

Semester: VI
Subject Name: Computer Maintenance and Troubleshooting
Subject Code: 09CE1604

Objective: Computer Maintenance and Troubleshooting is frequently required for smooth functioning of computer system. The Objective of this subject is to make the students capable to understand the functioning of hardware parts and develop skills in diagnosing the faults and troubleshoots the computer system. This course will be helpful for students to get employment in the computer maintenance industry as well as self-employment.

Credits Earned: 4 Credits

Course Outcomes: After completion of this course, student will be able to

- Understand Basics of Hardware Components.
- Acquire knowledge of Finding Faults in Components
- Install, Configure and maintain various components in computer system and peripherals.
- Diagnose faults of Different Component
- Repair and maintain computer system and its peripherals.

Pre-requisite of course: Computer Basic Knowledge of Hardware

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term work	
2	0	4	4	50	30	20	25	25	100

Contents:

Unit	Topics	Contact Hours
1	Hardware Basics Basic terms, concepts, and functions of system modules (System board, firmware, storage devices, monitor, boot process, ports). CMOS and BIOS, Overview of system components, Motherboard: definition, Components/connections in motherboard, Knowing mother board of PC, Identifying types of motherboard, SMPS: Circuit diagrams and pin assignments, working of SMPS Input and load requirements.	6
2	Memory Module and Hard disk Features of different types memory modules, Reading memory error messages, adding RAM, Tips on installing memory chips, Static and handling precautions. Disk structure: Cylinders, heads, platters, tracks and sectors, structure of a disk, hard disk controllers. Types of interface controller and drives. Hard disk software installation: Physical formatting, partitioning, high level formatting, Hard disk installation	6
3	Input / Output Devices Keyboard : Keyboard and Mouse operation, Key switches, Common faults and diagnostics, Scanner: Working Principle, Types and Fault finding, CD-ROM drive:-CD drives mechanism installation of CD drive, Monitors: Display basics, Display adapter cards, VGA and super VGA, Failure, Troubleshooting and Elimination, Printer: Types, Interfaces, Parts, Working Principle and Connection to Computers.	8
4	Troubleshooting and Preventive Maintenance Troubleshooting basics, Troubleshooting by visual Inspection, Preventative Maintenance, Using Preventative Maintenance Tools, POST : Functions, Test Sequence, Error messages, Troubleshooting Procedures and Preventative Maintenance: Identifying Troubleshooting Tools, Hardware tools, Diagnostic software, Materials and equipment, Software utilities, Maintaining Environmental Controls, Ventilation and airflow, Humidity and liquids, Dirt and dust, Power, UPS, and suppressors, Completing Maintenance Tasks, Case and components, Power supplies	8

Reference Books:

1. IBM PC & Clones: Hardware Trouble Shooting and Maintenance by B.Govindarajalu, Tata McGraw Hill
2. PC Upgrade & Repair Bible , Wiley India.
3. PC Systems, Installation and Maintenance, Second Edition by R. P. Beales,
4. PC Upgrade & Repair Black Book by Ron Gilster.
5. Computer Installation and Servicing by D Balasubramanian

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
35%	35%	30%	0%	0%	0%

List of Experiments:

Sr. No.	Unit No.	Name of Topics	Contact Hours
1	1	Disassemble the PC carefully. Assemble the same PC you have disassembled and boot the system. Observe the procedure of assembling a computer system.	4
2	1	Observe various connectors, ports back and front side of the computer. Write their purpose and specifications. (e.g. Power, PS/2 keyboard and mouse, Serial and parallel, USB, VGA, LAN, Audio & microphone, Firewire, HDMI, games, SATA etc.)	4
3	1	Identify the on-board features of the motherboard. Add additional facilities like the network capabilities, and gaming capabilities by adding an Accelerator card. Install the given driver and test the computer for proper functioning. Remove the drivers for some devices like sound, display, network etc. and again install them and check the proper functioning of computer. Upgrade the given PC by adding RAM and additional Hard Disk.	2
4	1	Observe the power supply (SMPS) and measure their voltage levels of a given SMPS. Measure various voltage levels, such as motherboard, storage devices and fan etc. using multi-meter. Do a detailed study on all the components and devices on the given power supply. Observe different types of switch mode Power Supply – AT, ATX, NLX . Record the different types of power connectors on the motherboard.	4
5	2	Identify BIOS settings, Demonstrate starting BIOS, Identify how to disable unused devices to decrease security risks. Change	4

		booting of computer with different secondary storage CD, HDD, USB etc.	
6	2	Perform low level and high level formatting of Hard Disk. Format the given Hard Disk using any one technique and create three partitions, two for operation systems and one for data. Install OS of different types. Also Search for various data recovery software apply on pen drive/HDD.	4
7	3	Open at least 2 to 3 different types of keyboard and mouse and observe the internal circuits. Observe and write steps to troubleshoot, maintain and clean the diskette drives, keyboard, mouse, etc.	4
8	3	Observe different types of printers (dot matrix, inkjet & laser, multifunction). Install driver and interface the printers with PC/Laptop on any operating system (connect the printer to one PC directly using USB/Serial/Parallel ports as per the availability; test the functioning of the printer.)	4
9	3	Learn the interfacing, installation and working of various devices such as scanner, projector, web cam etc. Connect all these devices with the given PC, install & test them.	4
10	4	Identify the problem in the given PC, using the given troubleshooting sequence, fix the issue, record the given problem, and produce proper documentation of your work.	4
11	4	Recognize common symptoms associated with diagnosing and troubleshooting PCs and utilize Windows built-in diagnostic tools. <ul style="list-style-type: none"> • Identify general troubleshooting techniques and strategies • Utilize scandisk, control panel, boot-up menu, and startup disk as diagnostic tools. • Access Microsoft Knowledge Base on the Internet to solve common problems. • Identify the common problems associated with shutdown, configuration, and cabling. • Identify problems associated with heating and cooling of the internal components. • Identify problems with installing internal devices such as hard drive, tape drives, or CD-ROM drive. • Recognize and interpret the meaning of common error codes and startup messages. 	4

		<ul style="list-style-type: none"> Recognize windows-specific printing problems and corrections. 	
12	4	Define registry file operation and maintenance. Using various tools available for the registry. Operate and maintain registry file. Describe registry file operations & demonstrate proper registry file maintenance practices.	4
13	4	Perform computer maintenance and preventative maintenance functions. <ul style="list-style-type: none"> Perform physical cleaning (internal and external) of personal computer. Demonstrate how to adjust basic performance settings. Perform hard drive file system maintenance. Identify anti-virus software and applications 	2
14	4	Utilize Internet to download device drivers. Installation of drivers of various devices from the internet. Demonstrate to remove unwanted software applications.	2
Total Hours			50

Instructional Method:

- The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory etc.

Suggested Resources

- Software: Microsoft windows operating system from XP/vista/7/8 to latest version available in market, Windows server, linux/ubuntu/centos, server operating system
- <http://www.gcflearnfree.org/computerbasics/15/print>
- <http://www.more.net/sites/default/files/training/BTTmain.pdf>
- <http://www.computerhope.com/issues/ch000248.htm>
- <http://computer.howstuffworks.com/computer-hardware-channel.htm>