

MAHARASHTRA STATE BOARD OF VOCATIONAL EDUCATION EXAMINATION, MUMBAI - 51

1	Name of Course	Certificate Course In Repair & Maintenance of Hardware of Computer & Peripherals (301127)																																								
2	Max.Nos. of Student	25 Students																																								
3	Duration	6 Month																																								
4	Type	Full Time																																								
5	Nos Of Days / Week	6 Days																																								
6	Nos Of Hours /Days	7 Hrs																																								
7	Space Required	Laboratory = 1000 Sq feet Class Room = 200 Sq feet TOTAL = 1200 Sq feet																																								
8	Entry Qualification	S.S.C.+ Any Course in Computer Group of MSBVE																																								
9	Objective Of Syllabus/ introduction	1. Awareness of Safety precautions. 2. Knowledge of soldering techniques, Testing, use of tools in assembly. 3. Application of Various Microprocessor/ Microcontroller 4. Computer Hardware & Networking. 5. Ability to read schematic layouts wrings diagrams. 6. Repair & Maintenance of Hardware of Computer & Peripherals 7. Testing of Computer Hardware & Software.																																								
10	Employment Opportunity	The trainee will either to be able to take up jobs with agencies which maintain and repair such equipments or with working experience will be in a position to start his own independent Business.																																								
11	Teacher’s Qualification	Diploma in Computer Engineering. With 3 year Teaching experience in Computer Field.																																								
12	Training System	Training System Per Week <table><tr><td>Theory</td><td>Practical</td><td>Total</td></tr><tr><td>12 Hours</td><td>30 Hours</td><td>42 Hours</td></tr></table>						Theory	Practical	Total	12 Hours	30 Hours	42 Hours																													
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13	Exam. System	<table><tr><th>Sr. No.</th><th>Paper Code</th><th>Name of Subject</th><th>TH/PR</th><th>Hours</th><th>Max. Marks</th><th>Min. Marks</th></tr><tr><td>1</td><td>30112711</td><td>Repair & Maintenance of Hardware of Computer & Peripherals</td><td>TH-I</td><td>3 hrs</td><td>100</td><td>35</td></tr><tr><td>2</td><td>30112721</td><td>Basic Electronics & Assembly Technique</td><td>PR-I</td><td>3 hrs</td><td>100</td><td>50</td></tr><tr><td>3</td><td>30112722</td><td>Repair & Maintenance of Hardware of Computer & Peripherals</td><td>PR-II</td><td>6 hrs</td><td>200</td><td>100</td></tr><tr><td></td><td></td><td>TOTAL</td><td></td><td></td><td>400</td><td>185</td></tr></table>						Sr. No.	Paper Code	Name of Subject	TH/PR	Hours	Max. Marks	Min. Marks	1	30112711	Repair & Maintenance of Hardware of Computer & Peripherals	TH-I	3 hrs	100	35	2	30112721	Basic Electronics & Assembly Technique	PR-I	3 hrs	100	50	3	30112722	Repair & Maintenance of Hardware of Computer & Peripherals	PR-II	6 hrs	200	100			TOTAL			400	185
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SYLLABUS

Repair & Maintenance of Hardware of Computer & Peripherals

PRACTICAL-11	THEORY-1
Identifying Digital IC's and Pins. Designing Logic circuits and verifying. Design, construct and test shift registers. Designing and constructing counters. Designing and constructing Adders and Subtractors Construct and test Comparators Construct and test Multiplexes/Demultiplexers.	Digital and Analog signal. Number system. Digital Gates. Basic gate structures - TTL, ECL, MOS, CMOS Comparators. A to D converters D to A converters Multiplexers/ Demultiplexers
Testing Serial and parallel cables. Making serial cables. Making parallel cables. Crimping using crimping tools(RJ11 and RJ45)	Serial and Parallel Data communication. RS 232C, RS 449, X.25, IEEE 802 and other current standards. Packet and message switching techniques.
Identifying Processor chips and handling procedure. Identifying I/O and memory chips on Microprocessor kit. Reading and loading memory locations. Assembly language programming. Interfacing to microprocessors. Microcontroller, architecture, types and applications.	Evolution of Microprocessors. Architecture of 8bit,16bit Microprocessors. Microcontrollers. Introduction to CISC and RISC processors. CISC processor, Hardware design principles of basic microcomputer systems, Memory and I/O interfacing. Recent processors, examples of typical RISC processors.
Identifying standard input/output devices of a PC. Physical handling I/O devices and ergonomics. Care to be taken while shifting PCs. Power-On and shut-down procedures. Using Dos commands.	Introduction to the PC. Key Functions of a PC. Standard Input and Output devices of a PC. The System Case/Cabinet.. The Motherboard CPU/MCP Clock Memory I/O Expansion Bus Commercially available PC and Types. Popular PC Manufacturers and assemblers.
Identifying ports of a PC. Connecting and Disconnecting procedures of I/O devices to PC. Checking system configuration and specifications. Checking connectivity of devices. Identifying IRQ and DMA settings. Modifying IRQ settings. Identifying device drivers and location. Disabling/Uninstalling and enabling/installing devices.	PS2 Ports • Parallel Ports • Serial Ports • USB Ports • SCSI • Network Ports • Audio Ports • IrDA Ports • Wireless Ports • Joystick/MIDI Ports • Concept of Interface hardware. Device drivers. Interrupt Request. Direct Memory Access.
Install Keyboard. Set keyboard features. Cleaning keyboard. Identifying defect in keyboards. Replacing parts of keyboards. Trouble shooting defects. Installation of Mouse. Set properties of mouse. Clean Mouse. Identify defective Mouse. Replacing Parts of mouse. Trouble shooting defects.	Types of Keyboards. Keyboard construction and circuitry. Cleaning and maintenance of KB. Repairing keyboards. Installing and setting keyboard properties. Types of Mouse. Mouse construction and circuitry. Cleaning and maintenance of Mouse. Repairing Mouse. Installing and setting Mouse properties.

Install Monitor. Use external controls for adjusting features. Set properties of Monitor. Set colour features of Monitor. Identify installation defects. Display cable connector repair/replacement. Maintenance of monitor. Measurement of radiation from monitor.	Types of Video Monitors. PCI and Integrated Display Interfaces. AGP Slot and Cards. Installing Video Monitor drivers. Setting Properties of Monitors. Colour management and Monitor Utilities. Radiation effect on user. Methods for reducing radiation.
Install Printer. Setting printer properties. Repairing printer cable. Removing and replacing ribbon/toner cartridge. Running Printer tools/utility. Maintenance of printers. Refilling tape/toner	Types of Printers. Printer Interface. Installing Printer driver. Setting Properties of Printers. Install Printer. Setting printer properties. Repairing printer cable. Removing and replacing ribbon/toner cartridge. Running Printer tools/utility. Dot matrix printer 80 and 132 column. Inkjet printers of at least four different makes and types. Inkjet printers of at least four different makes and types. Laser Printers of at least two different Printer Trouble shooting utilities and security settings.
Install Multimedia card/feature. Setting Sounds and multimedia properties. Setting properties of multimedia hardware. Setting advanced playback and recording properties. Testing playback and recording features. Using third party play and record software. Trouble shooting of Ampli-speakers, Microphone and connecting cables. Installing and using gaming devices at Game port. Identification of types of modem and ports. Installation of external/Internal Modems. Installation of cable modem. Installation of ISDN, ADSL modems. Setting properties of modem and communication. Installation and setting up wireless modems. Connecting to the internet and setting options. Repairing modem cables and crimping. Maintenance and troubleshooting of modems.	Types of Multimedia cards. PCI and Integrated Multimedia Interfaces. Installing Multimedia driver. Setting Properties of Multimedia devices. Sounds and Hardware settings. Game port and Game devices. Types of modems. Modem Interface. Installing modems. Setting Properties of Modems. Trouble shooting Modem connectivity.
Installing CD Players and CD writers. Burning different types of CD using Writer. Installing DVD players and DVD writers. Installing Combo drive and using. Fault finding and Repairing CD and DVD. Installing ZIP drives and using. Installing DAT drives and Using.	CD writers and Installation. DVD writer. Combo -drives ZIP drives and Installation. DAT Drives and Installation.
Identifying parts of a cabinet, dismantling and reassembling cabinet parts. Assembling Server and industrial chassis. Assembling front panel. Adding additional Bays for drives. Disassembling components from PC and servers. Cleaning cabinet and components.	Cabinet types and specifications. Layout of items inside a PC. Front panel to Mother board and SMPS connections. Disassembling of components inside PC and precautions. Cleaning the components and Cabinet.

Identify connectors and colour code. Measure voltage and check current rating. Identifying specifications and comparison of different manufacturers. Identifying components inside SMPS. Replacing Fan, connectors. Identifying faulty components, testing and replacing in each type of computer power supplies. Testing and repairing Surge arrestors/Power conditioners.	Specifications of SMPS. AT/ATX/Athelon/ Dual Xeon power supplies/1U,2U,3U power supplies/Redundant power supplies/Book PC power supplies. Power Supply converters / Connectors/extendors/splitters.Testing SMPS. SMPS Circuit and Testing. Troubleshooting SMPS. Surge Arrestors. Power Conditioners.
Identifying different types of motherboard form factors and specifications. Identifying components on a motherboard. Identifying different types of buses and raisers. Identifying Processor, form factor and specifications. Identifying jumpers on the motherboard and functions. Identifying RAM slot, type, size, expandability. Identify CMOS capacity. Lithium battery.	Form Factor. BIOS CMOS and Battery. Memory slots. CHIPSET ISA,PCI, AGP, Raisers. Processor, types, form factor, specifications. Jumpers and connectors on motherboard.
Identifying CMOS, size, features. Carrying out CMOS setup. Identify type of BIOS, manufacturer, version and features. Upgrading Bios features. Identify RAM form factor. Identify type of RAM and capacity. Test RAM. Identify Replacement options/equivalents. Upgrade RAM.	Function of CMOS setup. Altering and setting parameters of CMOS settings. RAM technology and evolution. Form Factor. Manufacturers. Specifications. Removing and replacing & Expanding RAM.
Install FDD. Repair of FDD cable and connector. Fault finding and repair of FDD. Identifying the type of HDD. Identifying specification of HDD. Maintenance of HDD. Partitioning IDE/ATA Drives, SCSI drives. Formatting IDE/ATA drives, SCSI drives. Jumper settings. Repairing HDD cables. Installing and testing Pen drives/Thumb drives.	FDD types and media. Maintenance and repair of FDD. HDD technology and types. Types of Interface. Installation, Partitioning, Partitioning tools, formatting. Care and maintenance of HDD. Thumb
Loading windows OS. Repairing OS. Upgrading OS. Loading Multiple OS. Loading patches. Working with systems files. Loading Windows office suit. Loading Linux OS. Repairing Linux. Loading Linux application packages.	Operating system and functions. Types and comparison. Installing operating systems. Multiple operating systems. Repairing OS installations. Upgrading OS. Minimum hardware requirement for loading application packages. Popular window based application packages - installation. Popular Linux based application packages – installation.
Repair and maintenance of CD Drives. Repair and maintenance of DVD Drives. Repair and maintenance of Combo Drives. Repair and maintenance of ZIP Drives. Repair and maintenance of DAT Drives. Repair and maintenance of external JAZ Drives. Repair and maintenance of MODs.	Principle and types. Media. Installation. Maintenance and minor repairs. Other back-up medias and devices. Working principle and capacity. Installation. Maintenance and repairs.

Repair and Maintenance of different makes and types of monitors.	Opening a monitor and identifying defect. Circuit tracing and fault finding. Trouble shooting techniques.
Repair and Maintenance of different types of printers.	Trouble shooting Dot matrix/impact printers. Trouble shooting Inkjet/DeskJet printers. Trouble shooting LaserJet Printers. Trouble shooting Heavy duty line printers. Toner and refilling techniques.
Repair and maintenance of scanners. Repair and maintenance of Web Camera. Repair and maintenance of Digitizers. Repair and maintenance of Joysticks.	Working and parts of a scanner. Trouble shooting Scanners. Working, parts and trouble shooting Web cameras. Working, parts and trouble shooting Digitizers/Trackballs. Working, parts and trouble shooting Joysticks.
Hands on with Laptop/notebook computers. Disassembling and reassembling procedures. Replacing processor. Replacing memory. Replacing add-in cards. Fault finding and repairing/replacing battery/main adaptor.	Difference between desktop and laptop architectures. Computer. Chipset. Internal layout of components. Special cards and accessories. Upgrading and Minor repairs.
Identification of network cable, connectors and outlets. Identification of straight and cross cables, testing and making. Installing NIC card and setting. Loading network protocols. Establishing a peer-to-peer connection across/straight cables and switch. Loading anti virus packages and terms used. Scanning for virus, removing/recovering virus infected files. Internet anti virus softwares.	LAN, MAN, WAN, Intranet, terms used. Network topology. Network protocols. Peer – to – peer and Client –server. Computers Virus and Antivirus

Basic Electronics & Assembly Technique

Practical - I
Tool Identification, safety precautions, Familiarization with Electronic Components. Different Type of Soldering Iron. Use of Soldering Iron. Color Code of Fixed Resistors.
Use of various Meters for Measuring Voltage, Current , Resistance etc. Safe Handling of Instruments . Use of Digital & Analog Multimeter. Familiarization with CRO. Measurement of L, C and R using LCR bridge.
Identification & Testing of various types of Diodes. Familiarization with CRO, Operating knobs. Construction of Half Wave & Full Wave Rectifiers. Calculation of Ripple using Filters to improve DC Output
Transistor Testing, study the transistor characteristics. Construction of single stage amplifier. Construction of a transistor- switch and to drive a relay.
Construction of RC Phase Shift Oscillator. Construction of Astable and Bistable multivibrator.
Plotting of V-I Characteristics of SCR/Triac, study of light Dimmer.
Lab Demonstration of all types of Digital Logic Gates. Verification of all truth table. Familiarization with various IC and their Packages.

List of Tools & Equipments / Software

IC remover/pullers. Soldering Irons (10W), De soldering Pumps (Handheld). Digital Voltmeters. Digital IC LAB Boards. Logic Probes. Logic Pulsar. CRO, (Digital IC's, Solder, Hookup wires – as required) (Digital IC's, Solder, Hookup wires – as required)
Crimping tools for Different types/Crimping tool kit. Coaxial cable strippers (Cables and Connectors as required.)
interface kits. 8086 Microprocessor kit with at least two interface kits. (Spare Processor, I/O and memory chips) Microcontroller kit and Interface kits.
At least four PC's of latest generation with all standard I/O and memory devices. Spare ports of all standard types. Different types of Keyboards including wireless keyboards. Different types of Mice including wireless mouse.
Different types of Monitors including Flat and Plasma Monitors. PCI and AGP display cards of different makes and VRAM capacity. Spare Monitor cables and connectors. Radiation measuring meter.
Dot matrix printer 80 and 132 column. Inkjet printers of at least four different makes and types. Inkjet printers of at least four different makes and types. Laser Printers of at least two different types and makes. Heavy duty Line printer. Tape refill kit. Toner refill kit. Spare printer cables and connectors.
Sound cards of at least four different makes and types. Ampli-speakers of at least four different makes and types. Microphones of at least four different makes and types. Game devices of at least four different makes and types. Spare cables and connectors. Internal PCI modems at least four different makes and types. External modems of at least four different makes and types. ISDN Modem with ISDN connection. Cable modem. Wireless modem. Spares Cables and connectors.
CD/DVD drives at least four different makes and types. CD writers at least four different makes and types. DVD players at least four different makes and types. COMBO drives at least four different makes and types. ZIP drives at least four different makes and types. DAT drives at least four different makes and types. Spare cables and connectors. Third party software utilities.
Different types of PC and Server cabinets at least four different makes and types. Different types of Industrial computer cabinets at least two types. Spare 3.5 and 5.5 mounting bays. Mini Vacuum cleaner with attachments. Special tool kit used for PC disassembly – at least four sets.
Four different types, wattage power supplies suitable for AT/ATX/Athelon/ Dual Processor/server power supplies/1U,2U,3U power supplies/Redundant power supplies/ Book PC power supplies. Power Supply converters / Connectors/extendors/s plitters. Surge Arrestors. Power Conditioners. Spare cables and connectors.
Four computers of different makes and processor based for dismantling, demonstration and Reassembly. Mother board manuals and technical manuals for PCs. Spare Lithium batteries.
Mother board manuals for the PCs available in the institute. RAM modules of different form factor, capacity, speed and technology suitable for PC's available.
Different makes of FDD at least four different types. Floppy diskettes. Tool kit for repair and maintenance. Different types, makes and capacities of HDD in IDE/ATA and SCSI. External Hard disk drives. Third party software utilities. Flash/Thumb/Pen drives of different makes and capacities.

Windows 98, 2000 and XP operating systems- full and legal versions. Windows MS office package. Linux OS. Linux application packages.
Micro screw driver set. Motorized screw driver. Allen key set. Lens assembly with light. Spares as required. Two different types of Magneto optical disk drives.
Four different types, makes and sizes of monitors for dismantling, demonstration and reassembly. Spares as required.
One DMP for dismantling, demonstration and reassembly. Four Inkjet/Desk jet for dismantling, demonstration and reassembly. Four LaserJet for dismantling, demonstration and reassembly. One Line printer.
Four different types and makes of Scanners for dismantling, demonstration, reassembly and trouble shooting practice. Four different types and makes of WEB Camera for dismantling, demonstration, reassembly and trouble shooting practice. Digitizers and Trackballs.
Two different types of Note Book computers of different type and make along with technical manual. Spare memory, Processor, cables, connectors, power pack, battery.
UTP 5/5e/6 cable. RJ45 connectors and Crimping tool. At least four different types of NIC cards.

Sr.No.	Equipment	Qty.
1	Pentium system with multimedia and Combo drives, Zip drives and DAT drives. (Latest con)	10 No.
2	Operating system	For each computer
3	Dot matrix printer	4 No.
4	Inkjet printer	3 No.
5	Laser printer	3 No.
6	Antivirus software	As required
7	Tool kit	5 No.
