2. **Watch for the Initial Boot Screen:**
    - As the computer restarts, pay attention to the initial boot screen. This is the first screen that appears when the computer starts up, usually displaying the system's logo or the motherboard's brand.
3. **Identify the Key to Enter BIOS:**
    - Look for a message on the screen that indicates which key to press to enter the BIOS setup or system configuration. Common keys include:
        - **Del (Delete)**
        - **Esc (Escape)**
        - **F2**
        - **F10**
        - **F12**
        - **Ctrl + Alt + Esc**
        - **Ctrl + Alt + Del**
4. **Observe different BIOS setup**.

K. Practical Related Questions:

1.Explain the fundamental role of the BIOS in a computer system.

2. Write difference between BIOS and CMOS.

Signature

Practical No. 07:

Demonstrate physical structure of Hard disk.

A. Objectives: Hard disks, also known as hard disk drives (HDDs), are essential components in modern computing systems for storing and retrieving digital data. It helps users and system administrators make informed decisions about hard disk capacity, speed, and reliability based on the specific requirements of their computing needs.

B. Relevant Program Outcomes (POs):

- **Basic and Discipline specific knowledge (PO1):** Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the e*ngineering* problems.
- **Life-long learning (PO7):** Ability to analyse individual needs and engage in updating in the context of technological changes in field of engineering.

C. Competency and Practical Skills:

This practical is expected to develop the following skills for the industry-identified competency '**Observe physical structure of HDD and its components and interconnections'**:

1. Observational skills.
2. Hardware Understanding with parts details with interconnections.

D. Relevant Course Outcomes (COs):

Classify hard disk and various types of peripheral devices.

E. Practical Outcomes:

The physical structure of a hard disk drive (HDD) has practical implications that influence its performance, reliability, and overall functionality.

F. Relevant Affective domain Outcomes (ADOs):

Observational skills which required carrying out by hardware components identification and details from Hard disk to part connections details

G. Prerequisite Theory:

The physical structure of a Hard Disk Drive (HDD) consists of several key components that work together to store and retrieve digital data. Here is an overview of the main parts of an HDD:

1. **Platters:**
   - **Description:** Platters are the circular, rigid disks inside the HDD. They are typically made of aluminum or glass and are coated with a thin layer of magnetic material. Data is stored on the platters in the form of magnetic patterns.
   - **Function:** Platters are the primary storage medium of the HDD. Multiple platters are stacked on a spindle and spin at a constant speed.
2. **Read/Write Heads:**
   - **Description:** Read/write heads are small electromagnets attached to the end of an actuator arm. Each platter surface has its own read/write head.
   - **Function:** The heads are responsible for reading data from and writing data to the platters. They float just above the platter surfaces on a thin cushion of air created by the spinning motion. The heads move rapidly across the platter surfaces during read and write operations.
3. **Actuator Arm:**
   - **Description:** The actuator arm is a mechanical arm that holds the read/write heads. It is mounted on a pivot and can move across the platter surfaces.
   - **Function:** The actuator arm positions the read/write heads over the correct track on the platter during read or write operations. Rapid and precise movement of the actuator arm is crucial for minimizing seek times.
4. **Spindle Motor:**
   - **Description:** The spindle motor is responsible for spinning the platters at a constant speed. The speed is measured in revolutions per minute (RPM) and is a critical factor in determining the data transfer rate of the HDD.
   - **Function:** The rotation of the platters is necessary for the read/write heads to access different areas of the platter surfaces.
5. **Caching Mechanism:**
   - **Description:** The caching mechanism consists of a small, high-speed buffer (volatile memory) located on the HDD. This buffer temporarily stores frequently accessed data.
   - **Function:** The cache helps improve read and write speeds by allowing the HDD to access commonly used data more quickly. It acts as a bridge between the relatively slow platter-based storage and the faster system bus.
6. **Controller Board (PCB):**
   - **Description:** The controller board, or PCB (Printed Circuit Board), is located on the bottom of the HDD. It contains the control electronics and interfaces for the HDD.
   - **Function:** The controller board manages the overall operation of the HDD, controlling the movement of the actuator arm, regulating the spindle motor, and facilitating communication with the computer's motherboard through the interface.
7. **Enclosure:**
   - **Description:** The enclosure is the protective outer casing of the HDD. It is designed to shield the internal components from dust, moisture, and physical damage.
   - **Function:** The enclosure ensures the reliability and longevity of the HDD by providing a protective barrier against environmental factors.

Understanding the physical structure of an HDD is essential for users and technicians involved in computer hardware, as it provides insights into the mechanics of data storage and retrieval.

H. Work Situation:

1.Faculty will demonstrate different components which are used in HDD.

2.Faculty must form a group of two or three students.

3.Students group will understand the functionality of internal components of HDD.

I. Resources Required:

Hard Disk Drive

J. Procedure:

Understand the physical structure of HDD.

K. Practical related Question:

1. Explain structure and working of Hard disk / and its parts.

2. Explain Disk Geometry (Tracks, Sectors, Cylinders etc…)

Signature

Practical No. 08

Demonstrate Logical structure of Hard disk.

A. Objectives:

The logical structure of a Hard Disk Drive (HDD) refers to how data is organized and managed at the software and file system level. Logical structure of an HDD contributes to efficient data management, reliable storage, and improved user experience. It also allows for compatibility and interoperability across different systems and applications.

B. Relevant Program Outcomes (POs):

Basic and Discipline specific knowledge (PO1): Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the e*ngineering* problems.

Life-long learning (PO7): Ability to analyse individual needs and engage in updating in the context of technological changes in field of engineering.

C. Competency and Practical Skills:

This practical is expected to develop the following skills for the industry-identified competency '**Brainstorm Logical structure of HDD.**

1 Observational skill.

2.thinking and imagination skills

D. Relevant Course Outcomes (COs):

Classify hard disk and various types of peripheral devices.

E. Practical Outcomes:

Clarity in **Logical structure of HDD.**

F. Relevant Affective domain Outcomes (ADOs):

Observational, logical and critical thinking skills which required carrying out by logical structure of HDD.

G. Prerequisite Theory:

In order to get maintain the organized storage and retrieval of data the platters are organized into specific structures. These specific structures include **tracks**, **sectors**, and **clusters**.

TRACKS: Each platter is broken into thousands of tightly packed concentric circles, known as tracks. These tracks resemble the structure of annual rings of a tree. All the information stored on the hard disk is recorded in tracks. Starting from zero at the outer side of the platter, the number of tracks goes on increasing to the inner side. Each track can hold a large amount of data counting to thousands of bytes.

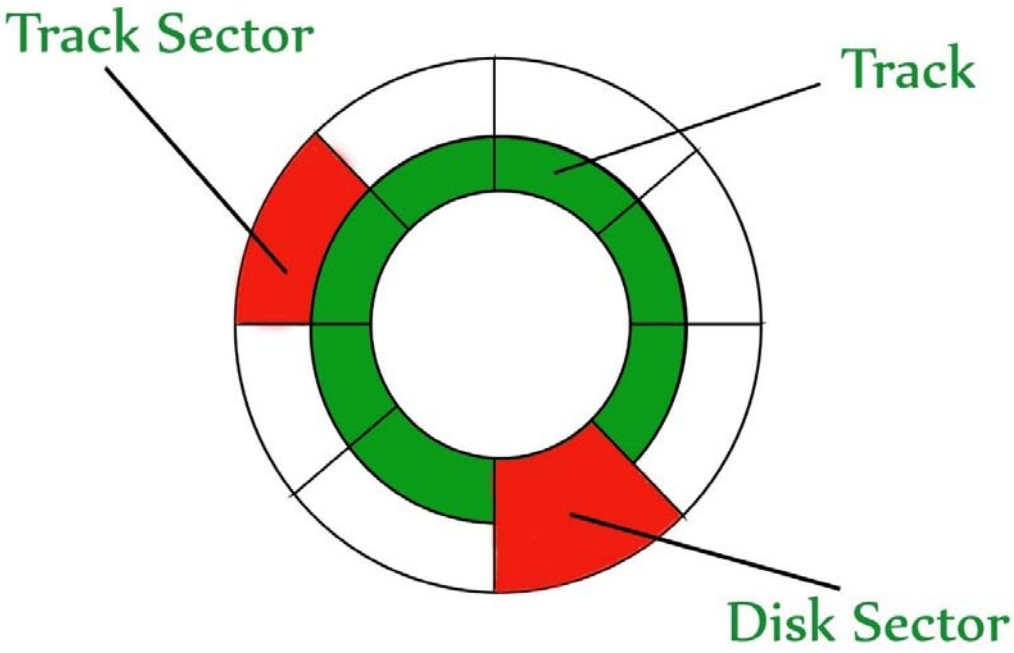
SECTORS: Each track is further broken down into smaller units called sectors. As sector is the basic unit of data storage on a hard disk. A single track typically can have thousands of sectors and each sector can hold more than 512 bytes of data. A few additional bytes are required for control structures and error detection and correction.

CLUSTERS: Sectors are often grouped together to form Clusters.

Cylinders

Each platter is divided into tracks. The cylinder value is the number of tracks on one side of each platter. There are the same number of cylinders on each side of each platter. The sector value is the number of sectors in each cylinder (or track), each sector consisting of (normally) 512 bytes.

A hard disk is a memory storage device that looks like this:



The disk is divided into tracks. Each track is further divided into sectors. The point to be noted here is that outer tracks are bigger in size than the inner tracks but they contain the same number of sectors and have equal storage capacity. This is because the storage density is high in sectors of the inner tracks whereas the bits are sparsely arranged in sectors of the outer tracks. Some space of every sector is used for formatting. So, the actual capacity of a sector is less than the given capacity.

Read-Write(R-W) head moves over the rotating hard disk. It is this Read-Write head that performs all the read and writes operations on the disk and hence, the position of the R-W head is a major concern. To perform a read or write operation on a memory location, we need to place the R-W head over that position. Some important terms must be noted here:

1. **Seek time –** The time taken by the R-W head to reach the desired track from its current position.

2. **Rotational latency –** Time is taken by the sector to come under the R-W head.

3. **Data transfer time –** Time is taken to transfer the required amount of data. It depends upon the rotational speed.

4. **Controller time –** The processing time taken by the controller.

5. **Average Access time –** seek time + Average Rotational latency + data transfer time + controller time.

Note: Average Rotational latency is mostly 1/2*(Rotational latency).

In questions, if the seek time and controller time are not mentioned, take them to be zero.

If the amount of data to be transferred is not given, assume that no data is being transferred. Otherwise, calculate the time taken to transfer the given amount of data.

The average rotational latency is taken when the current position of the R-W head is not given. Because the R-W may be already present at the desired position or it might take a whole rotation to get the desired sector under the R-W head. But, if the current position of the R-W head is given then the rotational latency must be calculated.

For Example –

Consider a hard disk with:

- **4 surfaces**
- **64 tracks/surface**
- **128 sectors/track**
- **256 bytes/sector**

What is the capacity of the hard disk?

- **Disk capacity = surfaces * tracks/surface * sectors/track * bytes/sector**
  Disk capacity = 4 * 64 * 128 * 256
  Disk capacity = 8 MB

The disk is rotating at 3600 RPM, what is the data transfer rate?

- 60 sec -> 3600 rotations
  1 sec -> 60 rotations
  Data transfer rate = number of rotations per second * track capacity * number of surfaces (since 1 R-W head is used for each surface)
  Data transfer rate = 60 * 128 * 256 * 4
  Data transfer rate = 7.5 MB/sec

The disk is rotating at 3600 RPM, what is the average access time?

- Since seek time, controller time and the amount of data to be transferred is not given, we consider all three terms as 0.
  Therefore, **Average Access time = Average rotational delay**
  Rotational latency => 60 sec -> 3600 rotations
  1 sec -> 60 rotations
  Rotational latency = (1/60) sec = 16.67 msec.
  Average Rotational latency = (16.67)/2
  = 8.33 msec.
  Average Access time = 8.33 msec.

H. Work Situations:

1.Faculty will demonstrate logical structure of HDD using projector.

2.Faculty must form a group of two or three students.

3.Students group will understand the functionality of internal organization of HDD.

I. Resources Required:

Hard Disk Drive

J. Procedure:

Understand the logical structure of HDD

K. Practical Related Questions:

1. Explain ZBR in detail.

2. What is the role of the Master Boot Record (MBR) in the boot process of a computer?

Signature

Practical No. 09

Illustrate formatting and partitioning of Hard disk.

A. Objectives:

Dividing a hard disk into partitions allows users to organize and segregate their data. Different partitions can be used for the operating system, applications, user data, and system backups. This organization helps in better management and isolation of data. Before installing an operating system, the hard disk needs to be formatted with a compatible file system. The format prepares the disk for the installation process by creating the necessary structures for the operating system to function properly.

B. Relevant Program Outcomes (POs):

- **Basic and Discipline specific knowledge (PO1):** Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the e*ngineering* problems.
- **Problem analysis(PO2)**: Identify and analyse well-defined e*ngineering* problems using codified standard methods.
- **Design/development of solutions(PO3):** Design solutions for e*ngineering* well-defined technical problems and assist with the design of systems components or processes to meet specified needs.
- **Engineering Tools, Experimentation and Testing (PO4):** Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.
- **Project Management(PO6):** Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities.
- **Life-long learning(PO7):** Ability to analyse individual needs and engage in updating in the context of technological changes in field of engineering.

C. Competency and Practical Skills:

This practical is expected to develop the following skills for the industry-identified competency like

1. Formatting skills.
2. Disk Management skills.
3. Partitioning Skills.

D. Relevant Course Outcomes (COs):

Classify hard disk and various types of peripheral devices

E. Practical Outcomes:

1. Partition and manage hard disk
2. Format hard drives with different file systems.

F. Relevant Affective domain Outcomes (ADOs):

1.Handling technical tasks related to computer hardware.

2.Execute essential tasks that contribute to the organization and optimization of their computer system.

3. Develop a curiosity about how the storage subsystem of a computer functions.

G. Prerequisite Theory:

Disk formatting and partitioning are essential processes in preparing a storage device for use in a computer system. These procedures involve creating logical structures on a physical hard disk, organizing the storage space, and establishing the file system for data storage. Let's delve into each process:

1. **Disk Partitioning:**

Definition: Partitioning is the process of dividing a physical hard disk into multiple logical sections, each treated as an independent unit by the operating system.

Steps in Disk Partitioning:

1. **Access Disk Management Utility:** In Windows, you can use the Disk Management utility. On Linux, tools like fdisk is commonly used. On macOS, Disk Utility is available.
2. **Identify the Target Disk:** Choose the hard disk that you want to partition. Ensure that the disk is not in use and that you have backed up important data.
3. **Create Partitions:** Decide on the number and size of partitions you want to create. Common partitions include the system partition (C: in Windows), data partitions, and possibly a separate partition for the operating system.
4. **Specify Partition Sizes:** Allocate the desired sizes to each partition. Be mindful of the file systems you plan to use, as different file systems have varying space requirements.
5. **Set Partition Labels:** Assign labels to each partition for easy identification. Labels can represent the purpose of the partition, such as "System," "Data," or "Backup."
6. **Choose File Systems:** Select the file system for each partition. Common file systems include NTFS for Windows, ext4 for Linux, and APFS for macOS.
7. **Apply Changes:** Once you've configured the partitions and settings, apply the changes. This process may require the system to be restarted for the changes to take effect.

2. Disk Formatting:

Definition: Formatting is the process of creating a file system on a partition, preparing it for data storage and retrieval.

Steps in Disk Formatting:

1. **Access the Formatting Tool:**

   Formatting is often performed during the partitioning process or separately through a formatting tool. Tools like Windows Disk Management or the format command in the command prompt can be used.

2. **Select the Partition:**

   Choose the partition you want to format. Ensure that you've selected the correct partition to avoid accidental data loss.

3. **Choose File System:**

   Specify the file system to be used on the partition. This must match the file system selected during partitioning.

4. **Set Allocation Unit Size (Optional):**

   Some formatting tools allow you to set the allocation unit size. This determines the smallest unit of disk space that can be allocated to a file.

5. **Perform the Format:**

   Initiate the formatting process. This may take some time, depending on the size of the partition and the speed of the storage device.

6. **Verify the Format:**

   Once the formatting is complete, verify that the process was successful. The partition should now be ready for use.

Important Considerations:

- **Data Backup:**

  Before partitioning or formatting, always back up important data to prevent data loss in case of errors or unforeseen issues.

- **File System Compatibility:**

  Ensure that the selected file system is compatible with the operating system that will be using the partitions.

- **Partitioning Tools:**

  Different operating systems may use different tools for partitioning. Familiarize yourself with the tools available on your specific platform.

- **Attention to Detail:**

  Pay attention to details such as partition sizes, file systems, and labels to avoid unintended consequences.

  Partitioning and formatting are critical steps in setting up storage for a computer system. They influence data organization, system performance, and the overall usability of the storage device.

H. Work Situations:

1. Faculty will demonstrate formatting and partitioning the Hard disk.
2. Students must list down the steps followed for formatting and partitioning the Hard disk.
3. Students will practice formatting and partitioning the Hard disk with any bootable media.

I. Resource Required:

Computer System
Bootable device

J. Procedure:

1. Take Computer System carefully.
2. Formate hard disk carefully.
3. Partition the hard disk.

K. Practical Related Questions:

1. List file systems displayed while formatting along with its full form.
2. Differentiate between the concept of Primary and secondary partitions.

Signature

Practical No. 10

Classify various types of secondary storage devices

A. Objectives: Secondary storage devices have significant practical importance in the field of computing and information management. Secondary storage devices lies in their ability to provide persistent, large-capacity storage, support data backup and recovery, facilitate data sharing, and play a crucial role in various aspects of computing, data management, and information technology.

B. Relevant Program Outcomes (POs):

- **Basic and Discipline specific knowledge (PO1):** Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the e*ngineering* problems.
- **Problem analysis (PO2)**: Identify and analyse well-defined e*ngineering* problems using codified standard methods.
- **Design/development of solutions (PO3):** Design solutions for e*ngineering* well-defined technical problems and assist with the design of systems components or processes to meet specified needs.
- **Project Management (PO6):** Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities.
- **Life-long learning (PO7):** Ability to analyse individual needs and engage in updating in the context of technological changes in field of engineering.

C. Competency and Practical Skills:

This practical is expected to develop the following skills for the industry-identified competency '**Importance of secondary storage devices**:

Competency in understanding the functionality of various secondary storage devices like CD, DVD,USB device etc.

D. Relevant Course Outcomes (COs):

Classify hard disk and various types of peripheral devices.

E. Practical Outcomes:

1. Students or users may develop a sense of responsibility and concern for protecting their data, understanding the potential consequences of data breaches or loss.

2.Gain confidence in managing and organizing data effectively using secondary storage devices.

F. Relevant Affective domain Outcomes (ADOs):

1. Recognize the significance of creating regular backups on secondary storage devices.
2. Develop trust in the reliability of secondary storage devices. Sense of Achievement
3. Develop awareness of the environmental impact of different secondary storage technologies.

G. Prerequisite Theory:

Secondary storage devices are a type of storage in a computing system that provides non-volatile, long-term storage for data and programs. Unlike primary storage (RAM), which is volatile and loses its content when the power is turned off, secondary storage retains data even when the power is off. These devices are essential for storing the operating system, applications, user files, and other data that need to be preserved over time. Here are some common types of secondary storage devices:

1. **Hard Disk Drives (HDDs):**
   - *Description:* HDDs use magnetic storage to store data on rapidly spinning disks. They are one of the most traditional and widely used forms of secondary storage. Data is read and written through a moving read/write head.
2. **Solid-State Drives (SSDs):**
   - *Description:* SSDs use flash memory to store data. Unlike HDDs, SSDs have no moving parts, resulting in faster data access speeds, reduced power consumption, and increased durability. They are commonly used in laptops, desktops, and servers.
3. **External Hard Drives:**
   - *Description:* These are portable versions of internal HDDs or SSDs, enclosed in a case with a USB or Thunderbolt interface. They provide additional storage capacity or serve as backup solutions for users who need extra space.
4. **USB Flash Drives:**
   - *Description:* USB flash drives, or thumb drives, use NAND-type flash memory to store data. They are small, portable, and connect to a computer through a USB port. Flash drives are commonly used for data transfer and portable storage.
5. **CDs, DVDs, and Blu-ray Discs:**
   - *Description:* Optical storage media, such as CDs (Compact Discs), DVDs (Digital Versatile Discs), and Blu-ray discs, use lasers to read and write data. They are suitable for archiving and distributing large amounts of data, multimedia content, or software.
6. **Network-Attached Storage (NAS):**
   - *Description:* NAS devices are specialized servers connected to a network, providing shared storage accessible to multiple users and devices. They are often used for centralized data storage, backup, and file sharing in homes and businesses.
7. **Cloud Storage:**
   - *Description:* Cloud storage involves storing data on remote servers accessed over the internet. Users can upload, download, and access their data from anywhere with an internet connection. Popular cloud storage services include Google Drive, Dropbox, and Microsoft OneDrive.

8. **Magnetic Tapes:**
    - *Description:* While less common for personal use, magnetic tapes are still used in enterprise environments for backup and long-term archival purposes. Tapes offer large storage capacities and cost-effective solutions for storing large volumes of data.

The primary functions of secondary storage devices include providing a means for long-term data storage, supporting data backup and recovery, facilitating data sharing, and enabling the installation of operating systems and applications. Each type of secondary storage device has its own advantages and disadvantages, and the choice of device depends on factors such as capacity requirements, speed, portability, and cost.

H. Work Situation:

1. Faculty will demonstrate various secondary storage devices like CD,DVD,USB device
2. Students will observe secondary storage devices and understand how it works.

I. Resource Required:

Secondary storage devices like CD, DVD, USB device

J. Procedure:

1)Identify various secondary storage devices available in laboratory.

K. Practical Related Questions:

1)Compare and contrast the characteristics of HDDs and SSDs as secondary storage devices.

2) Compare CD, DVD and Blu-Ray disk.

Signature

Practical No. 11

Test and troubleshoot working of Laser printer.

A. Objectives:

Laser printers are known for their high-speed printing capabilities, making them suitable for environments where quick and efficient document printing is essential. It produces high-quality print output with crisp text and sharp graphics. This ensures professional-looking documents, making laser printers suitable for applications where print quality is a critical factor, such as business reports and presentations.so students will be able to know the working of Laser printer and troubleshoot the problem related to printer.

B. Relevant Program Outcomes (POs):

- **Basic and Discipline specific knowledge (PO1):** Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the e*ngineering* problems.
- **Problem analysis(PO2)**: Identify and analyse well-defined e*ngineering* problems using codified standard methods.
- **Design/development of solutions(PO3):** Design solutions for e*ngineering* well-defined technical problems and assist with the design of systems components or processes to meet specified needs.
- **Engineering Tools, Experimentation and Testing (PO4):** Validate the identified solutions with various tools and techniques.
- **Life-long learning(PO7):** Ability to analyse individual needs and engage in updating in the context of technological changes in field of engineering.

C. Competency and Practical Skills:

This practical is expected to develop the following skills for the industry-identified competency like

1. In depth knowledge of Laser printer working.
2. Understand the problem arise during printing.

D. Relevant Course Outcomes (COs):

Classify hard disk and various types of peripheral devices.

E. Practical Outcomes:

Troubleshoot printer problems.

F. Relevant Affective domain Outcomes (ADOs):

1. Gain confidence in using a laser printer effectively.
2. Develop a sense of responsibility in using paper efficiently.
3. Develop patience and perseverance in troubleshooting printing issues.

G. Prerequisite Theory:

A laser printer is a type of printer that uses laser technology to produce high-quality printed documents. It operates based on the process known as electrophotography or xerography, which involves the use of a laser beam to create an electrostatic image on a photosensitive drum or belt. Laser printers are commonly used in offices, homes, and various other settings due to their fast printing speeds and high-quality output.

Here's an overview of how a laser printer works and its key components:

1. **Electrophotographic Process:**

   The laser printer uses an electrophotographic process to create an image on the printing surface. This process involves several steps: charging, exposing, developing, transferring, fusing, and cleaning.

2. **Key Components:**
   - **Photosensitive Drum or Belt:** The drum or belt is coated with a photosensitive material that can hold an electrostatic charge. It is a critical component where the image is formed during the printing process.
   - **Laser Scanning Unit:** The laser scanning unit directs a laser beam onto the photosensitive drum or belt, selectively discharging areas to create an electrostatic image of the content to be printed.
   - **Toner Cartridge:** Toner is a fine, powdery substance containing color pigments or black carbon particles. The toner cartridge holds the toner and dispenses it onto the charged areas of the drum or belt to develop the image.
   - **Developer Unit:** The developer unit contains charged particles (toner) that adhere to the electrostatic image on the drum or belt, creating a visible image.
   - **Transfer Corona:** The transfer corona applies an electrostatic charge to a sheet of paper, attracting the toner from the drum or belt onto the paper.
3. **Printing Process:**
   - The laser beam is used to selectively discharge parts of the photosensitive drum or belt, forming an electrostatic image of the content to be printed.
   - The toner is attracted to the discharged areas on the drum or belt, creating a toner image.
   - The toner image is transferred onto a sheet of paper using an electrostatic charge.
   - The transferred toner on the paper is fused or melted onto the paper using heat and pressure, creating a permanent print.
   - The final printed page is then ejected from the printer.
4. **Advantages of Laser Printers:**
   - **Speed:** Laser printers are known for their high printing speeds, making them efficient for large-volume printing tasks.

- **Print Quality:** Laser printers produce high-quality prints with sharp text and graphics.
- **Consistency:** Laser printers provide consistent print quality over time.
- **Cost-Effective:** While the initial cost might be higher, laser printers are often cost-effective in the long run, especially for high-volume printing.

5. **Applications:**
   - Laser printers are used for a wide range of applications, including printing documents, reports, presentations, graphics, and more.
   - They are commonly found in office environments, educational institutions, and homes where fast and high-quality printing is required.

H. Work Situation:

1.Faculty will demonstrate working process of Laser Printer.

2. Student will observe the working process of Laser Printer.

3. Students will troubleshoot the problems of printing.

I. Resource Required:

1.Desktop PC

2.Laser Printer with device driver.

J. Procedure:

1.Test the printer.

2.Troubleshoot the printer.

K. Practical Related Questions:

1. Write down general faults and its troubleshooting of Laser and Inkjet Printers

Signature

Practical No. 12

Experiment various troubleshooting strategies

A. Objectives:

Troubleshooting is a form of problem solving, often applied to repair failed products or processes on a machine or a system. It is a logical, systematic search for the source of a problem in order to solve it and make the product or process operational again. Computer system being an important working resource proper, diagnosis of problems and timely solution will prevent any business loss.

B. Relevant Program Outcomes (POs):

- **Basic and Discipline specific knowledge (PO1):** Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the e*ngineering* problems.
- **Problem analysis(PO2)**: Identify and analyse well-defined e*ngineering* problems using codified standard methods.
- **Design/development of solutions(PO3):** Design solutions for e*ngineering* well-defined technical problems and assist with the design of systems components or processes to meet specified needs.
- **Engineering Tools, Experimentation and Testing (PO4):** Validate the identified solutions with various tools and techniques.
- **Life-long learning(PO7):** Ability to analyse individual needs and engage in updating in the context of technological changes in field of engineering.

C. Competency and Practical Skills:

This practical is expected to develop the following skills for the industry-identified competency like

1.Troubleshooting skills.

2.Technical skills.

D. Relevant Course Outcomes (COs):

Test and troubleshoot various faults related to computer hardware and its peripherals.

E. Practical Outcomes:

Troubleshoot computer system by diagnosing the problem.

F. Relevant Affective domain Outcomes (ADOs):

1. Apply Logical thinking.
2. Improve Decision making.

G. Prerequisite Theory:

Troubleshooting is the process of identifying, diagnosing, and resolving problems or issues that occur in a system, device, or process. Effective troubleshooting strategies are essential for resolving issues promptly and ensuring the smooth operation of various systems. Here are some general troubleshooting strategies that can be applied to address a wide range of problems:

1. **Identify the Problem:**
   - Start by clearly defining and understanding the problem. Gather information about the symptoms, error messages, or any unusual behavior. A precise problem definition lays the foundation for an effective troubleshooting process.
2. **Isolate the Cause:**
   - Break down the system or process into components and identify the specific area where the problem is occurring. This may involve testing individual components or isolating the issue to a particular software or hardware element.
3. **Check for Recent Changes:**
   - Investigate whether any recent changes or updates have been made to the system. Changes in software, configurations, or hardware installations could be potential causes of issues.
4. **Consult Documentation and Resources:**
   - Review documentation, manuals, and online resources related to the system or device. Manufacturers often provide troubleshooting guides, FAQs, and forums where users share solutions to common problems.
5. **Perform System Checks:**
   - Check the overall health of the system, including hardware components, software versions, and system logs. Look for any anomalies or error messages that may provide clues about the nature of the problem.
6. **Use Diagnostic Tools:**
   - Utilize built-in diagnostic tools or third-party software to analyze system components. Diagnostic tools can help identify hardware failures, software conflicts, or configuration issues.
7. **Test and Verify:**
   - Conduct tests to verify potential causes and eliminate possibilities. Test individual components, run diagnostic tests, and observe the system's behavior under different conditions.
8. **Rollback Changes:**
   - If recent changes or updates are suspected to be the cause of the problem, consider rolling back to the previous state before the changes were made. This helps determine if the issue is related to the recent modifications.
9. **Check Connectivity:**
   - For network-related issues, check network connections, cables, and configurations. Verify internet connectivity and ensure that all devices are properly connected to the network.
10. **Update Software and Drivers:**
    - Ensure that software applications and drivers are up to date. Outdated software or drivers may lead to compatibility issues or security vulnerabilities.

11. **Reboot the System:**
    - A simple but often effective strategy is to reboot the system. This can resolve temporary glitches, clear system memory, and restart services or processes.
12. **Seek Expert Advice:**
    - If troubleshooting becomes challenging, seek advice from experts, support forums, or technical support. Collaborate with colleagues or online communities to gain insights and potential solutions.
13. **Document the Troubleshooting Process:**
    - Keep detailed records of the troubleshooting steps taken, including changes made, tests conducted, and outcomes. Documentation helps in tracking the progress and provides valuable information for future reference.
14. **Consider Environmental Factors:**
    - Assess environmental factors such as temperature, humidity, and power supply. Environmental conditions can affect the performance of hardware components.
15. **Plan for Further Action:**
    - If the initial troubleshooting steps do not resolve the issue, plan for further actions, such as escalating the problem to higher-level support, contacting the manufacturer, or exploring alternative solutions.

Effective troubleshooting involves a systematic and logical approach, combining technical expertise with problem-solving skills. The goal is to identify the root cause of the issue and implement solutions to restore normal functionality.

H. Work Situation:

1.Faculty will demonstrate Computer related problems and related solutions.

2.Students must work on system with induced errors or having certain problem. Accordingly, student needs to troubleshoot problems.

I. Resources Required:

Computer System (Any desktop PC)

J. Procedure:

1.Take any desktop system available in laboratory.

2. Diagnosis fault/problems related to any peripheral devices.

K. Practical Related Questions:

1.Write troubleshooting process step by step.

2. Write steps of Layman Check.

Signature

Practical No. 13

Perform Power on Self-Test (POST).

A. Objectives:

The Power-On Self-Test (POST) is a diagnostic process that occurs when a computer or other electronic device is powered on or restarted. The main objectives of the POST are to ensure that the essential hardware components are functioning correctly before the operating system is loaded. The POST checks critical hardware components such as the processor, memory (RAM), storage devices, graphics card, and other key components to ensure they are functioning properly. Students will be able to actual functioning of the POST.

B. Relevant Program Outcomes (POs):

- **Basic and Discipline specific knowledge (PO1):** Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the e*ngineering* problems.
- **Problem analysis (PO2)**: Identify and analyse well-defined e*ngineering* problems using codified standard methods.
- **Design/development of solutions (PO3):** Design solutions for e*ngineering* well-defined technical problems and assist with the design of systems components or processes to meet specified needs.
- **Engineering Tools, Experimentation and Testing (PO4):** Validate the identified solutions with various tools and techniques.
- **Life-long learning (PO7):** Ability to analyse individual needs and engage in updating in the context of technological changes in field of engineering.

C. Competency and Practical Skills:

This practical is expected to develop the following skills for the industry-identified competency like

1. In depth knowledge of POST.
2. Understand the problem arise during POST.

D. Relevant Course Outcomes (COs):

Test and troubleshoot various faults related to computer hardware and its peripherals.

E. Practical Outcomes:

The early detection, notification, and prevention of hardware-related issues, ultimately enhancing system stability, reliability, and the overall user experience.

F. Relevant Affective domain Outcomes (ADOs):

1. Successfully completing the POST and proceeding to the operating system boot can evoke a sense of satisfaction.
2. Develop a trust in the system's integrity.
3. Develop responsibility for the proper functioning of the system.

G. Prerequisite Theory:

The Power-On Self-Test (POST) is a diagnostic process that occurs when a computer or other electronic device is powered on or restarted. The primary purpose of the POST is to perform a series of checks on the system's hardware components to ensure they are functioning correctly before the operating system is loaded. Here's a step-by-step overview of the POST process:

1. **Powering On:**
   - The user turns on the power to the computer, initiating the boot process. This can also occur during a system restart.
2. **Processor Initialization:**
   - The central processing unit (CPU) is initialized, ensuring that it is ready to execute instructions.
3. **BIOS (Basic Input/Output System) Activation:**
   - The system's BIOS or firmware is activated. The BIOS is responsible for initializing and configuring essential hardware components.
4. **Memory Testing:**
   - The POST checks the system's random access memory (RAM) to ensure it is functional. Memory tests involve writing and reading data to and from specific memory addresses.
5. **Display Initialization:**
   - The video controller and display components are initialized. This includes checking the graphics card and ensuring that the display is ready to output information.
6. **Peripheral Checks:**
   - The POST verifies the functionality of essential peripherals such as the keyboard and mouse. It ensures that these input devices are connected and operational.
7. **Storage Device Checks:**
   - The POST checks the primary storage devices, typically hard drives or solid-state drives, to ensure they are recognized and operational.
8. **BIOS Identification and Configuration:**
   - The POST identifies the system's BIOS version and configuration. It checks the BIOS settings to ensure they are compatible with the hardware.
9. **Power Supply and Voltage Checks:**
   - The power supply unit and voltage regulators are checked to ensure stable and adequate power is supplied to the system components.
10. **Boot Device Verification:**
    - The POST checks the presence and integrity of bootable devices, such as the hard drive or SSD. It ensures that the system can initiate the boot process from the designated device.
11. **CPU and System Temperature Checks:**

- Some POST sequences include checks for the temperature of the CPU and other critical components. Overheating can lead to system instability.

12. **Error Handling and Reporting:**
    - If any issues are detected during the POST, error codes, audible beep patterns, or on-screen messages are generated to indicate the nature of the problem.
13. **System Integrity Assessment:**
    - The POST provides an overall assessment of the system's integrity based on the results of the individual checks. If all checks pass successfully, the system proceeds to the next stage of the boot process.
14. **Handover to Boot Loader:**
    - Once the POST completes successfully, the control is handed over to the system's boot loader, which continues the boot process by loading the operating system.

The POST is crucial for ensuring that a computer system starts up with reliable and functional hardware components. If the POST detects issues during the diagnostic process, it generates error messages that can guide users or technicians in troubleshooting and resolving hardware problems. The entire POST process occurs within seconds, and its results are typically displayed on the screen or signaled through a combination of audible beeps from the system speaker.

H. Work Situation:

1.Faculty will demonstrate working process of POST.

2. Student will observe the working process of POST.

3. Students will observe the system functioning properly.

I. Resource Required:

1.Desktop PC

J. Procedure:

1.Boot the PC.

2.Check POST sequence.

K. Practical Related Questions:

1.Explain POST (Powe On Self Test) with steps.

Signature

Practical No. 14

Dissembling of PC for troubleshooting purpose.

A. Objectives:

Computer system is made up of different internal components such as motherboard, memory, HDD, CD/DVD drives, SMPS and external peripheral such as Keyboard, mouse, monitor, printer, scanner etc. All these components and peripherals are properly disconnected while dissembling the computer. Hence students will be able to know how desktop PC dissemble.

B. Relevant Program Outcomes (POs):

- **Basic and Discipline specific knowledge (PO1):** Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the e*ngineering* problems.
- **Problem analysis(PO2)**: Identify and analyse well-defined e*ngineering* problems using codified standard methods.
- **Design/development of solutions(PO3):** Design solutions for e*ngineering* well-defined technical problems and assist with the design of systems components or processes to meet specified needs.
- **Engineering Tools, Experimentation and Testing (PO4):** Validate the identified solutions with various tools and techniques.
- **Life-long learning(PO7):** Ability to analyse individual needs and engage in updating in the context of technological changes in field of engineering.

C. Competency and Practical Skills:

This practical is expected to develop the following skills for the industry-identified competency like

1. In depth knowledge of dissembling the PC.
2. Disconnect all components and peripherals properly while dissembling PC.

D. Relevant Course Outcomes (COs):

Test and troubleshoot various faults related to computer hardware and its peripherals.

E. Practical Outcomes:

Dissemble desktop PC.

F. Relevant Affective domain Outcomes (ADOs):

1. Gain confidence in dissembling all peripheral devices.
2. Develop a sense of responsibility in disconnecting the devices.
3. Develop patience and perseverance in dissembling desktop PC.

G. Prerequisite Theory:

Disassembling a computer system involves taking apart its various components and parts. This process is typically done for various reasons, such as upgrading hardware, performing maintenance, troubleshooting, or recycling components. Here is a general guide on how to disassemble a desktop computer system:

Caution: Before starting the disassembly process, ensure that the computer is powered off and unplugged. Take necessary precautions to prevent static electricity discharge, and follow safety guidelines.

1. **Shut Down the Computer:**
   - Power off the computer through the operating system and shut down any connected peripherals.
2. **Unplug the Computer:**
   - Disconnect the power cable from the electrical outlet. Unplug any other connected cables, including network cables, USB devices, and peripherals.
3. **Ground Yourself:**
   - To prevent static electricity damage to sensitive components, ground yourself by touching a grounded metal surface or using an anti-static wrist strap.
4. **Open the Computer Case:**
   - Depending on the computer case design, remove the side panel to access the internal components. This is often done by removing screws or releasing latches.
5. **Disconnect Power Supply Cables:**
   - Disconnect the power supply cables from the motherboard, hard drives, and other components. Some cables may have latches or clips that need to be released.
6. **Disconnect Data Cables:**
   - Unplug SATA or IDE cables connecting hard drives, optical drives, and other storage devices. Also, disconnect data cables for any expansion cards.
7. **Remove Expansion Cards:**
   - If applicable, remove any expansion cards (graphics card, sound card, etc.) by releasing the retention mechanism and gently pulling the card out of its slot.
8. **Remove Memory Modules (RAM):**
   - Release the latches on the sides of the memory modules, and gently lift them out of their slots. Handle memory modules by the edges to avoid damaging the connectors.
9. **Disconnect and Remove Storage Drives:**
   - Unplug power and data cables from hard drives and SSDs. Remove the drives from their bays by releasing any securing mechanisms or screws.
10. **Disconnect and Remove Optical Drives:**
    - Unplug power and data cables from optical drives (CD/DVD drives) and remove them from their bays if necessary.
11. **Remove CPU Cooler:**
    - If upgrading or inspecting the CPU, remove the CPU cooler by unscrewing it from the motherboard. Carefully lift the cooler to avoid damaging the CPU and clean off any thermal paste for future use.
12. **Unplug Front Panel Connectors:**

- Disconnect the front panel connectors (power button, reset button, LED indicators) from the motherboard.

13. **Unseat the CPU:**
    - Release the CPU socket lever, lift the CPU socket cover, and carefully lift the CPU out of its socket.
14. **Disconnect Motherboard Cables:**
    - Disconnect any remaining cables connected to the motherboard, including USB headers, fan connectors, and audio connectors.
15. **Remove the Motherboard:**
    - Unscrew the motherboard from the case and carefully lift it out. Ensure that no components are still connected to the motherboard.
16. **Remove Power Supply:**
    - If necessary, unscrew the power supply from the case and disconnect its cables from the motherboard and components.
17. **Final Check:**
    - Inspect the components and ensure that no cables or connectors are still attached. Clean the components if necessary.

H. Work Situation:

1.Faculty will demonstrate dissembling of PC.

2. Faculty must form group of four or five students..

3. Students group will dissemble desktop computer.

I. Resource Required:

1.Desktop PC

2.Screw Driver set.

3.multi-meter

J. Procedure:

1.Take any desktop computer available in laboratory.

2.Dissembling desktop PC.

K. Practical Related Questions:

1.Write steps for Dissembling of PC for troubleshooting purpose

Signature