I

Name _____

Roll No. _____ Year 20____20____

Exam Seat No. _____

COMPUTER GROUP | SEMESTER - II | DIPLOMA IN ENGINEERING AND TECHNOLOGY

A LABORATORY MANUAL

FOR

COMPUTER PERIPHERAL & HARDWARE MAINTENANCE

(22013)

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI

(Autonomous) (ISO 9001 : 2015) (ISO / IEC 27001 : 2013)

VISION

To ensure that the Diploma level Technical Education constantly matches the latest requirements of technology and industry and includes the all-round personal development of students including social concerns and to become globally competitive, technology led organization.

MISSION

To provide high quality technical and managerial manpower, information and consultancy services to the industry and community to enable the industry and community to face the changing technological and environmental challenges.

QUALITY POLICY

We, at MSBTE are committed to offer the best in class academic services to the students and institutes to enhance the delight of industry and society. This will be achieved through continual improvement in management practices adopted in the process of curriculum design, development, implementation, evaluation and monitoring system along with adequate faculty development programmes.

CORE VALUES

MSBTE believes in the followings:

- Education industry produces live products.
- Market requirements do not wait for curriculum changes.
- Question paper is the reflector of academic standards of educational organization.
- Well designed curriculum needs effective implementation too.
- Competency based curriculum is the backbone of need based program.
- Technical skills do need support of life skills.
- Best teachers are the national assets.
- Effective teaching learning process is impossible without learning resources.

A Laboratory Manual for

Computer Peripherals and Hardware Maintenance

(22013)

Semester-II

(CO/CM/CW/IF)

Maharashtra State
Board of Technical Education, Mumbai
(Autonomous) (ISO 9001:2015) (ISO/IEC 27001:2013)

Maharashtra State Board of Technical Education,
(Autonomous) (ISO 9001 : 2015) (ISO/IEC 27001 : 2013)
4th Floor, Government Polytechnic Building, 49, Kherwadi,
Bandra (East), Mumbai - 400051.
(Printed on December, 2017)

MAHARASHTRA STATE

BOARD OF TECHNICAL EDUCATION

Certificate

This is to certify that Mr. / Ms. …… Roll No. ……., of First Semester of Diploma in…….. …… of Institute,…….…….. …… (Code: ……...) has completed the term work satisfactorily in Subject **Computer Peripherals & Hardware Maintenance (22013)** for the academic year 20…….. to 20…….. as prescribed in the curriculum.

Place: …… Enrollment No:……

Date: …… Exam. Seat No: ……

Subject Teacher **Head of the Department** **Principal**

Seal of Institution

Preface

The primary focus of any engineering laboratory/field work in the technical education system is to develop the much needed industry relevant competencies and skills. With this in view, MSBTE embarked on this innovative 'I' Scheme curricula for engineering Diploma programmes with outcome-based education as the focus and accordingly, relatively large amount of time is allotted for the practical work. This displays the great importance of laboratory work making each teacher, instructor and student to realize that every minute of the laboratory time need to be effectively utilized to develop these outcomes, rather than doing other mundane activities. Therefore, for the successful implementation of this outcome-based curriculum, every practical has been designed to serve as a ***'vehicle'*** to develop this industry identified competency in every student. The practical skills are difficult to develop through 'chalk and duster' activity in the classroom situation. Accordingly, the 'I' scheme laboratory manual development team designed the practicals to ***focus*** on ***outcomes***, rather than the traditional age old practice of conducting practicals to 'verify the theory' (which may become a byproduct along the way).

This laboratory manual is designed to help all stakeholders, especially the students, teachers and instructors to develop in the student the pre-determined outcomes. It is expected from each student that at least a day in advance, they have to thoroughly read the concerned practical procedure that they will do the next day and understand minimum theoretical background associated with the practical. Every practical in this manual begins by identifying the competency, industry relevant skills, course outcomes and practical outcomes which serve as a key focal point for doing the practical. Students will then become aware about the skills they will achieve through procedure shown there and necessary precautions to be taken, which will help them to apply in solving real-world problems in their professional life.

This manual also provides guidelines to teachers and instructors to effectively facilitate student-centered lab activities through each practical exercise by arranging and managing necessary resources in order that the students follow the procedures and precautions systematically ensuring the achievement of outcomes in the students.

Maintenance and troubleshooting of computer system and its peripherals is an important skill to upkeep the computer systems and peripherals. Diploma pass out must be able to use and maintain these system peripherals authentically. They must also possess basic skills of assembling desktop computers, interfacing with peripheral devices, installing new devices and carry out preventive and breakdown maintenance and troubleshooting. This course is designed to develop these vital skills in them through lab-based activities to solve problems associated with computer hardware.

Although best possible care has been taken to check for errors (if any) in this laboratory manual, perfection may elude us as this is the first edition of this manual. Any errors and suggestions for improvement are solicited and highly welcome.

Programme Outcomes (POs) to be achieved through Practicals of this Course

Following programme outcomes are expected to be achieved significantly out of the programme outcomes through the practicals of the course:

PO 1. Basic knowledge: Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Computer Hardware related problems.

PO 2. Discipline knowledge: Apply discipline related knowledge to solve broad-based Computer Hardware related problems.

PO 3. Experiments and practice: Plan to perform experiments and practices to use the results to solve broad-based Computer Hardware related problems.

PO 4. Engineering tools: Apply relevant Computer Technologies and tools with an understanding of the limitations.

PO 5. The engineer and society: Assess social, health, safety and legal issues and the consequent responsibilities relevant to practice in the field of Computer Technology.

PO 6. Environment and sustainability: Apply Computer Technology related engineering solutions for sustainable development practices in environmental contexts.

PO 7. Ethics: Apply ethical principles for commitment to professional ethics, responsibilities and norms of practice in the field of Computer Technology.

PO 8. Individual and teamwork: Function effectively as a leader and team member in diverse/ multidisciplinary teams.

PO 9. Communication: Communicate effectively in oral and written form.

PO 10. Life-long learning: Engage in independent and life-long learning activities in the context of technological changes also in the Computer engineering and allied industry.

Practical- Course Outcome matrix

Course Outcomes (COs)

a. Identify different types of computer systems.
b. Troubleshoot common motherboard problems.
c. Select processors required for relevant systems.
d. Partition/format hard disk drives.
e. Troubleshoot peripherals and networks.
f. Test power supplies.

S. No.	Title of the Practical	CO a.	CO b.	CO c.	CO d.	CO e.	CO f.
1.	a. Identify desktop and server by its type and verify its specifications b. Identify type of laptop and verify its Specification	✓	-	✓	-	-	-
2.	a. Identify hardware components on motherboard b. Troubleshoot common problems of motherboard.	-	✓	-	-	-	-
3.	Configure BIOS settings	✓	-	-	-	✓	-
4.	Partition and manage hard disk: format hard drives with different file systems. (Part-I& II)	-	-	✓	-	-	-
5.	Install Operating System – Windows family (such as Windows 7/ Windows 10,Windows server 12)	-	-	-	✓	-	-
6.	Install Operating System –Unix family (such as Linux/Ubuntu/Centos)	-	-	-	✓	-	-
7.	Troubleshoot Hard disk problems.	-	-	-	✓	-	-
8.	a. Install local printer (Software configuration settings on printer and troubleshooting) b. Share Printer in Network(Software configuration settings on printer and troubleshooting)	-	-	-	-	✓	-
9.	Set keyboard, mouse, monitor, Speaker, Microphone and LCD Projector	-	-	-	-	✓	-
10	Install SMPS, measure voltage levels in main connectors of SMPS connecting various subsystems.	-	-	-	-	-	✓
11	Assemble and Disassemble Desktop System (Part-I & II)	-	-	✓	-	✓	-
12	Troubleshoot computer system by diagnosing the problem	-	✓	-	-	✓	-
13	Use diagnostic software for fault finding and viruses	-	✓	-	-	✓	-
14	Undertake Preventive Maintenance of PC using vacuum cleaner and simple tools	-	✓	-	-	✓	-

List of Industry Relevant Skills

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

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

Guidelines to Teachers

1. Teacher shall explain prior concepts to the students before starting each experiment.
2. For practical's requiring tools to be used, teacher should provide the demonstration of the practical emphasizing the skills, which the student should achieve.
3. Involve students in the activities during the conduct of each experiment.
4. Teachers should give opportunity to students for hands-on after the demonstration.
5. Assess the skill achievement of the students and COs of each unit.
6. Teacher is expected to share the skills and competencies to be developed in the students.
7. Teacher should ensure that the respective skills and competencies are developed in the students after the completion of the practical exercise.
8. Teacher may provide additional knowledge and skills to the students even though that may not be covered in the manual but are expected from the students by the industries.
9. Teacher may suggest the students to refer additional related literature of the reference books/websites/seminar proceedings etc.
10. During assessment teacher is expected to ask questions to the students to tap their knowledge and skill related to that practical.

Instructions for Students

Student shall read the points given below for understanding the theoretical concepts and practical applications.

1. Students shall listen carefully the lecture given by teacher about importance of subject, learning structure, course outcomes.
2. Students shall organize the work in the group of two or three members and make a record of all observations.
3. Students shall understand the purpose of experiment and its practical implementation.
4. Students shall write the answers of the questions during practical.
5. Student should feel free to discuss any difficulty faced during the conduct of practical.
6. Students shall develop maintenance skills as expected by the industries.
7. Student shall attempt to develop related hands on skills and gain confidence.
8. Students shall refer technical magazines; websites related to the scope of the subjects and update their knowledge and skills.
9. Students shall develop self-learning techniques.
10. Students should develop habit to submit the write-ups on the scheduled dates and time.

Content Page

List of Practicals and Progressive Assessment Sheet

11.	Assemble and Disassemble Desktop System (Part-I & II)	48					
12.	Troubleshoot computer system by diagnosing the problem	54					
13.	Use diagnostic software for fault finding and viruses	59					
14.	Undertake Preventive Maintenance of PC using vacuum cleaner and simple tools	63					
Total Marks							

***** To be transferred to proforma of CIAAN 2017.

Practical No. 1: Specifications of Desktop PC, Laptop and Server

I Practical Significance

A desktop computer and Laptop system typically runs a user-friendly operating system and desktop applications to facilitate desktop-oriented tasks. In contrast, a server manages all network resources and performs no other task besides server tasks. There are different types of Computer System with different specifications. Hence students will be able to identify the specifications of Desktop, Laptop and Server with its types for given application.

II Relevant Program Outcomes (POs)

PO2- Discipline knowledge
PO3- Experiments and practice

III Relevant Course Outcomes

Identify different types of computer systems

IV Practical Learning Outcomes

a. Identify desktop and server by its type and verify its specifications
b. Identify type of laptop and verify its Specification

V Competency & Practical Skills

a. Identify Desktop PC, Laptop and Server.
b. Write Specifications of Desktop, laptop and Server.
c. Handle computer system carefully.

VI Minimum Theoretical Background

A desktop computer is a personal computer generally consists of a monitor, keyboard, mouse and either a horizontal or vertical form factor cabinet. The first desktop computer was the Hewlett Packard 9100A which was introduced in 1968. Since then, there have been many desktop computers launched and used all over the world.

A **laptop** computer some time it is called as Notebook is a portable personal computer powered by a battery. Laptops have an attached keyboard, touchpad, trackball, joystick used for navigation and a thin LED/LCD display screen. A laptop computer is smaller than a desktop computer in size.

A **server** is a computer designed to process requests and transport data to other computers called as client on a local network or the internet. The server facilitates sharing of resources such as Hard disk, Printer, Modem etc. and information among other computer in network. There are different types of server such as Tower, Blade and Rack Server.

Tower server is similar to desktop PC only the difference is it has more drives and hardware into a single tower. Rack Servers consist multiple servers, and are specially constructed to fit in these small spaces. Blade servers are Slim and compact, just like a blade, they slide vertically into a specially designed chassis and having much greater processing power, take up less space and use less energy than other forms of server used for the same purposes.

VII 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 with its specification.

VIII Resources required

S. No.	Instrument /Object	Specification	Quantity	Remarks
1.	Desktop PC	Pentium IV or above with Keyboard, Mouse, Monitor	1 No.	Whichever is available
2.	Laptop	Pentium IV or above with Keyboard, LED/LCD TFT Display	1 No.	Whichever is available
3.	Server	Any Latest Server Computer	1 No.	Whichever is available

IX Procedure

1. Identify Desktop PC, Laptop and Server available in Laboratory.
2. Identify the various parts of Desktop PC, Laptop and Server.
3. Observe the standard specification of Desktop PC, Laptop and Server.
4. Observe the various parts of Desktop PC, Laptop and Server.
5. Compare Desktop PC, Laptop and Server.
6. Find the price difference of Desktop PC, Laptop and Server.

X Precautions

1. Connect all the parts of Desktop PC correctly.
2. Connect power supply carefully.
3. Shut down PC properly.

XI Resources used (with major specifications)

……
……
……
……
……

XII Actual procedure followed

……
……
……
……
……

XIII Precautions followed

……
……
……
……

XIV Observations:

Table 1: Specification of Desktop PC

Sr. No.	Part	Manufacturer	Specification
1	Processor (CPU)		
2	Processor Speed		
3	Operating System		
4	Memory		
5	Storage (Hard Disk)		
6	Graphics Card		
7	Display/Monitor		
8	Hard Disk Drive		
9	CD/DVD Drive		
10	Keyboard		
11	Mouse		
12	Network Adaptor		
13	HDMI Port (if available)		
14	USB Ports (if available)		
15	Card Reader		

Table 2: Specification of Laptop

Sr. No.	Part	Manufacturer	Specification
1	Processor (CPU)		
2	Processor Speed		
3	Operating System		
4	Memory		
5	Storage		
6	Graphics Card		
7	Display (LED/LCD)		
8	Hard Disk Drive		
9	CD/DVD Drive		
10	Network Adapter		
11	HDMI Port (if available)		
12	USB Port (if available)		
13	Wireless Network (if available)		
14	Camera (if available)		
15	Card Reader (if available)		

Table 3: Specification of Server

Sr. No.	Part	Manufacturer	Specification
1	Server Type		
2	Processor (CPU)		
3	Processor Speed		
4	Nos. of Processors		
5	Memory- RAM		

6	Cache Memory (L1 and L2)		
7	Hard Disk Drive		
8	Hard Drives Supported (IDE/SCSI)		
9	Network Adapter		
10	Fire wire Port (if available)		
11	USB Port (if available)		
12	Wireless(if available)		
13	Operating System		
14	CD/DVD Drive		

XVI. Practical related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions to ensure the achievement of identified CO.

1. Write the frequency of processor in Desktop PC, Laptop and Server.
2. Label different parts of Desktop Computer shown in Fig. 1

Fig. 1 Desktop Computer

3. Label different parts of Laptop shown in Fig. 2

Fig.2 Laptop

(**Space for Answers**)

……
……
……
……
……
……
……
……
……
……
……
……

XVII. References / Suggestions for further Reading

1. https://www.computerhope.com/jargon/d/desktopc.htm
2. https://techterms.com/definition/laptop
3. www.serverschool.com/server-hardware/3-types-of-server-hardware/

XVIII. Assessment Scheme

Performance indicators		Weightage
Process related 15 Marks		**(60%)**
1	Handling of the devices	20%
2	Attentiveness	10%
3	Performance	30%
Product related 10 Marks		**(40%)**
4	Practical related questions	20%
5	Completion and submission of practical in time	10%
6	Observations	10%
	Total (25 Marks)	**(100%)**

List of student Team Members

1. ……..
2. ……...
3. ……
4. ……

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total (25)**	

Practical No. 2: Identify and Troubleshoot Motherboards

I Practical Significance

A motherboard is one of the most essential parts of a computer system. The motherboard is a printed circuit board that is the foundation of a computer, located on the back side or at the bottom of the computer chassis. It holds together different components of a computer, including the central processing unit (CPU), memory and connectors for input and output devices. Hence students will be able to identify the components of the motherboard.

II Relevant Program Outcomes (POs)

PO2- Discipline knowledge
PO3- Experiments and practice

III Relevant Course Outcomes

Identify different components on motherboard.

IV Practical Learning Outcome

a. Identify different components on motherboard.
b. Troubleshoot common problems of motherboard

V Competency & Practical Skills

a. Identify components on motherboard
b. Find common faults in motherboard
c. Handle motherboard carefully.

VI Minimum Theoretical Background

The main printed circuit board in a computer is known as the motherboard. Other names for this central computer unit are system board, main board. The major components necessary for the functioning of the computer, are attached to the motherboard. These include the processor, memory, expansion slots and connectors for input and output devices. The motherboard connects directly or indirectly to every part of the PC. It also controls various data transactions between the CPU and other peripherals connected to it.

VII Work Situation:

a. Faculty will demonstrate different components of available motherboard and primary preventive maintenance.
b. Faculty must form a group of four to five students.
c. Students group will observe different components of available motherboard.
d. Students must list down the steps to perform primary preventive maintenance.

VIII Resources required

Sr. No.	Instrument /Object	Specification	Quantity	Remarks
1.	Motherboards	Pentium IV Onwards	5 Nos.	whichever is available
2.	Vacuum Cleaner	-	01 No.	whichever is available

IX Procedure

1. Take motherboard from faculty.
2. Identify different components on motherboard.
3. Understand the function of different components of motherboard.
4. Remove the data and power supply cables.
5. Remove other components connected to the motherboard such as processor, RAM and add-on cards.
6. Clean the components by removing dust and contaminants deposited on contacts using vacuum cleaner.
7. After cleaning, fix the components firmly in their respective slots.
8. After fixing, the components connect the data and power cables.

X Precautions

a. Before removing components, remove power supply cable carefully.
b. Remove components carefully.
c. While cleaning hold the cards by its sides only.
d. Avoid touching the contact edges.

XI Resources used (with major specifications)

……
……
……
……

XII Actual procedure followed

……
……
……
……

XIII Precautions followed

……
……
……
……

XIV Observations:

(a) Motherboard supports …… RAM banks.

(b) There are ……. Numbers of SATA/IDE connectors on motherboard.

(c) The motherboard supports …….. Type of CPU socket.

(d) ….. pin ATX power supply connector supplies power to the motherboard.

(e) List different components of motherboard and their use in Table 1.

Table 1: Components of Motherboard

Sr. No.	Component	Use

(1) Note down the motherboard problems and solutions in Table-2

Table 2: Motherboard- common problems and its solution

Sr. No.	Problem	Solution

XV Practical related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

a. Give details of chipset used in your computer motherboard.
b. How many USB ports, serial and parallel ports are available in the computer used.
c. Give the details of buses available on the motherboard used.
d. Label components of motherboard given in Fig. 1

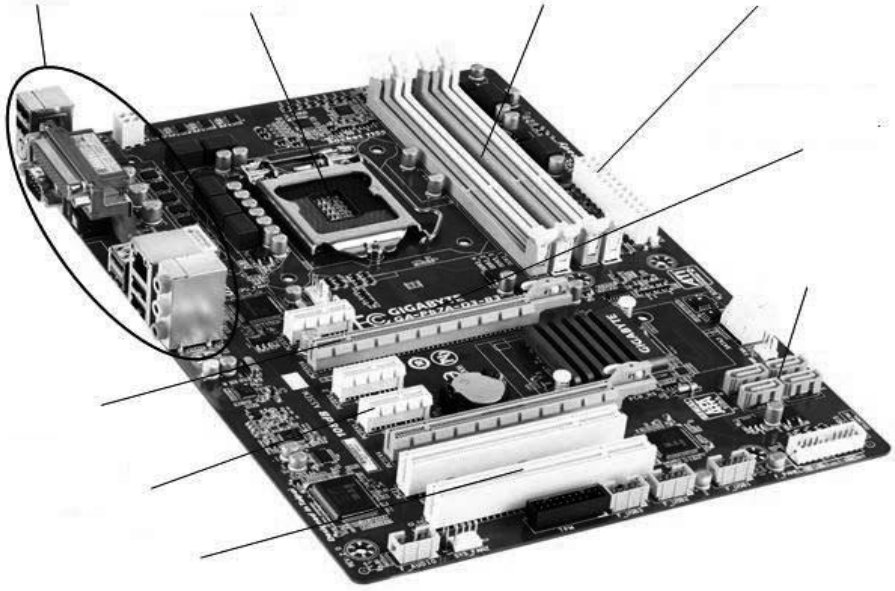


Fig.1. Motherboard

(Space for answers)

……
……
……
……

XVI References / Suggestions for further Reading

a. https://www.youtube.com/watch?v=KWknRqJQJ3U
b. https://www.youtube.com/watch?v=1K8Zu4P88Yc
c. www.deskdecode.com/how-to-fix-no-display-computers-**motherboard- problem**

XVII Assessment Scheme

Performance indicators		Weightage
Process related 15 Marks		**(60%)**
1	Handling of the devices	20%
2	Attentiveness	10%
3	Performance	30%
Product related 10 Marks		**(40%)**
4	Practical related questions	20%
5	Completion and submission of practical in time	10%
6	Observations	10%
	Total (25 Marks)	**(100%)**

List of student Team Members

1. ……..
2. ……...
3. ……
4. ……

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total (25)**	

Practical No. 3: Configure BIOS Settings

I Practical Significance

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 in a computer such as the hard drive, floppy drive, optical drive, CPU, memory, etc. All available settings in BIOS are configurable via the BIOS Setup Utility.

II Relevant Program Outcomes (POs)

PO2- Discipline knowledge
PO3- Experiments and practice
PO10-Life Long Learning

III Relevant Course Outcomes

Identify different types of computer systems

IV Practical Learning Outcome

Configure BIOS settings

V Competency & Practical Skills

a. BIOS Configuration
b. Handle computer system carefully.

VI Minimum Theoretical Background

The BIOS is accessed and configured through the BIOS Setup Utility. The BIOS Setup Utility is accessed in different ways depending on your computer or motherboard make and model. BIOS contain a number of hardware configuration options that can be changed through the setup utility. Saving these changes and restarting the computer applies the changes to the BIOS and change the way BIOS instructs the hardware to function.

BIOS have the different set ups as given below:

1. Standard CMOS Setup
2. Advanced CMOS Setup
3. Advanced Chipset Setup.
4. Power Management Setup
5. PCI/Plug and Play Setup
6. Peripherals Setup
7. CPU Configuration Setup

VII Work Situation:

a. Faculty will demonstrate different BIOS Settings using projector.
b. Faculty must form a group of two or three students.
c. Students group will practice different BIOS Settings.
d. Students must list down the steps to access BIOS Setup utility.

VIII Resources required

S. No.	Instrument /Object	Specification	Quantity	Remarks
1.	Desktop PC	Pentium IV or above with Keyboard, Mouse, Monitor	1 No. per Group	Whichever is available Group of two or three students

IX Procedure

Steps to enter the BIOS Setup Program Utility

1. Power ON the computer.
2. After power On, black screen appear on you monitor, wait until the message appears briefly at the bottom of the screen such as "*Press F2 to enter SETUP, F12 for Network Boot, ESC for Boot Menu*"
3. Now press F2 key to enter the setup program. (This key may vary from one machine to other machine depending on the manufacture of the BIOS Setup program)
4. Observe different BIOS set ups.

X Precautions

1. Change the setting carefully.
2. Save changes if required under the guidance of teacher.

XI Resources used (with major specifications)

……
……
……
……

XII Actual procedure followed

……
……
……
……

XIII Precautions followed

……
……
……
……

XIV Observations:

1. The key/key combination used to enter the BIOS setup is …….
2. The computer system has ……MB L2 cache memory.
3. The computer system has ……MB/GB RAM.
4. First Boot Priority Device is ……..
5. Various BIOS settings are stored in ……

XV Practical related Questions

Note: Below given are few sample ***questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.***

1. List cache type, size and memory size of the system from Main setup.
2. State any two setting under CPU configuration.
3. Write down boot devices priority in boot sequence menu as follows:
   1st Boot Device:
   2nd Boot Device:
   3rd Boot Device:

(Space for answers)

XVI References / Suggestions for further Reading

a. http://www.informit.com/articles/article.aspx?p=130913&seqNum=10
b. https://www.youtube.com/watch?v=7JFffYlxfYg
c. https://www.computerhope.com/issues/ch000192.htm

XVII Assessment Scheme

Performance indicators		Weightage
Process related (15 Marks)		**60%**
1	Handling of the devices	20%
2	Attentiveness	10%
3	Performance	30%
Product related (10 Marks)		**40%**
4	Practical related questions	20%
5	Completion and submission of practical in time	10%
6	Observations	10%
	Total (25 Marks)	**100%**

List of student Team Members

1. ……..
2. ……...
3. ……
4. ……

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total (25)**	

Practical No. 4: Partition and Manage Hard Disk: Format Hard Drives With Different File Systems. (Part-I and Part-II)

I Practical Significance

With the use of computing technologies in every span of life, use of tools and techniques for storage and efficient storage management has become absolute necessity. Hence the very first step in making any secondary storage usable is through formatting with appropriate file system. Partitioning in-turn leads to proper organization, management and effective logical use of available storage spaces. Separating Operating System space from other data storages further eases the task of recovering from Operating Systems failure. Mainly, by partitioning your disk, you can separate your operating system from your data and thus reduce the chances of your data becoming corrupted.

II Relevant Program Outcomes (POs)

PO1- Basic knowledge
PO3- Experiments and practice
PO10-Life Long Learning

III Relevant Course Outcomes

Partition/format hard disk drives.

IV Practical Learning Outcome

Partition and manage hard disk: format hard drives with different file systems (Part-I and Part-II)

V Competency & Practical Skills

a. Formatting Skills.
b. Disk Management Skills.
c. Partitioning Skills.

VI Relevant Affective domain related Outcomes

a. Handle tools and equipment carefully.
b. Apply Logical thinking.
c. Improve Decision Making.

VII Minimum Theoretical Background

Disk formatting is the process of preparing a data storage device such as a hard disk drive, solid-state drive, floppy disk or USB flash drive for initial use. In some cases, the formatting operation may also create one or more new file systems. Formatting most often refers to the process of generating a new file system. Formatting creates the file system format within a disk partition or a logical volume. This may occur during operating system installation, or when adding a new disk. The term "format" is understood to mean an operation in which a new disk medium is fully prepared to store files.

Partitioning divides a disk into one or more regions. Partitioning can be done using Operating Systems media or software tools.

VIII Work Situation :

a. Faculty will demonstrate formating and partitioning with hardisk during Part-I as per procedure given below . Any file system(From Linux/Windows family) could be chosen.
b. Students must list down the steps followed for formating and partitioning during Part-I.
c. Students will practice formating and partitioning on any external media or the given harddisk in group during Part-II.

IX Resources required

Sr. No.	Instrument /Object	Specification	Quantity	Remarks
1.	Computer System	Any desktop PC with attached Hard Disk.	10	Whichever is available
2.	External Hard Disk	--	1	Any Available external Disk
3.	Pen Drive/ Any Secondary storage media	--	1	Any Available
4.	Bootable CD/DVD/Any bootable media	--	1	Linux/Windows. Multiple Copies of original CDs can be used.
5.	Projector	--	1	Whichever is available

X Procedure

For Partitioning:

Method1: Create disk partitions using Operating system media. Create partitions, specify size and assign it as a drive. Follow the steps as per given directions during installation.

Method 2: With Windows

1. Open the Computer Management tool. Open the Start menu. Type “Computer Management” in the search bar of the Start menu and press enter.
2. Select the Disk Management tool. Click on Disk Management on the left side of the window and you should see all of the disks and their partitions on your computer.
3. Make some space for the new partition. Right-click on the partition you wish to re-size and select the Shrink Volume option.
   Note: There may be a partition named System Reserved. It is not recommended that you alter this partition at all.
4. Shrink the drive. Enter the size you wish to shrink your drive to, in megabytes (1000 MB = 1GB). Then click on the Shrink button.
   Note: You cannot shrink your volume greater than the amount indicated in the Size of available shrink space in MB section.
5. The New Simple Volume Wizard. The New Simple Volume Wizard should popup. Click on the Next button to continue.
6. Enter size of new partition. Enter the amount of memory you wish to allocate for your new partition and click on the Next button.
   Note: You cannot make your new volume larger than the maximum amount of memory available.
7. Enter size of new partition. Enter the amount of memory you wish to allocate for your new partition and click on the Next button.
   Note: You cannot make your new volume larger than the maximum amount of memory available.

8. Give the new volume a letter name or path. Select from the menu, a letter name for your new partition and click on the “Next” button.
   Note: The letter name or path is used by Windows to identify and navigate to your new volume.
9. Settings for the new volume.
   Click on the Format this volume with the following settings:
   a. For File System, select NTFS
   b. For Allocation unit size, select Default
   c. For Volume Label, type the name you wish to give your new drive.
   d. Click on the Perform a quick format
   e. Then click on the Next button
10. Create the new volume. Look over your settings and click on the Finish button.
11. Format the new volume.
    a. You will get a popup asking you to partition your new drive. Click on the Format disk button.
    b. A new window will popup. Keep the settings and click on the Start button.
    c. A warning will popup. Click on the OK button.
12. Check new volume. If everything was done correctly, you should now see your new drive in the Disk Management window.

For Formatting:

1. Boot your PC using bootable media.
2. Follow the instructions that appear on the screen.
3. On the "Install " page, enter your language and other preferences, and then click Next.
4. Follow the instructions and proceed till the partitions are displayed or the system is waiting for partitions.
5. Click the partition that you want to format and click Format.
   a. If you have more than one partition on this hard drive and want to get rid of them to make one big drive again, then select a partition and click on the Delete option for each partition. Once you have deleted all of the partitions, select the Unallocated Space partition and click Format.
   b. Pick the formatting option (i.e the file System) that you want.
   c. When you've finished formatting, click Next.

XI Precautions

Selection of any drive for formatting/partitioning must be done carefully so as not to delete any useful data.

XII Resources used (with major specifications)

……
……
……
……
……

XIII Actual procedure followed

……
……
……
……
……

XIV Precautions followed

……
……
……
……
……

XV Observations :

1. Every drive must be _____ before use.
2. Mention size of each partition created.
3. State the O/P of shrinking the partition.
4. _____ media can be used to boot the PC.
5. State time required to format a drive.
6. List volume Labels assigned with NTFS.

XVI Practical Assignment Summary :

Note: Student has to specify - storage media used for formatting, file systems used, number of partitions created, size of created partitions, usable size after formatting.

XVII Practical related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions to ensure the achievement of identified CO.

1. List file systems displayed while formatting along with its full form.
2. List Linux file system used while formatting.
3. How does Linux identify partitions?
4. Differentiate between the concept of Primary and secondary partitions.
5. List Storage media used for formatting and partitioning.
6. List Partitioning Methods Used.

(Space for answers)

……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……

……
……
……
……
……
……
……
……

XVIII References / Suggestions for further Reading

https://en.wikipedia.org

XIX Assessment Scheme

Performance indicators		Weightage
Process related (15 Marks)		**60%**
1	Handling of the devices	20%
2	Attentiveness	10%
3	Performance	30%
Product related (10 Marks)		**40%**
4	Practical related questions	20%
5	Completion and submission of practical in time	10%
6	Observations	10%
	Total (25 Marks)	**100%**

List of student Team Members

1. ……..
2. ……...
3. ……
4. ……

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total (25)**	

Practical No. 5: Installation of Operating System (Windows Family)

I Practical Significance

Computing devices with their own operating systems are being used in every span of life.

II Relevant Program Outcomes (POs)

PO1- Basic knowledge
PO3- Experiments and practice
PO10-Life Long Learning

III Relevant Course Outcomes

Partition/format hard disk drives.

IV Practical Learning Outcome

Install Operating System – Windows family (such as Windows 7/ Windows 10, Windows server 12)

V Competency & Practical Skills

Installation skills.

VI Relevant Affective domain related Outcomes

a. Handle equipment carefully.
b. Apply Logical thinking.

VII Minimum Theoretical Background

An operating system (OS) is system software that manages computer hardware and software resources and provides common services for computer programs. All computer programs, excluding firmware, require an operating system to function. Windows OS**,** computer operating system (OS) developed by Microsoft Corporation to run personal computers (PCs). Featuring the first graphical user interface (GUI) for IBM-compatible PCs, the Windows OS soon dominated the PC market. Approximately 90 percent of PCs run some version of Windows. The first version of Windows, released in 1985, was simply a GUI offered as an extension of Microsoft's existing disk operating system, or MS-DOS. Windows for the first time allowed opening graphical "windows" displaying the contents of electronic folders and files with the click of a mouse button, rather than typing commands and directory paths at a text prompt.

VIII Work Situation :

a. Faculty will demonstrate installation of any Windows operating system during practicals as per procedure given below . Any file system(From Windows family) could be chosen. Faculty must give common demonstration using projector.
b. Students will practice installation of windows operating system in the group.
c. Students must list down the steps followed for Installation.
d. Faculty must allocate one hour for demonstration, 2 hours for Installation practice by students, and one hour for reporting and verification.

IX Resources required

Sr. No.	Instrument /Object	Specification	Quantity	Remarks
1.	Computer System	Any desktop PC with attached HardDisk.	10 No.	Whichever is available
2.	Bootable CD/Any bootable media	--	1 No.	Linux/Windows. Multiple Copies of original CDs can be used.

X Procedure :

1. Boot your computer from OS media.
2. When the computer starts, press a key if you are asked if you would like to boot from the disc by pressing any key.
3. You should have Windows product key, a 25-character alphanumeric code unique to your copy of Windows. After you choose to start from the disc, Windows Setup will begin loading.
4. Choose your Windows Setup options and click the Install Now button.
5. Accept the License Terms-Accept the Windows 7 License Terms : Read through the agreement, check the *I accept the license terms* checkbox under the agreement text and then click **Next** to confirm that you agree with the terms.
6. Select the Custom installation. Choose the Type of Windows Installation to Complete
7. For clean install erase all the drives, recreate drives as required again.
8. Decide on which hard drive and partition you want to install Windows on.
9. Start guided Windows Installations on your preferred hard drive .
10. Choose Language and Other Preferences: Choose the Language to install, Time and currency format, and Keyboard or input method that you'd like to use in your new Windows installation.
11. The Repair your computer link is used to start a Windows startup repair. Perform another recovery or repair task from System Recovery Option.
12. Wait for the installation process to complete. Once it is finished, you will be prompted to restart the computer and Windows will load.

XI Precautions

Selection of any drive for installation must be done carefully so as not to delete any useful data or partition.

XII Resources used (with major specifications)

(1) Fixed Hard Disk.
(2) Windows Operating System Licensed Media.

XIII Actual procedure followed

……
……
……
……
……
……
……
……
……

……
……
……

XIV Precautions followed

……
……

XV Observations :

1. Every drive must be _____ before use.
2. A product key is a _____ used to activate Windows.
3. Indian Language supported in Windows Installation : _____ (Specify for your Windows Version)
4. Time Zone Chosen _____.
5. Keyboard Chosen _____.
6. File Format chosen _____.

XVI Practical Assignment Summary :

Note: Student has to specify – Windows operating system family, method used for installation, file systems used, size of created partitions.

……
……
……
……
……

XVII Practical related Questions

Note: Below given are few suggestive sample questions for reference. Teachers must design more such questions to ensure the achievement of identified CO.

1. Is any partition automatically created during installations? If yes, mention size.
2. Name Formatting options displayed and chosen.
3. State information about number and size of partitions created. Mention File systems.
4. Name Windows Operating system with its specifications.

(Space for answers)

……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……

……
……
……
……
……
……
……
……
……
……
……

XVIII References / Suggestions for further Reading

a. https://en.wikipedia.org
b. http://www.wikihow.com/Install-Window

XIX Assessment Scheme

Performance indicators		Weightage
Process related (15 Marks)		**60%**
1	Handling of the devices	20%
2	Attentiveness	10%
3	Performance	30%
Product related (10 Marks)		**40%**
4	Practical related questions	20%
5	Completion and submission of practical in time	10%
6	Observations	10%
	Total (25 Marks)	**100%**

List of student Team Members

1. ……..
2. ……...
3. ……
4. ……

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total (25)**	

Practical No. 6: Installation of Operating System (Linux Family)

I Practical Significance

Computing devices with their own Operating Systems are being used in every span of life.

II Relevant Program Outcomes (POs)

PO1- Basic knowledge
PO3- Experiments and practice

III Relevant Course Outcomes

Partition/format hard disk drives.

IV Practical Learning Outcome

Install Operating System –Unix family (such as Linux/Ubuntu/Centos)

V Competency & Practical Skills

Technical skills.

VI Relevant Affective domain related Outcomes

a. Handle equipment carefully.
b. Apply Logical thinking.

VII Minimum Theoretical Background

Linux was originally developed for personal computers based on the Intel x86 architecture, but has since been ported to more platforms than any other operating system. Linux is also the leading operating system on servers and other systems such as mainframe computers, and is used on 99.6% of the TOP500 supercomputers

The development of Linux is one of the most prominent examples of free and open-source software collaboration. The underlying source code may be used, modified and distributed—commercially or non-commercially by anyone under the terms of its respective licenses, such as the GNU (General Public License).

Typically, Linux is packaged in a form known as a Linux distribution (or distro for short) for both desktop and server use. Some of the most popular and mainstream Linux distributions are ArchLinux , CentOS , Debian , Fedora , Gentoo Linux , Linux Mint Mageia , Opens USE and Ubuntu , together with commercial distributions such as Red Hat Enterprise Linux and SUSE Linux Enterprise Server.

VIII Work Situation :

a. Faculty will demonstrate installation of any Linux operating system during as per procedure given below . Any file system(From Windows family) could be chosen. Faculty must give common demonstration using projector.
b. Students will practice installation of Linux operating system in the group.
c. Students must list down the steps followed for Installation.

IX Resources required

S. No.	Instrument /Object	Specification	Quantity	Remarks
1.	Computer System	Any desktop PC with attached HardDisk.	10 No.	Whichever is available
2.	Bootable CD/Any bootable media	--	1 No.	Linux/Windows. Multiple Copies of original CDs can be used.

X Procedure:

Installation of Linux OS

1. Boot from the OS media.
2. Choose what to do with your existing operating system
3. Set partition size
4. Once you are satisfied with your settings, click Install Now.
5. Choose your location Set and keyboard layout
6. Enter your login information. Enter your name, the name of the computer (which will be displayed on the network), choose a username, and come up with a password.
7. You can choose to have Ubuntu automatically log you in, or require your username and password when it starts.
8. Wait for the installation process to complete. Once it is finished, you will be prompted to restart the computer and Ubuntu will load.

XI Precautions

Selection of any drive for installation must be done carefully so as not to delete any useful data.

XII Resources used (with major specifications)

……
……
……
……
……

XIII Actual procedure followed

……
……
……
……
……

XIV Precautions followed

……
……
……
……
……

XV Observations :

1. A product key is a _____ used to activate Windows.
2. Linux is _____source Operating system.
3. Indian Language supported in Linux : _____ (Specify for your Linux Version)
4. Time Zone Chosen _____.
5. Keyboard Chosen _____.
6. File Format chosen _____.

XVI Practical Assignment Summary :

Note: Student has to specify –Linux operating system family, method used for installation, file systems used, size of created partitions.

XVII Practical related Questions

Note: Below given are few suggestive sample questions for reference. Teachers must design more such questions to ensure the achievement of identified CO.

1. How many partitions were created. Name them. State their size.
2. Name Formatting options displayed and chosen.
3. Mention Linux File systems.
4. Name Linux Operating system installed with its specifications.
5. State if product key is compulsory in Linux ?

(Space for answers)

……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……

XVIII References / Suggestions for further Reading

a. https://en.wikipedia.org
b. http://www.wikihow.com/

XIX. Assessment Scheme

Performance indicators		Weightage
Process related (60%)		**15 Marks**
1	Handling of the devices	20%
2	Attentiveness	10%
3	Performance	30%
Product related (40%)		**10 Marks**
4	Practical related questions	20%
5	Completion and submission of practical in time	10%
6	Observations	10%
	Total (25 Marks)	**25 (100%)**

List of student Team Members

1. ……..
2. ……...
3. ……
4. ……

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total (25)**	

Practical No. 7: Troubleshooting Hard Disk

I Practical Significance

The most common internal storage used in the computer system is the hard disk which is also known as fixed disk.

II Relevant Program Outcomes (POs)

PO1- Basic knowledge
PO3- Experiments and practice
PO4- Engineering tools

III Relevant Course Outcomes

Troubleshoot peripherals and networks.

IV Practical Learning Outcome

Troubleshoot Hard disk problems.

V Competency & Practical Skills

a. Troubleshooting skills.
b. Technical skills.

VI Relevant Affective domain related Outcomes

a. Handle tools and equipment carefully.
b. Apply Logical thinking.
c. Improve Decision Making.

VII Minimum Theoretical Background

a. Corrupted files on hard disk: Sometimes, the files become inaccessible by the user as the operating system fails to boot up properly. The reasons for this could be shutting down the device unethically, closing the running program accidentally, power failure, use of corrupted software etc. All these things could potentially contributed a lot in corrupting the hard disk files.

b. Virus Threat : Virus attack is one of the major problems that are faced by HDD. System may get virus from other media, external drives, network etc. If the user takes back-up of files that contain virus, then the system gets re-infected and results in hard disk failure.

c. Disk Defragmentation : Defragmentation is the process of locating the noncontiguous fragments of data into which a computer file may be divided as it is stored on a hard disk, and rearranging the fragments and restoring them into fewer fragments or into the whole file. Defragmentation reduces data access time and allows storage to be used more efficiently. Some operating systems automatically defragment storage periodically; others require that the user occasionally use a special utility for this purpose.

d. Computer fails to detect hard disk or BIOS: When the UPS fails to deliver the required power supply or gives very high power supply, the BIOS cannot detect the hard drive. The HDD fails to spin up in such situations. You may even have problem with the mother board.

e. Heat and dust : This is one of the hard disk problems that occur frequently. Due to excess usage, the system gets heated to the peak point. Sometimes, lack of ventilation and faulty CPU fan also cause this problem.

VIII Work Situation:

a. Faculty will demonstrate Hard disk problems and related solutions. Faculty must give common demonstration using projector. (1/2hr)
b. Students must be provided with devices with induced errors or having certain problem. Accordingly student needs to troubleshoot problems.
c. Students must list down the steps followed.

IX Resources required

S. No.	Instrument /Object	Specification	Quantity	Remarks
1.	Computer System	Any desktop PC with attached HardDisk.	10	Whichever is available
2.	External Hard Disk	--	1	Any Available external Disk

X Procedure

Following faults/problems are to be addressed with hard disk:

1. Corrupted files on hard disk : Avoid installing suspected software and malicious programs into your hard disk. Clean the hard disk on a regular basis to remove unwanted programs. Use Disk Cleanup utility in windows .

To open Disk Cleanup on a Windows follow these instructions:

a. Click Settings > Click Control Panel > Administrative Tools.
b. Click Disk Cleanup.
c. At the Drives list, select which drive you want to run Disk Cleanup on.
d. Select which files you want to delete.
e. Click OK.
f. Click delete files.

2. Virus threat : Students should practice scanning and malware detection with available antivirus S/W. Update the anti-virus program
3. Slow performance of Hard disk :

Steps to be followed for Defragmentation with Windows :

a. Open the Computer window.
b. Right-click the media you want to defragment, such as the main hard drive, C.
c. In the drive's Properties dialog box, click the Tools tab.
d. Click the Defragment Now button.
e. The Disk Defragmenter window appears. Click the Analyze Disk button. Wait while Windows checks the defragmentation on the media.
f. Check the Percent Fragmented value by the disk in the Disk Defragmenter window. If it's zero, there's no point in continuing: Skip to Step 8.
g. Even when the drive shows 0 percent fragmented files, you can still proceed with defragmentation. No media can be fully defragmented, so the Windows Defragmenter will always find something to do.
h. Click the Defragment Disk button.
i. Windows defragments the media. You shouldn't do anything on your computer while the media is being defragmented.
j. Click the Close button, and close up any other windows you opened.

4. Computer fails to detect hard disk: Check through BIOS. If still undetected, check the power supply and connections. Practice switching the drive to another power plug.

5. Heat and dust : Make sure that the CPU fans are in proper condition. Check whether the processor is getting sufficient cooling or not. Users can make use of SMART tools that notify them about the condition of the hard disk and risks that the hard disk may face in future.

Checking Hard Drive through Windows GUI

a. Open File Explorer
b. Click **Properties** from **This PC** / **Computer**
c. Choose the **Tools** tab
d. Click the **Check** button followed by **Scan drive**.
e. Two options are available before starting an Error Checking scan in:

- Automatically fix file system errors : automatically corrects file system related errors that the scan detects.

-Scan for and attempt recovery of bad sectors will perform a search for areas of the hard drive that may be damaged or unusable. If found, this tool will mark those areas as "bad" and prevent your computer from using them in the future. This is a very useful feature but could extend the scan time as much as a few hours.

-Advanced: The first option is equivalent to executing **chkdsk/f** and the second to executing **chkdsk /scan /r**. Checking both is the same as executing **chkdsk /r**.

1. Click the **Start** button.
2. Wait while Error Checking scans the selected hard drive for errors and, depending on options you selected and/or what errors are found, fixes any errors found. Note: If you get a Windows can't check the disk while *it's in use* message, click the Schedule disk check button, close any other open windows, and then restart your computer. You'll notice that Windows takes much longer to start up and you'll see text on the screen as the Error Checking (chkdsk) process completes.
3. Follow whatever advice is given after the scan. If errors were found, you may be asked to restart your computer. If no errors were found, you can close any open windows and continue using your computer normally. **Advanced:** If you're interested, a detailed log of the Error Checking scan, and what was corrected if anything was, can be found in the list of *Application* events in Event Viewer.

Command Line Check Disk Through chkdsk command:

- To use the command line check disk version, open a Command Prompt using the 'Run As Administrator' option. Type command chkdsk at the prompt. This will run chkdsk in a Read-Only mode and display the status of the current drive.
- Typing chkdsk /? and hitting Enter will give you its parameters or switches.

XI Precautions

1. Do not defragment a media card or flash drive. Optical drives cannot be defragmented.
2. Do not run the defragmentation utilities over and over, trying to get a perfectly defragmented hard drive.

XII Resources used (with major specifications)

……
……
……

XIII Actual procedure followed

……
……
……

XIV Precautions followed

……
……
……

XV Observations :

a. State the O/P of disk cleanup utility.
a. List viruses and malware detected on your PC.
b. State Percent Fragmented value by the disk in the Disk Defragmenter window.
c. On detecting the hard disk state the entry shown in BIOS.
d. State the output of *chkdsk.*

XVI Practical Summary :

Note: Student has to specify –steps followed for troubleshooting hard disk, note down problems faced and solution practiced. Students must write syntax of commands used along with their explanations.

XVII Practical related Questions

Note: Below given are few sample questions for reference. Faculty must design more such questions so as to ensure the achievement of identified CO.

a. State the command used for checking disk errors.
b. State the SMART tools used.
c. Write the disk space used before and after disk cleanup.
d. Write name of the antivirus software.
e. Name the malware and or virus detected by your antivirus.
f. Write format of *chkdsk* command.

(Space for answers)

……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……

……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……

XVIII References / Suggestions for further Reading

https://en.wikipedia.org

XIX Assessment Scheme

Performance indicators		Weightage
Process related (15 Marks)		**60%**
1	Handling of the devices	20%
2	Attentiveness	10%
3	Performance	30%
Product related (10 Marks)		**40%**
4	Practical related questions	20%
5	Completion and submission of practical in time	10%
6	Observations	10%
	Total (25 Marks)	**(100%)**

List of student Team Members

1. ……
2. ……....
3. ……
4. ……

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total (25)**	

Practical No. 8: Install Local Printer and Share Printer in Network

I Practical Significance

A printer is an external output device that takes data from a computer and generates output in the form of graphics or/and text on a paper. Printers provide a permanent paper record of computer output data, graphics, or text and are available in a wide variety of different speeds, features, and capabilities. Printers can also be used with different types of paper forms to print labels, stamps, bank checks, and a wide range of business forms. Hence students will be able to install the printer and troubleshoot the problem related to printer.

II Relevant Program Outcomes (POs)

PO2- Discipline knowledge
PO3- Experiments and practice
PO4 -Engineering tools

III Relevant Course Outcomes

Troubleshoot peripherals and networks.

IV Practical Learning Outcome

a. Install printers
b. Share printer in Network
c. Troubleshoot printer problem

V Competency & Practical Skills

a. Connect printer to appropriate PC port using cables
b. Install appropriate printer driver
c. Handle computer system and printer carefully.

VI Minimum Theoretical Background

Printers are one of the easiest devices to set up and configure. There are different types of printer such as dot matrix, inkjet and laser etc. With some printers, we can set up printer by simply connecting the printer to PC either using parallel or USB port and a power supply. But before using printer for printing, the appropriate device driver must be installed in the PC. All modern versions of Windows operating System are able to automatically detect the printer and install the necessary drivers for you. Normally, every printer comes with driver and software CD/DVD.

VII Work Situation:

a. Faculty will demonstrate installation of printer using projector.
b. Faculty must form a group of two or three students.
c. Students group will practice the installation of different printers.
d. Students must list down the steps of installation of printers.

VIII Resources required

S. No.	Instrument /Object	Specification	Quantity	Remarks
1.	Desktop PC	Pentium IV or above with Keyboard, Mouse, Monitor with CD/DVD drive	1 No. per Group	Whichever is available Group of two or three students
2.	Printer with device driver CD/DVD	Laser, Inkjet and dot matrix printer	1 No. per Group	Whichever is available Group of two or three students

IX Procedure

Steps to install printer:

1. Plug the power supply cable to printer properly.
2. Plug the Data cable to printer and PC port such as USB or parallel.
3. Press the Power button to turn ON printer and the power light comes on.
4. Put some papers in the paper tray/drawer.

Way 1: **Installing a plug and play printer**

a. If printer is plug and play device, connect it and power it on; Windows Operating System installs device driver automatically if printer device driver is in-built in Windows Operating System.
b. If printer device driver is not in-built in Windows Operating System then insert the disk that came with the printer and follow the on-screen instructions.
c. Test the printer to make sure it is working.

Way 2: **Installing a printer using the CD**

a. Second way of installation is to insert the CD that came with the printer.
b. If the CD does not automatically start, open "My Computer", double-click on the CD drive, and then click the Setup or Install file.
c. Follow the installation wizard and once completed your software is installed.
d. Test the printer to make sure it is working.

Way 3: **Installing a printer only using the drivers**

(If you only want the printer to be installed without extra software application programs, you can only install the printer driver by following the steps below.)

a. With the printer connected and ON, open the "Control Panel".
b. In the Control Panel double-click the **Printers** or **Printers and Fax** icon.
c. In the Printers window, click the **Add a printer** icon.
d. After completing the above steps, you should see the Windows Printer Wizard. Click **Next** to start the wizard.
e. Next, you have the choice of installing a Local or Network printer. If the printer is connected to computer choose **Local printer** attached to this computer and click **Next**.
f. When prompted for the location of the printer drivers, browse to the directory of printer drivers or point it to the printer CD

Testing the printer:

After the printer is installed, you can use Windows to print a self-test page to verify the printer is working.

1. Click "Start", Settings, and open "Control Panel".
2. Double-click the "Printers or Printers and Fax icon".
3. Right-click on the Printer you want to test and click "Properties". If you do not see your printer, your printer is not installed.

4. In the “Printers Properties” window, click the “**Print Test Page”** button.
5. If the printer can print a test page, your printer is installed and setup properly.

Sharing the printer:

After the printer is installed, you can share a printer in network if your PC is connected in the network.

1. Click “Start”, Settings, and open “Control Panel”.
2. Double-click the “Printers or Printers and Fax icon”.
3. Right-click on the Printer you want to share and click “**Sharing**”. If you do not see your printer, your printer is not installed.
4. In the “Sharing” window, Check the box that says "Share this printer".
5. Then, you can edit the share name of the printer, in case you don't want to use the default name provided by Windows.
6. When done, click OK .
7. The printer is now shared with the other computers on your network, regardless of the operating systems they are using.

Troubleshoot the printer:

1. If you do not have any indicator light, make sure the printer is connected to a working power outlet by verifying each end of the power cable.
2. If the indicator is blinking or is orange, often this is an indication of a printer error, like a paper jam or an issue with the ink or toner cartridge. Remove the panel and carefully pull out the jammed paper.
3. No paper or paper jam -without paper, your printer will not be able to print. Make sure you have paper loaded into the printer paper cartridge or tray.

X Precautions

1. Change the printer setting carefully.
2. Switch OFF before Connecting data and power cable.

XI Resources used (with major specifications)

……
……
……

XII Actual procedure followed

……
……
……
……
……
……

XIII Precautions followed

……
……

XIV Observations:

1. The type of printer used for installation is ……. (Dot Matrix/Inkjet/Laser)
2. The model of printer installed is……
3. The port used for connecting data cable is ……..(Parallel/USB/Wireless)
4. Various buttons available on printer control panel are ……..

XV Practical related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

1. List different printer drivers available in your PC.
2. State memory (RAM) available in printer.
3. Write features of printer used for installation.

(Space for answers)

XVI. References / Suggestions for further Reading

1. https://www.techsupportall.com/how-to-**install**-a-**printer-driver**/
2. https://support.microsoft.com/.../how-to-download-and-**install**-the-latest- **printer-driver**-from-your-printer
3. www.pptfaq.com/FAQ00605_How_to_**install**_a_local_**printer_driver**.htm

XVII. Assessment Scheme

Performance indicators		Weightage
Process related (15 Marks)		**(60%)**
1	Handling of the devices	20%
2	Attentiveness	10%
3	Performance	30%
Product related (10 Marks)		**(40%)**
4	Practical related questions	20%
5	Completion and submission of practical in time	10%
6	Observations	10%
	Total (25 Marks)	**(100%)**

List of student Team Members

1. ……..
2. ……...
3. ……
4. ……

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total (25)**	

Practical No. 9: Set Keyboard, Mouse, Monitor, Speaker, Microphone and LCD Projector

I Practical Significance

Computers can only interact with the world using input and output devices. An input device sends information to a computer system for processing, and an output device reproduces or displays the results of that processing. Hence students will be able to install and set different input and output devices such as Keyboard, mouse, monitor, speaker, microphone and LCD projector.

II Relevant Program Outcomes (POs)

PO1- Basic Knowledge
PO3- Experiments and practice

III Relevant Course Outcomes

Troubleshoot peripherals and networks.

IV Practical Learning Outcome

Install keyboard, mouse, monitor, microphone, speaker and LCD projector

V Competency & Practical Skills

a. Connect different devices to appropriate PC port using cables.
b. Install appropriate device driver.
c. Handle computer system and peripherals carefully.

VI Minimum Theoretical Background

An input device can send data to another device. An output device can receive data from another device. I/O devices are the hardware devices used by a user (or other system) to communicate with a computer. A keyboard and mouse is input device for a computer, while monitors, speakers are output devices.

Keyboard is the most common input device, which helps to input data to the computer and same as that of traditional typewriter.

Mouse is the most popular pointing device and called as cursor-control device, which senses the movement of the mouse and sends corresponding signals to the CPU when the mouse buttons are pressed.

Microphone is an input device to input sound that is then stored in a digital form and used for various applications such as adding sound to a multimedia presentation or for mixing music.

Monitors, commonly called as Visual Display Unit (VDU), are the main output device of a computer. It forms images from tiny dots, called pixels that are arranged in a rectangular form. The sharpness of the image depends upon the number of pixels.

Computer speakers are output device used to hear sounds and music from programs, the internet and movies.

An LCD projector is a type of video projector for displaying video, images or computer data on a screen or other flat surface.

VII Work Situation:

a. Faculty will demonstrate installation of various devices using projector.
b. Faculty must form a group of two or three students.
c. Students group will practice the installation of different devices.
d. Students must list down the steps of installation of device.

VIII Resources required

S. No.	Instrument /Object	Specification	Quantity	Remarks
1.	Desktop PC	Pentium IV or above with Keyboard, Mouse, Monitor with CD/DVD drive	1 No. per Group	Whichever is available Group of two or three students
2.	Keyboard	Any	1 No. per Group	Whichever is available Group of two or three students
3.	Mouse	Two button with Scroll button	1 No. per Group	Whichever is available Group of two or three students
4.	Microphone	Any	1 No. per Group	Whichever is available Group of two or three students
5.	Monitor	CRT/LCD/LED	1 No. per Group	Whichever is available Group of two or three students
6.	Speaker	Stereo	1 No. per Group	Whichever is available Group of two or three students
7.	LCD Projector	Any	1 No. per Group	Whichever is available Group of two or three students

IX Procedure

Steps to set Keyboard:

1. Connect keyboard to appropriate connector of CPU.
2. Open the **“Control Panel”,** selects and double click on “**Keyboard".**
3. Select "Keyboard" from the list of options that appears.
4. Change the sliders for "Repeat delay" "Repeat rate," and "Cursor Blink" to where you want them. You can also click on the empty bar in the middle to test the new settings.

Steps to set Mouse:

1. Connect mouse to appropriate connector of CPU.
2. Open the Control Panel.
3. Double Click "Mouse" from the control panel.
4. Adjust the settings for the physical buttons. The Buttons tab allows you to change the way your mouse buttons work.
5. Change your pointers. The Pointers tab allows you to change the cursors for all the different modes. You can use the "Scheme" menu to choose from any of the pre-installed collections of cursors.
6. Adjust the mouse movement. The Pointer Options tab allows you to change how the mouse cursor moves around on the screen.

7. Change how fast your wheel scrolls. The settings in the Wheel tab affect how fast you can scroll through documents and web pages.

Steps to set Microphone:

1. Connect microphone to jack (Pink Color) on sound panel front/back of CPU.
2. Open the Control Panel.
3. Double Click "Sound and Audio Devices" from the control panel.
4. Select “Audio” tab, in “Sound Recording”, set “default device”.
5. Select “Voice” tab, in “Voice Recording”, set “default device”

Steps to set Monitor:

1. Right-click the Desktop background, select “Properties” or open “Control Panel”, double click on “Display” to open the Display Settings Window
2. “Themes” tab can be used to set different themes available.
3. “Desktop” tab can be used to set background picture and desktop item.
4. “Screen Saver” tab can be used to set screen saver.
5. “Appearance” tab can be used to set Windows appearance, color scheme, font size.
6. “Setting” tab can be used to set Screen resolution and color quality of monitor,

Steps to set Speakers:

1. Connect speaker to jack (Lime Green Color) on sound panel front/back of CPU.
2. Open the Control Panel.
3. Double Click "Sound and Audio Devices" from the control panel.
4. Select “Volume” tab, you can set speaker volume
5. In “Volume” tab, Select “Speaker Setting” , you can set individual speaker volume.

Steps to set LCD projector:

1. Setup the projector facing the screen, and plug in the power cord. Set your PC/laptop next to the projector.
2. Connect projector to PC/Laptop using VGA/HDMI cable.
3. Turn on your PC/laptop first and then turn on the projector.
4. The lamp will take a minute to warm up and display.
5. After you have set the display mode, you may need to adjust your laptop's appropriate resolution.
6. Click on the **Settings** tab or **General Settings** and make sure the screen resolution is set to appropriate values.
7. Click on Apply and then OK.

X Precautions

1. Connect the devices to appropriate port.
2. Change the device setting carefully.

XI Resources used (with major specifications)

……
……
……
……

XII Actual procedure followed

……
……
……

……
……
……
……
……
……
……
……
……
……
……

XIII Precautions followed

……
……

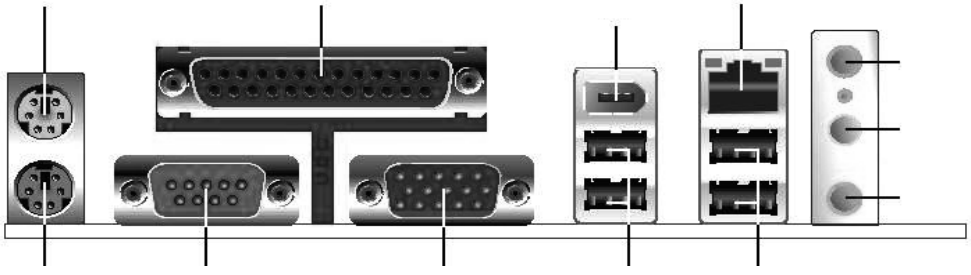
XIV Observations:

1. The number of keys present on keyboard used is……..
2. Connector used to connect mouse to PC is…….. (PS2/USB/Serial)
3. The …….. (VGA/HDMI) port is used to connect LCD projector to PC/Laptop.
4. The resolution of the monitor used is …….
5. The model of speakers used is…….. (Stereo/Mono)

XV Practical related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

a. List different multimedia and function keys available on the keyboard used.
b. List steps to change the monitor resolution.
c. Lable the different ports available in following diagram-



(Space for answers)

……
……
……
……
……
……
……

……
……
……
……
……
……
……
……
……
……

XVI References / Suggestions for further Reading

1. https://support.hp.com/in-en/document/c01926155
2. home.bt.com/.../computing/.../is-your-monitor-set-up-correctly- 11363936571782
3. https://mcmw.abilitynet.org.uk/category/changing-keyboard-settings/
4. http://www.wikihow.com/Change-Mouse-Settings
5. www.wikihow.com/Set-Up-a-Video-Projector
6. www.wikihow.com/Set-Up-a-Simple-One-Microphone-Sound-System

XVII Assessment Scheme

Performance indicators		Weightage
Process related (15 Marks)		**60%**
1	Handling of the devices	20%
2	Attentiveness	10%
3	Performance	30%
Product related (10 Marks)		**40%**
4	Practical related questions	20%
5	Completion and submission of practical in time	10%
6	Observations	10%
	Total (25 Marks)	**(100%)**

List of student Team Members

1. ……..
2. ……...
3. ……
4. ……

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total (25)**	

Practical No. 10: Switched Mode Power Supply (Smps)

I Practical Significance

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 greater power conversion and reduce the overall power loss. Hence, students will be able to indentify different voltage level generated by SMPS required to operate computer system.

II Relevant Program Outcomes (POs)

PO2- Discipline knowledge
PO3- Experiments and practice

III Relevant Course Outcomes

Install and Test power supplies.

IV Practical Learning Outcome

a. Install SMPS
b. Measure voltage levels in connectors of SMPS

V Competency & Practical Skills

a. Install power supply
b. Measure various output voltage levels
c. Handle computer system carefully

VI Minimum Theoretical Background

SMPS converts electric power from AC to DC the load by converting the characteristics of current and voltage. SMPS provide a regulated power supply to the computer system irrespective of the input variations. SMPS gives power to all the components in your computer system. The advantages of SMPS are smaller in size, lightweight, better power efficiency, wide output range and Low heat generation. In a computer, mainly three types of DC voltage are required to run. 12 Volts is necessary for the motherboard itself and new age graphic cards, 5 Volts is required for the chassis, CPU fan or USB ports, and 3.3 Volts is used for the CPU. 12 Volts is also required for "smart" chassis fans. Hence, a computer power supply can convert 220≈230 Volt electrical to +12V, -12V, +5V, -5V, and +3.3Volts.

VII Work Situation:

a. Faculty will demonstrate installation of SMPS.
b. Faculty must form a group of two or three students.
c. Students group will observe different voltage levels generated by SMPS on connectors.

VIII Resources required

S. No.	Instrument /Object	Specification	Quantity	Remarks
1.	SMPS	Any	1 No.	Whichever is available
2.	Digital Multi-meter	3½ Digit Handheld	1 No.	Whichever is available
3.	Screw Driver Set	-	1 No.	Whichever is available

IX 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

X Precautions

1. Make connections properly
2. Use digital multi-meter correctly
3. Connect power supply carefully

XI Resources used (with major specifications)

……
……
……

XII Actual procedure followed

……
……
……
……

XIII Precautions followed

……
……
……

XIV Observations:

Write down the different voltage level observed in Table given below

Pin No	Wire Color	Output Voltage
1	Orange	
2	Orange	
3	Black	
4	Red	
5	Black	
6	Red	
7	Black	
8	Gray	
9	Purple	
10	Yellow	
11	Yellow	
12	Orange	
13	Orange	
14	Blue	
15	Black	

16	Green	
17	Black	
18	Black	
19	Black	
20	White	
21	Red	
22	Red	
23	Red	
24	Black	

XV Practical related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

1. Write wattage of given SMPS.
2. State how many power outlets (Connectors) on SMPS.

(Space for answers)

……
……
……
……
……
……
……
……

XVI References / Suggestions for further Reading

1. https://www.youtube.com/watch?v=7Gx3G5atHP8
2. http://www.polytechnichub.com/advantages-disadvantages-switch-mode-power-supply-smps/
3. https://www.computerhope.com/jargon/s/smps.htm

XVII Assessment Scheme

Performance indicators		Weightage
Process related (15 Marks)		**60%**
1	Handling of the devices	20%
2	Attentiveness	10%
3	Performance	30%
Product related (10 Marks 40%)		**40%**
4	Practical related questions	20%
5	Completion and submission of practical in time	10%
6	Observations	10%
	Total (25 Marks)	**(100%)**

List of student Team Members

1. ……..
2. ……...
3. ……
4. ……

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total (25)**	

Practical No. 11: Assemble and Disassemble Desktop System

I Practical Significance

The Desktop computer system is made up different internal components such as motherboard, memory, Hard disk drive, CD/DVD drive, SMPS and external peripheral such as Keyboard, mouse, monitor, printer, scanner etc. All these components and peripherals are properly connected while assembling the computer. Hence, students will be able to know how desktop PC assemble and dissemble.

II Relevant Program Outcomes (POs)

PO2- Discipline knowledge
PO3- Experiments and practice

III Relevant Course Outcomes

Troubleshoot common motherboard problems.

IV Practical Learning Outcome

a. Assemble desktop PC
b. Dissemble desktop PC

V Competency & Practical Skills

a. Connect all components and peripherals properly while assembling PC.
b. Disconnect all components and peripherals properly while dissembling PC.
c. Handle computer system carefully

VI Minimum Theoretical Background

A computer system consists of mainly four basic units; namely input unit, storage unit, central processing unit and output unit. A computer performs five major operations or functions irrespective of its size and make. These are

- It accepts data or instructions as input,
- It stores data and instruction
- It processes data as per the instructions,
- It controls all operations inside a computer, and
- It gives results in the form of output.

VII Work Situation:

a. Faculty will demonstrate assembling and disassembling of desktop computer.
b. Faculty must form a group of four or five students.
c. Students group will assemble and disassemble desktop computer.

VIII Resources required

S. No.	Instrument /Object	Specification	Quantity	Remarks
1.	Desktop PC	Pentium IV or above with Keyboard, Mouse, Monitor	4 No.	Whichever is available
2.	Screw Driver Set	-	4 No.	Whichever is available
3.	Multi-meter	3½ Digit Handheld	4 No.	Whichever is available

IX Procedure

Steps for Assembling:

1. **Getting the Cabinet ready:-**
   - Check how to open the cabinet and determine where to fix the components.
   - Determine if the case has the appropriate risers installed.
2. **Fitting the Mother board**
   - Line up the patch on the motherboard (PS/2, USB, etc) with the appropriate holes in the block panel I/O shield of the case.
   - Check the points where you want to install
   - Install them and make the mother board sit on them and fix screws if required.
3. **Fitting the processor:**
   - Raise the small lever at the side of the socket.
   - Notice that there is a pin missing at one corner, determine the direction to fit in the processor.
   - You should not force the CPU. While inserting it. All pins should slide smoothly into the socket.
   - Lock the lever back down.
   - Install the heat sink/CPU fan over it.
4. **Fitting the RAM:**
   - The RAM must be suitable for motherboard.
   - There are currently 2 types of RAM available.
     a) SD RAM.
     b) DDR RAM.
   - The motherboard's chipset determines which type of RAM may be used.
   - Open the plastic retention levers on either sides of RAM slot by toggling.
   - Insert RAM module & press it firmly in slot.
5. **Installing the PCI Cards if any :**
   - Most of the cards are onboard these days.
   - NIC, Sound Cards etc. are fitted into PCI slots.
6. **Fitting the hard disk:**
   - Place the hard disks in their slots.
   - Leave some space above HDD to prevent heat building.
   - Check the jumper configuration.
   - Fix it with screws.
7. **Installing the CD-ROM/DVD Drives:**
   - CD-ROM/DVD drive is similar to installing a hard disk.
   - Check the jumper configuration on CD-ROM/DVD drive is correct.
   - Fix it with screws.
8. **Connecting the Ribbon Cables:-**
   - Attach the long end of the cable to the IDE/SATA connector on the motherboard first.
   - The red stripe on the IDE/SATA cable should be facing the CD/HDD Power connector.
9. **Powering the driver and motherboard:**
   - Connecting the cables for the case front panel
   - SD, SPK or SPEAK: The loud speakers output and it has 4 pins.
   - RS, RE, RS or RESET: Connect the two-pin Reset cable here.
   - PWR, PW, PWSW, PS or power SW: Power switch, the pc's on (switch, the plug is two pin).
   - PWLED, PWRLED or Power LED: The light emitting diode on the front Panel of the case illuminates when the computer is switched ON. It's a 2- Pin cable.

- HD, HDD, and LED: These two pins connect to the cable for the hard disk Activity LED.
- Connector name may be different depending on the motherboard manufacturer.

10. Final Check:-

- Motherboard jumper configurations are the settings for the processor operator.
- Drive jumper settings, master/ slave correct.
- Are the processor, RAM modules and plug in cards finally seated in there sockets?
- Did you plug all the cables in? Do they all fit really?
- Have you tightened all the screws in plug- in cards or fitted the clips?
- Are the drive secure?
- Have you connected the power cables to all drive?

11. Powering up for the first time:

- Ensure that no wires are touching the CPU heat sink fan.
- Plug your monitor, mouse and keyboard.
- Plug in power cable and switch ON the power supply.
- If everything is connected as it should be
  - All system, fans should start spinning.
  - You should hear a single beep and after about 5-10 sec.
  - The light on monitor should go green.
  - You will see computer start to boot with a memory check.
  - Now check front LED's to see if you plugged them in correctly.
  - Check all other buttons.
  - Power afford change any wrong settings.

Steps for Disassembling the Desktop PC:

1. Remove the External I/O Systems:

- Unplug all power cords, from the commercial outlet
- Remove all peripherals from the system unit.
- Disconnect the keyboard from the rear of the unit.
- Disconnect the monitor power cable.
- Disconnect the monitor signal cable (video cable) from the video adapter card.

2. Do the following for each card if any and drive removed:

- Before removing a card, document any cables that are attached to the card, noting where they go and their orientation.
- Store screws properly.
- Note the position of the color strip i.e. pin no. 1 on the cables and make a mark for the pin no.1 if needed on the I/O card or Motherboard and the hard drive.

3. Remove the Storage Devices in the System Unit:

- Remove the CD/DVD drive.
- Remove the hard drive.

4. Remove the Interface Cards if any (Adapter Cards):

- Remove the video card from the expansion slot.
- Remove other interface cards if exists.

5. Remove the memory module:

- Memory modules are mounted on the motherboard as the chips that can be damaged by manual force if applied improperly. SIMMs and DIMMs are removed in a different way:
- SIMM - gently push back the metal tabs while holding the SIMM chips in the socket. Tilt the SIMM chip away from the tabs until a 45% angle. It will now lift out of the socket. Put SIMM in a safe place.

- DIMM- There are plastic tabs on the end of the DIMM sockets. Press the tabs down and away from the socket. The DIMM will lift slightly. Now grab it by the edges and place it safely. Do not let the chips get dust at all.

6. **Remove the power supply:**
   - The power supply is attached into tower cabinet at the top back end of the tower.
   - Make sure the power connector is detached from the switchboard.
   - Start removing the power connector connected to motherboard including CPU fan power connector, cabinet fan, the front panel of cabinet power buttons and all the remaining drives if not detached yet.
   - Now remove the screws of SMPS from the back of the cabinet and the SMPS can be detached from the tower cabinet.
7. **Remove the motherboard:**
   - Before removing all the connectors from the motherboard, make sure you memorize the connectors for assembling the computer if required, as that may require connecting the connectors at its place.
   - Remove the screws from the back of the motherboard and you will be able to detach it from the cabinet. Now remove the CPU fan from the motherboard.
   - The heat sink will be visible now which can be removed by the pulling the tab upward.
   - Finally, the processor is visible now, which can be removed by the plastic tab which can be pulled back one stretching it side way.

X Precautions

1. Build computer on a hard surface, away from moisture.
2. Wear shoes and the short-sleeved cotton wear.
3. Use head screw driver.
4. Keep the components away from moisture.
5. Avoid using pressure while installing.
6. Beware of electrostatic discharge (ESD)

XI Resources used (with major specifications)

……
……
……

XII Actual procedure followed

……
……
……
……
……
……
……
……

XIII Precautions followed

……
……
……
……
……
……

……
……
……
……

XIV Observations:

1. Memory module i.e. SIMM used is/are…….(DDR1/DDR2/DDR3/DDR4)
2. Size of the Hard Disk used is ……GB/TB.
3. Total numbers power connectors available in SMPS are……
4. Hard disk/CD-ROM/DVD is connected on motherboard using…….. (SATA/IDE) cable.
5. Wattage of SMPS used is…….watts.

XV Practical related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions to ensure the achievement of identified CO.

1. State which processor is mounted on motherboard processor socket.
2. State the model of motherboard used.
3. State the type of Hard disk/CD-ROM/DVD drive used.

(Space for answers)

……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……

……
……
……
……
……
……

XVI References / Suggestions for further Reading

1. https://www.youtube.com/watch?v=7Gx3G5atHP8
2. http://www.polytechnichub.com/advantages-disadvantages-switch-mode-power-supply-smps/
3. https://www.computerhope.com/jargon/s/smps.htm
4. http://www.powershow.com/view/2602c-MTQyZ/PC_assembly_disassembly_workshop_powerpoint_ppt_presentation

XVII Assessment Scheme

Performance indicators		Weightage
Process related (15 Marks)		**(60%)**
1	Handling of the devices	20%
2	Attentiveness	10%
3	Performance	30%
Product related (10 Marks)		**(40%)**
4	Practical related questions	20%
5	Completion and submission of practical in time	10%
6	Observations	10%
	Total (25 Marks)	**(100%)**

List of student Team Members

1. ……..
2. ……...
3. ……
4. ……

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total (25)**	

Practical No. 12: Troubleshoot Computer System

I Practical Significance

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.

II Relevant Program Outcomes (POs)

PO1- Basic knowledge
PO3- Experiments and practice
PO 4-Engineering tools

III Relevant Course Outcomes

Troubleshoot peripherals and networks.

IV Practical Learning Outcome

Troubleshoot computer system by diagnosing the problem.

V Competency & Practical Skills

a. Troubleshooting skills. b. Technical skills.

VI Relevant Affective domain related Outcomes

a. Handle tools and equipment carefully.
b. Apply Logical thinking.
c. Improve Decision Making.

VII Minimum Theoretical Background

1. *Unexpected computer crashes*: This may occur when the hard disk has too many bad sectors and blocks. Sometimes, the hard disk may crash as the spindle motor stops rotating. You will notice symptoms like – clicking sounds from HDD, invisible files etc. The heads may not be able to identify the sectors the user is searching for hence, are making contact with the platters. This problem occurs when the hard disk is formatted more than its limit or is too old to operate.
2. *Reboot your computer:* Rebooting your computer will fix many of the problems you may be having
3. *Run virus and malware scans*: A computer that was running fine and then suddenly becomes slow may be infected with a virus. This is a common symptom of a virus infection, but is not always the cause. Viruses not only affect your computer's performance, but also put your personal data at risk.
4. *Check all of the cables:* A loose power cable could be preventing your computer from booting up. A bad surge protector could be the culprit. Your keyboard or mouse may have become unplugged. Your monitor cable might be loose.
5. *Heat and dust:* This is one of the motherboard problems that occur frequently. Due to excess usage, the system gets heated to the peak point. Sometimes, lack of ventilation and faulty CPU fan also cause this problem.

VIII Work Situation :

a. Faculty will demonstrate Computer related problems and related solutions. Faculty must give common demonstration using projector. (1/2hr)
b. Students must work on systems with induced errors or having certain problem. Accordingly student needs to troubleshoot problems.
c. Students must list down the steps followed.

IX Resources required

S. No.	Instrument /Object	Specification	Quantity	Remarks
1.	Computer System	Any desktop PC .	12	Whichever is available

X Procedure

Following faults/problems are to be addressed:

1. Unexpected computer crashes: Student must practice setting up of Operating systems update schedule, antivirus update schedule.
   To configure a schedule for Automatic Updates:
   a. Click Start, click Control Panel, and then double-click. System.
   b. On the Automatic Updates tab, click. Automatically download the updates, and install them on the schedule that I specify.
   c. Click to select the day and time that you want to download and install updates.
2. My computer is running slow: Delete temporary files and other files no longer needed on the computer. To do this,
   a. Open the Start Menu and type **%temp%** in the Search field Press Enter and a Temp folder should open.
   b. You can delete all files found in this folder and, if any files are in use and cannot be deleted, they can be skipped.
3. Run virus and malware scans: A computer that was running fine and then suddenly becomes slow may be infected with a virus. Fix common problem: Reboot your computer
   a. Press the Power button or use the Shut Down command to safely turn the computer OFF.
   b. If the computer is not responding, press and hold the Power button for about five seconds to force the computer to power off. Allow your computer to sit for about thirty seconds after being turned OFF before you turn it back on again.
   c. Check all of the cables: Checking all of your connections will resolve the problem.
4. Heat and dust : Remove all the mounted cards on the motherboard , Clean the Motherboard, remount the cards.
5. The screen is blank
   - Solution 1: The computer may be in Sleep mode. Click the mouse or press any key on the keyboard to wake it.
   - Solution 2: Make sure the monitor is plugged in and turned ON.
   - Solution 3: Make sure the computer is plugged in and turned ON.
   - Solution 4: If you're using a desktop, make sure the monitor cable is properly connected to the computer tower and the monitor.

XI Precautions

- Switch off power before troubleshooting.
- When needed to switch on power, be careful of not touching the circuitry.

XII Resources used (with major specifications)

……
……
……
……
……
……
……
……
……
……

XIII Actual procedure followed

……
……
……
……
……
……
……
……

XIV Precautions followed

……
……
……
……
……
……
……
……
……
……

XV Observations :

a. State the problems observed with your system.
b. Write the practiced solution.
c. State the size cleared after removing temporary files.

……
……
……
……

XVI. Practical related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions to ensure the achievement of identified CO.

1. State the command used to find temporary files.
2. Write the disk space utilized before and after temporary files deletion.
3. State reasons for blank screen.

(Space for answers)

XVII. References / Suggestions for further Reading

https://en.wikipedia.org

XVIII. Assessment Scheme

Performance indicators		Weightage
Process related (15 Marks)		**60%**
1	Handling of the devices	20%
2	Attentiveness	10%
3	Performance	30%
Product related (10 Marks)		**40%**
4	Practical related questions	20%
5	Completion and submission of practical in time	10%
6	Observations	10%
	Total (25 Marks)	**25 (100%)**

List of student Team Members

1. ……..
2. ……...
3. ……
4. ……

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total (25)**	

Practical No. 13: Use Diagnostic Software for Fault Finding and Viruses

I Practical Significance

Computers have become daily necessity and essential tool in Business and daily life. Troubleshooting or repairing a computer is not always an easy task for technicians. To diagnose an issue properly first of all we need to gather system Information. Through this information we can diagnose any issue in less time and effectively. Diagnostic tools are powerful dedicated software; allow diagnosing and trouble-shooting your machine.

II Relevant Program Outcomes (POs)

PO1- Basic knowledge
PO3- Experiments and practice
PO 4-Engineering tools

III Relevant Course Outcomes

Troubleshoot peripherals and networks.

IV Practical Learning Outcome

Use diagnostic software for fault finding and viruses

V Competency & Practical Skills

a. Troubleshooting skills.
b. Technical skills.

VI Relevant Affective domain related Outcomes

a. Handle tools and equipment carefully.
b. Apply Logical thinking.
c. Improve Decision Making.

VII Minimum Theoretical Background:

Diagnostic tools are powerful dedicated software; allow diagnosing and troubleshooting your machine. They can provide some extra utility and can help you track down issues with your hardware and software. They can even scan viruses and malwares. Tools can be used to/for –

a. Find out Files and Directories opened by a process. (Microsoft Free tool **Process Explorer**)
b. Detailed information about Tasks, Processes, Modules, Startups, IE Add-ons, Uninstallers, Windows, Services, Drivers, Connections and Opened Files.
c. Easy check of suspicious files via File Database or the Virus Total services.
d. Easy monitoring of processes activities and System changes.
e. Usage graphs of important System resources.
f. Try hints of detailed System and Battery status.
g. Acquire Additional System Info.
h. Multilanguage Support.

VIII Work Situation :

a. Faculty will demonstrate installation of any software tool for the tasks listed above Faculty must give common demonstration using projector. (1/2hr)
b. Faculty must demonstrate working of atleast one antivirus tool.
c. Students must practice **atleast three diagnosis services** provided by any one installed tools and practice on one Antivirus S/W.
d. Students must list down the steps followed.

Suggestive tools(Any free available tools can be used)

1. Process Explorer : Process Explorer shows you information about which handles and DLLs processes have opened or loaded.
2. System Explorer is free , awards winning software for exploration and management of System Internals.
3. CPU-Z: CPU-Z is a nifty little program that scans your system for its internal hardware configuration. It's indispensable if you ever want to upgrade your PC parts and want to avoid incompatibility issues.
4. ClamWin: It's one of the best free virus scanners currently available. The scans can take a while but it detects pretty much everything so the trade-off is worth it.
5. Any available Antivirus Software.

IX Resources required

S. No.	Instrument /Object	Specification	Quantity	Remarks
1.	Computer System	Any desktop PC.	12	Whichever is available
2.	Diagnostic tool	Free downloadable Tool	02	One tool is Antivirus and another any free tool.

X Procedure

1. Student Must find out details of System specification
2. Monitor CPU performance.

XI Precautions

- Install software carefully under teacher guidance.
- Switch on power when needed, be careful of not touching the circuitry.

XII Resources used (with major specifications)

……
……
……
……
……
……
……
……
……
……

XIII Actual procedure followed

……
……
……
……
……
……
……
……
……
……

XIV Precautions followed

……
……
……
……
……
……
……
……
……
……

XV Observations :

a. State the problems observed with your system.
b. Write the practiced solution.
c. List practiced diagnostic tools for virus scan.
d. Name practiced diagnostic tools for fault finding.

XVI Practical Summary:

Note: Student has to specify –steps followed for installing software, note down problems faced and solution practiced.

……
……
……
……
……

XVII Practical related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions to ensure the achievement of identified CO.

1. State the name of diagnostic software
2. State function of Antivirus
3. State the name of any Antivirus software.

(Space for answers)

……
……
……
……

……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……
……

XVIII References / Suggestions for further Reading

https://en.wikipedia.org

XIX Assessment Scheme

Performance indicators		Weightage
Process related (60%)		**15 Marks**
1	Handling of the devices	20%
2	Attentiveness	10%
3	Performance	30%
Product related (40%)		**10 Marks**
4	Practical related questions	20%
5	Completion and submission of practical in time	10%
6	Observations	10%
	Total (25 Marks)	**(100%)**

List of student Team Members

1. ……..
2. ……...
3. ……
4. ……

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total (25)**	

Practical No. 14: Preventive Maintenance of Computer

I Practical Significance

Maintenance and troubleshooting of computer system and its peripherals is an important skill to upkeep the computer systems. Preventive maintenance is the procedure of taking measures proactively which prevents the problem or issue from occurring in the PC. So, periodical preventive maintenance is required to maintain the PC in working condition. Preventive maintenance of system can be a Hardware or Software Maintenance.

II Relevant Program Outcomes (POs)

PO2- Discipline knowledge

PO3- Experiments and practice

III Relevant Course Outcomes

a. Troubleshoot peripherals and networks
b. Troubleshoot common motherboard problem.

IV Practical Learning Outcome

Undertake Preventive Maintenance of PC using vacuum cleaner and simple tools.

V Competency & Practical Skills

a. Maintain computer and peripherals.
b. Handle computer system carefully.
c. Handle vacuum cleaner carefully.

VI Minimum Theoretical Background

Preventive maintenance is the procedure of taking measures proactively, which prevents the problem or issue from occurring in the PC. So, periodical preventive maintenance is required to maintain the PC in working condition. Preventive maintenance of system can be a Hardware or Software Maintenance.

Hardware Maintenance:

The PC's has two basic enemies are heat and moisture. The most common causes of overheating are dust and dirt in clogged vents and CPU cooling fans. Even a skinny coating of dust or dirt can increase the temperature of PC components. So, dust and dirt in PC can be clean using vacuum cleaner periodically. The Fig. 1 shows excellent example of just how dirty the inside computer case can get. Cleaning your computer, components, and peripherals such as keyboard, mouse, monitor, CD/DVD Drive help keep everything in good working condition, helps prevent germs from spreading, and helps allow proper airflow.

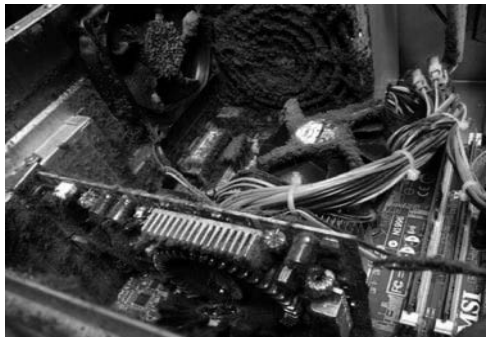


Fig. 1 Dust in PC

VII Work Situation:

a. Faculty will demonstrate different steps to perform primary preventive maintenance.
b. Faculty must form a group of four to five students.
c. Students group will perform preventive maintenance steps.
d. Students must list down the steps to perform preventive maintenance.

VIII Resources required

S. No.	Instrument /Object	Specification	Quantity	Remarks
1	Desktop PC	Pentium IV and above with Keyboard, Mouse, Monitor	5 No.	Whichever is available
2	CD/DVD Drive cleaning kit	--	5 No.	Whichever is available
3	Vacuum cleaner	--	1 No.	Whichever is available

IX Procedure

Preventive Hardware Maintenance of PC

1. **Clean the case:** The plastic case that houses the PC components can be cleaned with a slightly damp lint-free cloth. For stubborn stains, add a little household detergent to the cloth and should not use a solvent cleaner on plastics.
2. **Motherboard and SMPS Cleaning**: Open the cabinet cover. Use Portable vacuum cleaner to remove the dust, dirt, and hair from the motherboard and SMPS completely.
3. **Keyboard Cleaning:** Before cleaning the keyboard first turn off the computer or if you are using a USB keyboard unplug it. To clean a keyboard, using the vacuum cleaner between the keys and blow away all of the dust.
4. **Mouse Cleaning:** Blowing air using vacuum cleaner on the bottom of the mouse, clears away any dirt, dust, hair, or other obstructions that may be blocking the optical sensor.
5. **CRT Monitor Cleaning:** A glass monitor screen can be cleaned with normal household glass cleaner. Vacuum off using vacuum cleaner, any dust that has settled on top of the monitor and makes sure no books or papers are covering the air vents.
6. **LCD/LED Cleaning:** When cleaning the LCD or LED screen, it is important to remember to not spray any liquids onto the screen directly and do not use a paper

towel, since it can scratch the screen. To clean the LCD or LED screen, use a non-rugged microfiber cloth, soft cotton cloth, or swifter duster. If a dry cloth does not completely clean the screen, you can apply rubbing alcohol to the cloth and wipe the screen with a damp cloth.

7. **CD and DVD Disc Drive Cleaning:** Use a CD-ROM cleaner kit to clean the CD-ROM/DVD drive laser lenses from dust, dirt, and hair.

X Precautions

1. Shut down properly.
2. Connect power supply carefully
3. Disconnect and connect all the parts of PC correctly
4. Use vacuum cleaner carefully.
5. Avoid water and other hazardous liquids.

XI Resources used (with major specifications)

……
……

XII Actual procedure followed

……
……
……
……
……
……
……
……
……
……

XIII Precautions followed

……
……

XIV Observations

1. The CD/DVD cleaning kit used is …….
2. The tool/equipment used to clean the keyboard is……..

XVIII. Practical related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions to ensure the achievement of identified CO.

1. Write the step performed to clean the motherboard.
2. Write the steps performed to clean the monitor.

(Space for Answers)

XIX. References / Suggestions for further Reading

1. https://www.ifixit.com/Wiki/Preventative_Computer_Maintenance
2. www.mapcon.com/preventative-maintenance-for-computers
3. https://www.youtube.com/watch?v=w2jx893SNWU
4. https://www.computerhope.com/cleaning.htm

XX. Assessment Scheme

Performance indicators		Weightage
Process related 15 Marks		**(60%)**
1	Handling of the devices	20%
2	Attentiveness	10%
3	Performance	30%
Product related 10 Marks		**(40%)**
4	Practical related questions	20%
5	Completion and submission of practical in time	10%
6	Observations	10%
	Total (25 Marks)	**(100%)**

List of student Team Members

1. ……..
2. ……...
3. ……
4. ……

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total (25)**	

List Of Laboratory Manuals Developed by MSBTE

First Semester:

1	Fundamentals of ICT	22001
2	English	22101
3	English Work Book	22101W
4	Basic Science (Chemistry)	22102
5	Basic Science (Physics)	22102

Second Semester:

1	Bussiness Communication Using Computers	22009
2	Computer Peripherals & Hardware Maintenace	22013
3	Web Page Design with HTML	22014
4	Applied Science (Chemistry)	22202
5	Applied Science (Physics)	22202
6	Applied Machines	22203
7	Basic Surveying	22205
8	Applied Science (Chemistry)	22211
9	Applied Science (Physics)	22211
10	Fundamental of Electrical Engineering	22212
11	Elements of Electronics	22213
12	Elements of Electrical Engineering	22215
13	Basic Electronics	22216
14	'C' programming Language	22218
15	Basic Electronics	22225
16	Programming in "C"	22226
17	Fundamentals of Chemical Engineering	22231

Third Semester:

1	Applied Multimedia Techniques	22024
2	Advanced Serveying	22301
3	Highway Engineering	22302
4	Mechanics of Structures	22303
5	Building Construction	22304
6	Concrete Technology	22305
7	Strength Of Materials	22306
8	Automobile Engines	22308
9	Automobile Transmission System	22309
10	Mechanical Operations	22313
11	Technology Of Inorganic Chemicals	22314
12	Object Oriented Programming Using C++	22316
13	Data Structure Using 'C'	22317
14	Computer Graphics	22318
15	Database Management System	22319
16	Digital Techniques	22320
17	Principles Of Database	22321
18	Digital Techniques & Microprocessor	22323
19	Electrical Circuits	22324
20	Electrical & Electronic Measurment	22325
21	Fundamental Of Power Electronics	22326
22	Electrical Materials & Wiring Practice	22328
23	Applied Electronics	22329
24	Electrical Circuits & Networks	22330
25	Electronic Measurments & Instrumentation	22333
26	Principles Of Electronics Communication	22334
27	Thermal Engineering	22337
28	Engineering Matrology	22342
29	Mechanical Engineering Materials	22343
30	Theory Of Machines	22344

Fourth Semester:

1	Hydraulics	22401
2	Geo Technical Engineering	22404
3	Chemical Process Instrumentation & Control	22407
4	Fluid Flow Operation	22409
5	Technology Of Organic Chemicals	22410
6	Java Programming	22412
7	GUI Application Development Using VB.net	22034
8	Microprocessor	22415
9	Database Managment	22416
10	Electric Motors And Transformers	22418
11	Industrial Measurements	22420
12	Digital Electronics And Microcontroller Applications	22421
13	Linear Integrated Circuits	22423
14	Microcontroller & Applications	22426
15	Basic Power Electronics	22427
16	Digital Communication Systems	22428
17	Mechanical Engineering Measurments	22443
18	Fluid Mechanics and Machinery	22445
19	Fundamentals Of Mechatronics	22048
20	Guidelines & Assessment Manual for Micro Projects & Industrial Training	22049

Fifth Semester:

1	Network Management & Administration	17061
2	Solid Modeling	17063
3	CNC Machines	17064
4	Behavioral Science(Hand Book)	17075
5	Behavioral Science (Assignment Book)	17075
6	Windows Programming using VC++	17076
7	Estimation and Costing	17501
8	Public Health Engineering	17503
9	Concrete Technology	17504
10	Design of Steel Structures	17505
11	Switchgear and Protection	17508
12	Microprocessor & Application	17509
13	A.C. Machines	17511
14	Operating System	17512
15	Java Programming	17515
16	System Programming	17517
17	Communication Technology	17519
18	Hydraulic & Pneumatics	17522
19	Advanced Automobile Engines	17523
20	Basic Electrical & Electronics	17524
21	Measurement and Control	17528
22	Power Engineering	17529
23	Metrology & Quality Control	17530
24	Computer Hardware & Networking	17533
25	Microcontroller	17534
26	Digital Communication	17535
27	Control System & PLC	17536
28	Audio Video Engineering	17537
29	Control System	17538
30	Industrial Electronics and applications	17541
31	Heat Transfer Operations	17560
32	Chemical Process Instrumentation & control	17561

Sixth Semester:

1	Solid Modeling	17063
2	Highway Engineering	17602
3	Contracts & Accounts	17603
4	Design of R.C.C. Structures	17604
5	Industrial Fluid Power	17608
6	Design of Machine Elements	17610
7	Automotive Electrical and Electronic Systems	17617
8	Vehicle Systems Maintenance	17618
9	Software Testing	17624
10	Advanced Java Programming	17625
11	Mobile Computing	17632
12	System Programing	17634
13	Testing & Maintenance of Electrical Equipments	17637
14	Power Electronics	17638
15	Illumination Engineering	17639
16	Power System Operation & Control	17643
17	Environmental Technology	17646
18	Mass Transfer Operation	17648
19	Advanced Communication System	17656
20	Mobile Communication	17657
21	Embedded System	17658
22	Process Control System	17663
23	Industrial Automation	17664
24	Industrial Drives	17667
25	Video Engineering	17668
26	Optical Fiber & Mobile Communication	17669
27	Therapeutic Equipment	17671
28	Intensive Care Equipment	17672
29	Medical Imaging Equipment	17673

Pharmacy Lab Manual

First Year:

1	Pharmaceutics - I	0805
2	Pharmaceutical Chemistry - I	0806
3	Pharmacognosy	0807
4	Biochemistry and Clinical Pathology	0808
5	Human Anatomy and Physiology	0809

Second Year:

1	Pharmaceutics - II	0811
2	Pharmaceutical Chemistry - II	0812
3	Pharmacology & Toxicology	0813
4	Hospital and Clinical Pharmacy	0816

HEAD OFFICE

Secretary,
Maharashtra State Board of Technical Education
49, Kherwadi, Bandra (East), Mumbai - 400 051
Maharashtra (INDIA)
Tel: (022)26471255 (5 -lines)
Fax: 022 - 26473980
Email: -secretary@msbte.com
Web -www.msbte.org.in

REGIONAL OFFICES:

MUMBAI

Deputy Secretary (T),
Mumbai Sub-region,
2nd Floor, Govt. Polytechnic Building,
49, Kherwadi, Bandra (East)
Mumbai - 400 051
Phone: 022-26473253 / 54
Fax: 022-26478795
Email: rbtemumbai@msbte.com

PUNE

Deputy Secretary (T),
M.S. Board of Technical Education,
Regional Office,
412-E, Bahirat Patil Chowk,
Shivaji Nagar, Pune
Phone: 020-25656994 / 25660319
Fax: 020-25656994
Email: rbtepn@msbte.com

NAGPUR

Deputy Secretary (T),
M.S. Board of Technical Education
Regional Office,
Mangalwari Bazar, Sadar, Nagpur - 440 001
Phone: 0712-2564836 / 2562223
Fax: 0712-2560350
Email: rbteng@msbte.com

AURANGABAD

Deputy Secretary (T),
M.S. Board of Technical Education,
Regional Office,
Osmanpura, Aurangabad -431 001.
Phone: 0240-2334025 / 2331273
Fax: 0240-2349669
Email: rbteau@msbte.com