

Maharashtra State Board of Technical Education (MSBTE)**'T' Scheme**

II – Semester Course Curriculum

Course Title: **Computer Peripheral and Hardware Maintenance (IF, CO)**

(Course Code:)

Diploma Programme in which this course is offered	Semester in which offered
Information Technology, Computer Engineering	Second

1. RATIONALE

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.

2. COMPETENCY

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- **Maintain computer hardware and peripherals.**

3. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following *industry oriented* COs associated with the above mentioned competency:

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

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
L	T	P		ESE	PA	ESE	PA	
2#	-	2	4	-	-	50	50~ ²	100

(~²): For the *practical only courses*, the PA has two components under practical marks i.e. the assessment of practicals (seen in section 6) has a weightage of 60% (i.e.30 marks) and micro-project assessment (seen in section 12) has a weightage of 40% (i.e.20 marks). This is designed to facilitate attainment of COs holistically, as there is no theory ESE.

Legends: L-Lecture; T – Tutorial/Teacher Guided Theory Practice; P - Practical; C – Credit, ESE - End Semester Examination; PA - Progressive Assessment; # - No Theory Exam

5. COURSE MAP (with sample COs, Learning Outcomes i.e.LOs and topics)

This course map illustrates an overview of the flow and linkages of the topics at various levels of outcomes (details in subsequent sections) to be attained by the student by the end of the course, in all domains of learning in terms of the industry/employer identified competency depicted at the centre of this map.

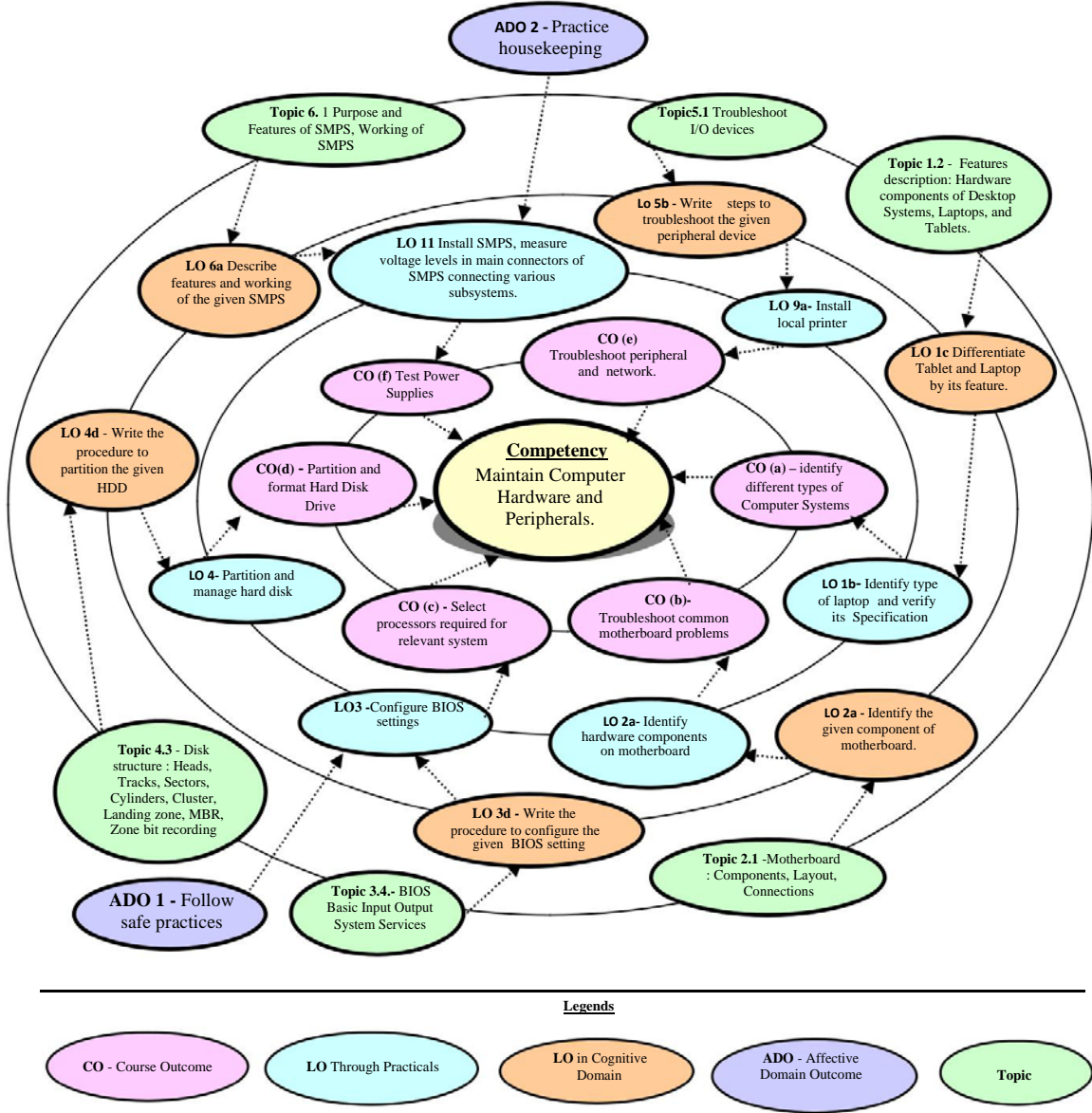


Figure 1 - Course Map

6. SUGGESTED PRACTICALS/ EXERCISES

The practicals/exercises/tutorials in this section are psychomotor domain LOs (i.e.sub-components of the COs), to be developed and assessed in the student to lead to the attainment of the competency.

S. No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Unit No.	Approx. Hrs. Required

S. No.	Practical Exercises (Learning Outcomes in Psychomotor Domain)	Unit No.	Approx. Hrs. Required
1	a. Identify desktop and server by its type and verify its specifications	I	2*
	b. Identify type of laptop and verify its Specification		
2	a. Identify hardware components on motherboard	II	2*
	b. Troubleshoot common problems of motherboard.		
3	Configure BIOS settings	III	2*
4	Partition and manage hard disk: format hard drives with different file systems. (Part-I)	IV	2*
5	Partition and manage hard disk, format hard drives with different file systems. (Part-II)	IV	2
6	Install Operating System – Windows family (such as Windows 7/ Windows 10, Windows server 12)	IV	2
7	Install Operating System –Unix family (such as Linux/Ubuntu/Centos)	IV	2
8	Troubleshoot Hard disk problems.	IV	2
9	a. Install local printer (Software configuration settings on printer and troubleshooting)	V	2*
	b. Share Printer in Network(Software configuration settings on printer and troubleshooting)		
10	Set keyboard, mouse, monitor, Speaker, Microphone and LCD Projector	V	2
11	Install SMPS, measure voltage levels in main connectors of SMPS connecting various subsystems.	VI	2*
12	Assemble and Disassemble Desktop System (Part-I)	VI	2
13	Assemble and Disassemble Desktop System (Part-I)	VI	2
14	Troubleshoot computer system by diagnosing the problem	VI	2
15	Use diagnostic software for fault finding and viruses	VI	2
16	Undertake Preventive Maintenance of PC using vacuum cleaner and simple tools.	VI	2
Total			32

Note

- i. A suggestive list of practical LOs is given in the above table, more such practical LOs can be added to attain the COs and competency. A judicious mix of minimum 12 or more practical LOs/tutorials need to be performed, out of which, the practicals marked as ‘*’ are compulsory, so that the student reaches the ‘Precision Level’ of Dave’s ‘Psychomotor Domain Taxonomy’ as generally required by the industry.
- ii. Hence, the ‘Process’ and ‘Product’ related skills associated with each LO of the laboratory/workshop/field work are to be assessed according to a suggested sample given below:

S. No.	Performance Indicators	Weightage in %
a.	Use of Appropriate tool to solve the problem	10
b.	Operate equipment skillfully	30
c.	Follow Safety measures	10
d.	Completed the exercise in stipulated time	30
e.	Answer to sample questions	10

S. No.	Performance Indicators	Weightage in %
f.	Submit report in time	10
Total		100

Additionally, the following affective domain LOs (social skills/attitudes), are also important constituents of the competency which can be best developed through the above mentioned laboratory/field based experiences:

- a. Follow safety practices.
- b. Practice good housekeeping.
- c. Demonstrate working as a leader/a team member.
- d. Maintain tools and equipment.
- e. Follow ethical practices.

The development of the attitude related LOs of Krathwohl's 'Affective Domain Taxonomy', the achievement level may reach:

- 'Valuing Level' in 1st year.
- 'Organising Level' in 2nd year.
- 'Characterising Level' in 3rd year.

7. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of experiments, as well as aid to procure equipment by authorities concerned.

S. No.	Equipment Name with Broad Specifications	Exp. S.No.
1	Computer system with all necessary components like; motherboard, random access memory (RAM), read-only memory (ROM), Graphics cards, sound cards, internal hard disk drives, DVD drive, network interface card	All
2	LCD/DLP Projector	Student Activity
3	Mouse :Mechanical, Optical, Opto-Mechanical	8
4	Laptop	All
5	Bluetooth based wireless mouse and keyboard or any other device	8
6	Dot Matrix Printer, Laser Printer, Inkjet Printer	7
7	Computer Maintenance kit	All
8	Logic probe, logic pulser, current tracer.	11
9	Digital voltmeter	9
10	Operating systems	5,6,7,8,,11,12
11	Power Supply	All
12	Diagnostics Software	12
13	Vacuum Cleaner/Blower	13

Note: There are no specifications fixed for the above listed equipments, devices and instruments. Depending on the availability in the institute they can be utilized for the purpose.

8. UNDERPINNING THEORY COMPONENTS

The following topics/subtopics should be taught and assessed in order to develop LOs in cognitive domain for achieving the COs to attain the identified competency.

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – I Features of Computer Hardware	1a. Explain characteristics of the given type of computer systems. 1b. Describe features of the given desktop systems. 1c. Describe features of the given Tablet systems. 1d. Describe features of the given server systems.	1.1 Computers: Desktop Computers, Tablet, Laptop, Mainframe, Supercomputer. 1.2 Features description: Hardware components of Desktop Systems, Laptops, and Tablets. 1.3 Types of Servers, Server Feature descriptions and its applications.
Unit– II Motherboard	2a. Identify the given component of motherboard. 2b. Describe features of the given motherboard. 2c. Differentiate hardware based and software based problems of motherboard. 2d. Describe the procedure to identify the given type of motherboard problems.	2.1 Motherboard : Components, Layout, Connections 2.2 Motherboards : Types and Features 2.3 Enhancing features of motherboard: Adding and or replacing components. 2.4 Troubleshooting problems of a motherboard.
Unit– III Processor and BIOS	3a. Describe architecture of given type of Multi-core processors. 3b. Explain the purpose of the given type of co-processors. 3c. Explain the level and purpose of cache memory. 3d. Write the procedure to configure the given BIOS setting.	3.1 Processor : Common Features, Types of Processors, Basic Structure of CPU, Different levels of cache, system bus, clock speed, packaging 3.2 Multiple Core Processors: Description, Two core processor architecture and multi-core processor architecture 3.3 Co-processors: Graphics, Math. 3.4 BIOS: Basic Input Output System Services, Bios Interaction, date and time, Boot device priority, boot setting configuration, password security.
Unit– IV Hard Disk	4a. Describe features of the given type of hard disk interface. 4b. Describe features of the given type of disk structure. 4c. Explain characteristics of the given disk performance parameter. 4d. Write the procedure to partition the given HDD. 4e. Describe the given type of file system.	4.1 Hard Disk Drive 4.2 Hard Disk Interfaces: EIDE, Serial ATA, SCSI, USB and IEEE 1394 (Firewire), RAID, Solid State Drive (laptop) 4.3 Disk structure : Heads, Tracks, Sectors, Cylinders, Cluster, Landing zone, MBR, Zone bit recording 4.4 Disk performance parameters Characteristics: Seeks and Latency, Data Transfer Rate 4.5 File system: FAT16, FAT32, NTFS, Unix file system, EXT2/EXT3, RAID
Unit– V	5a. Describe features of the	5.1 Troubleshoot I/O devices: Keyboard,

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
I/O and Modem	<p>given I/O device.</p> <p>5b. Write steps to troubleshoot the given peripheral device</p> <p>5c. Explain use of the given I/O cable.</p> <p>5d. Explain features of given type of Interface.</p> <p>5e. Describe the procedure to troubleshoot the given network problem.</p>	<p>Switches, Mouse, Scanners, Webcam, Monitors, Printers, Speaker and Mike, LCD Projector</p> <p>5.2 I/O Cables: Specification of I/O Cables, Types of I/O cables, Types of I/O Ports, Internal and External modem, Block diagram and specifications.</p> <p>5.3 Network Interface: Definition of network interface, Types of network interface, troubleshooting of network connectivity, Antivirus</p>
Unit–VI Power Supply	<p>6a. Describe features and working of the given SMPS</p> <p>6b. Describe features and working of the given UPS.</p> <p>6c. Differentiate the salient features of the specified type of UPS.</p> <p>6d. Describe the steps to troubleshoot the given tpe of SMPS.</p>	<p>6.1 Purpose and Features of SMPS, Working of SMPS</p> <p>6.2 Fault finding in power supply</p> <p>6.3 Uninterrupted Power Supply: Characteristics of UPS, Types of UPS, online and offline</p> <p>6.4 Preventive Maintenance of Power Supply</p>

Note: To attain the COs and competency, above listed Learning Outcomes (LOs) need to be undertaken to achieve the 'Application Level' of Bloom's 'Cognitive Domain Taxonomy.

9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

-Not Applicable --

10. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related *co-curricular* activities which can be undertaken to accelerate the attainment of the various outcomes in this course:

- Prepare specification chart of different types/family of processors (Ex. Intel/AMD)
- Prepare journal of practical.
- Prepare a presentation to display Layout of different motherboards and different System components and present it in groups.

11. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

- Massive open online courses (*MOOCs*) may be used to teach various topics/sub topics.
- '*L*' in item No. 4 does not mean only the traditional lecture method, but different types of teaching methods and media that are to be employed to develop the outcomes.
- About **15-20% of the topics/sub-topics** which is relatively simpler or descriptive in nature is to be given to the students for *self-directed learning* and assess the development of the LOs/COs through classroom presentations (see implementation guideline for details).

- d. With respect to item No.10, teachers need to ensure to create opportunities and provisions for *co-curricular activities*.
- e. Guide student(s) in undertaking micro-projects.
- f. Demonstrate students thoroughly before they start doing the practice
- g. Show video/animation films to explain handling/functioning of different instruments.
- h. Continuously observe and monitor the performance of students in Lab/Workshop

12. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student assigned to him/her in the beginning of the semester. S/he ought to submit it by the end of the semester to develop the industry oriented COs. Each micro-project should encompass two or more COs which are in fact, an integration of practicals, cognitive domain and affective domain LOs. The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The total duration of the micro-project should not be less than **16 (sixteen) student engagement hours during the course**.

In the first four semesters, the micro-project could be group-based. However, in higher semesters, it should be individually undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. A suggestive list is given here. Similar micro-projects could be added by the concerned faculty:

- a. **SMPS:** List down the components available in SMPS. Measure different output voltages from SMPS.
- b. **Computer motherboard:** Prepare brief report by identifying different electronics components in a given motherboard. Classify them in passive and active components.
- c. **Microprocessor:** Prepare a small report of different microprocessors being used in industry (Any four) by doing market survey.
- d. **Computer Specifications:** Prepare a small report on major specification of different types of computer systems available in your lab.
- e. **Peripheral Specifications:** Prepare a small report based on technological differences and installation procedure of printers and scanners.
- f. **Network Layout:** Prepare a small report by doing survey of computer labs. List various networking devices/components with its application.

13. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1.	The computer hardware installation, interfacing, troubleshooting and maintenance	James, K.L.	PHI Learning, New Delhi, 2014 ISBN: 978-81-203-4798-4
2.	Comdex: Hardware and Networking Course Kit	Gupta, Vikas	Dreamtech Press, New Delhi ISBN: 978-93-5119-265-7
3.	The Complete PC Upgrade And maintenance Guide	Minasi, Mark	BPB Publication, New Delhi ISBN:978-81-265-0627-9
4.	Computer Architecture and Maintenance Vol.1	Kadam, Sachin	Shroff Publication, Mumbai ISBN: 978-9350230244

14. SOFTWARE/LEARNING WEBSITES

- a. <http://www.howstuffworks.com/>
- b. <http://www.gcflearnfree.org/computerbasics/keeping-your-computer-clean/1/>
- c. <https://www.youtube.com/watch?v=4iaxOUYalJU>
- d. <http://www.instructables.com/id/Computer-Assembly/>