MAHARASHTRA STATE BOARD OF VOCATIONAL EDUCATION EXAMINATION, MUMBAI -51

<table>
<tr><td>1</td><td>Name of Syllabus</td><td>C.C. IN Hardware Technology
(301133)</td></tr>
<tr><td>2</td><td>Max.Nos of Student</td><td>25 Students</td></tr>
<tr><td>3</td><td>Duration</td><td>6 Months</td></tr>
<tr><td>4</td><td>Type</td><td>Part Time</td></tr>
<tr><td>5</td><td>Nos Of Days / Week</td><td>6 days</td></tr>
<tr><td>6</td><td>Nos Of Hours /Days</td><td>4 Hrs.</td></tr>
<tr><td>7</td><td>Space Required</td><td>Practical Lab = 200 Sq feet
Class Room = 200 Sq feet
TOTAL = 400 Sq feet</td></tr>
<tr><td>8</td><td>Entry Qualification</td><td>S. S. C. Appeared</td></tr>
<tr><td>9</td><td>Objective Of Syllabus/ introduction</td><td>i). To generate hardware experts
ii) . To generate self and wage employment</td></tr>
<tr><td>10</td><td>Employment Oppertunity</td><td>Wage : 1. Hardware assistants in software companies
2. System In-charge
3. Sales assistant E-market.</td></tr>
<tr><td>11</td><td>Teacher’s Qualification</td><td>Diploma In Computer / IT OR Related ITI Trade</td></tr>
<tr><td>12</td><td>Training System</td><td>Training System Per Week
<table>
<tr><th>Theory</th><th>Practical</th><th>Total</th></tr>
<tr><td>06 hrs.</td><td>18 hrs.</td><td>24 hrs.</td></tr>
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<tr><td>13</td><td>Exam. System</td><td>
<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>30113311</td><td>Hardware Technology</td><td>TH- I</td><td>3 hrs.</td><td>100</td><td>35</td></tr>
<tr><td>2</td><td>30113321</td><td>Basic & Digital Electronics</td><td>PR -I</td><td>3 hrs.</td><td>100</td><td>50</td></tr>
<tr><td>3</td><td>30113322</td><td>Computer Hardware & Networking</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>
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Hardware Technology - Theory - I

A) : Electricity, Electronics & OS.

Introduction : Electric Current, DC & AC voltages & graphic representations. Concept of current, potential difference, voltage and resistance, Ohm's law, resistances in series and parallel, Kirchoff's laws - application to simple DC circuits, power and energy concepts

Electronics : Capacitors : Functions and types, series and parallel connection of capacitors, electric field, energy stored in capacitors, charging and discharging of capacitors

Electromagnetism : Magneto - motive force, flux, reluctance and permeability, energy stored in magnetic fields, Faraday's laws of Electromagnetic Induction, Lenz's law, self and mutual induction, B-H curve, Eddy currents and their significance, inductance I series and parallel.

Alternating Current : Concept of Alternating voltage and current, difference between AC&DC,concept of frequency, period cycle, amplitude hase, Transformer principle, construction and working of transformer, application.

Semiconductor Devices : P type materials, P-N junctions, Diode, forward and reverse biasing, characteristics and application of Zener diode, LED, PNP and NPN transistor - transistor biasing, transistor as a switch**.**

Integrated circuits : Linear and digital ICs, TTL and CMOS ICs - Characteristics, parameters, timer circuits**.**

Amplifiers : transistor as amplifiers, CC, CB, CE modes of operation, operational amplifiers, OP-AMP inverting and non-inverting modes of operation**.**

Power Supply : Diode rectifier, half wave, full wave, bridge, filter circuits, stabilized power supplies, series regulators, Ni-Cd, led acid batteries, short circuit and over voltage protection, typical supply circuits using ICs, SMPS, Principles and applications of CVT, invertors and UPS.

Digital Electronics : Binary, decimal, octal and hexadecimal number systems and their conversions, Binary addition and subtraction. Logic Gates : AND, OR, NOT, NOR, XOR, XNOR gates, their logic diagrams and truth tables, positive and negative logic, half, full binary adders, Boolean Algebra, DeMorgan's theorems. Flip Flops RS, JK, JK Master slave flip flops, Counters, Registers, and Memories

B) : Computer Hardware & Networking.

Computer hardware and internal structure

Motherboard : Motherboard various designs, various buses, single board computers, AT, Mini AT, ATX, configuration of various socket formats, expansion buses (ISA, EISA, PCI, PCMCIA)

Processor : Study and specification of CPU's available in the market, installation of CPU in related motherboards, operating voltage, power management, upgradation, functional parts of microprocessor

Memory : Various volatile and non-volatile memory, concept of FPM, EDO, SDRAM, SIMM,
DIMM, Installation of various RAM into motherboard, Static Memory, ROM, PROM, EPROM,
EEPROM, Internal, External and Cache Memory

BIOS : Power-on self test, error codes, beep codes, BIOS extensions, BIOS capability, BIOS development, BIU identifications, system configuration and CMOS setup.

Hard Disks : Hard disk technology, rotation, speed, data transfer rates, media, R/W heads, clusters, FAT, formatting, partitioning, installation of hard disks, various types of hard disks (IDE, EIDE, SCSI).

Floppy disk & Floppy disk drive : Drive components, R/W heads, head activator, motor, circuit board, connectors, floppy disk controller, types of floppy disk drives (1.2 MB, 1.44 MB), Installation of floppy disk drive, trouble shooting, R/W head aligning and cleaning, repairing of floppy disk drive.

Display adopter and montors : Applications of VGA adopters & display, VESA, SVGA, standard, video RAM video processor, AGP, 3D accelerators, troubleshooting, types of monitors, resolution, mono & colour VGA/SVGA monitors, interlaced & non-interlaced monitors, precautions to be taken while handling monitors.

Computer hardware

SMPS & Cabinet : Power supply, Power supply ratings, functions and operation of power supply, colour coding, types of connectors (P8 - P13), testing voltages, power greed signal, power supply problems, troubleshooting of SMPS, repairing power supply, various types of cabinets - vertical tower, mini tower**.**

I/O devices : Types of key boards, keyboard technology, keyboard trouble shooting and repair, keyboard-mouse interface, types of mouse, installation of mouse, mouse interface type (serial, PS/2 mouse port, cleaning of mouse, troubleshooting).

CD ROM & DVD Drives : Principles, operation, characteristics, data transfer rates, access time and types of CD ROM/DVD (IDE and SCSI), CD ROM disks, drive formats, installation
and troubleshooting, disk formats, types, installation and troubleshooting of sound card and multi-media speakers**.**

Serial and Parallel Interfaces : Types of connectors - D types, 9 pin, 25 pin, 5 pin, male, female, their connections and configurations, RS 232 C and Centronics / IEEE 488 protocols.

Printers : Printer types, principles, working, parameters of impact and non-impact printers, speed, formats, 9 pin and 24 pin printers, parts of printers, overhaul of printers, types of bubble jet and ink jet printers, thermal and piezo inkjet printer, identification of various parts of inkjet printer, overhaulting and servicing, replacement and refilling of cartridges, principle, specification and operation of laser printer, replacement of toner cartridge, installation and troubleshooting of laser printer, principle and working of line and high seed printers

Modem : Principle, operation, types and applications of modern, parameters, installation and troubleshooting of modem, terminal emulation software.

Computer Networking--

Network basics : Models of network computing - centralized computing, distributed computing, collaborative computing, Network models : client/server, peer to peer, LAN, MAN and WAN, Introduction to Archir, Ethernet, FDDI, ATM

OSI Model : Standards, ISO, OSI reference model, communication by peer layers, concept of physical layer, data link layer network layer, transport layer, session layer, presentation layer, application layer.

Transmission Media : Transmission frequencies, characteristics of transmission media, cable media, coaxial cable, twisted pair cable, fiber optic cable, wireless media, radio, microwave integrated, public and private networks, internet connecting hardware for various types of cables.

Network Topologies : Connection types, physical topologies based on point to point connections - Ring, Star, Hybrid topologies**.**

Data Transmission : Digital to Analogue Signaling, Digital Signaling Technique, Analogue Signaling, Bit Synchronization, Asynchronous Communication, Synchronous Communication, Baseband and Broadband Transmission, Multiplexing, Frequency Division Multiplexing, Time Division Multiplexing.

Protocol Suits : Models and Protocols, Introduction to Netware IPX, TCP/IP, IEEE 802 family, IP, ICMP, RIP, OSPF, TCP, UDP, ARP, DNS, FTP, SMTP, TELNET, NFS, SLIP, PPP.

Network Architecture : Ethernet specifications, ethernet board settings, Ethernet cabling, Ethernet frame types, Ethernet troubleshooting**.**

Network Connectivity : Network devices, NICs, Hubs, Repeaters, Bridges, Multiplesols, Modems, Inter-Network connectivity, Routers, Brouters, Gateways**.**

PRACTICAL -I -: Basic & Digital Electronics

SR.NO.	TOPIC NAME
01	Drawing of electrical and electronics symbols as per specifications, familiarization with various electric material, tools, and meters, identification of components and devices, study of resistors and colour coding, measurement of voltage and circuit using voltmeter Ameter & Multimeter, capacitors and testing with multimeter, verification of Ohm's law and Kirchoff's law, resistors in series and parallel circuits, testing of transformer, continuity, insulating and voltage ratio, Soldering and de-soldering involving tag, PCB terminations, ICs, testing semiconductor diode, LED and Zener with multimeter**.**
	Measurement of voltage and frequency with C.R.O. Study of Half wave, Full wave rectifiers, Full wave rectifiers using filters, fabrication of stabilized power supply using series regulator ICs (7805, 7812), CE amplifier, study of Phase shift and Colpitts oscillators, Verification of truth tables of basic gates circuit, building basic gates using NAND, NOR gates, Truth tables of Half and Full adders, Study of inverting and non-inverting amplifiers using OPAMP, fabrication of delay switching circuit using IC 555, fabrication of 7 segment display with decoder counter, study of R-S and J-K Flip-Flops**.**

PRACTICAL -II: Computer Hardware & Networking

SR. NO	TOPIC NAME
1	Familiarization of various parts of computer, installation and removal of CPU, Test voltages and frequencies, jumper settings on the motherboard with reference to manual, installation of memory in related sockets, installation of PCI card and configuration of driver software, configuration of CMOS BIOS setup, power and data connections to system board and various peripherals, study of various types of motherboards, partitioning, formatting of hard disks and loading of DOS and Windows, installing floppy disk drives, aligning and cleaning of R/W head, Assembling of computer, fabrication of serial cable.
2	Study of circuit diagram of switch mode power supply, replacement of fan, P8-P13 connector in SMPS, adjustment of D indicator of cabinet with jumpers, dismantling, assembling and cleaning keyboard, fabrication of various data cables with related connectors, installation of CD-ROM, DVD-ROM drives in DOS and Windows operating system, installation of sound card, installation and configuration of DMP or inkjet or laser printer, replacement of Printer head, replacement and refilling of cartridge, overhauling and servicing, installation, configuration and fine tuning of Modem
3	**Identification of Network Components :** Passive - Cables - UTP, Thin Ethernet, Thick Ethernet, Fiber Optic Cable. Connectors : BNC Connector, Terminator, RJ-45 Connector, Male / Female, Info Outlets, Jack Panels, Active-Hub, Switch, Installation of Ethernet card on a PC with IR settings and Base I/O address-setup using software or Jumpers, changing ports from UTP to BNC to AVI port in a combo chor, Crimping of BNC connectors on thin Ethernet cable, Crimping of RJ-45 connector using 568A and 568B specification on UTP cable, establish connectivity between two PCs on Peer to Peer Network by mapping drive & sharing, Connecting a printer and sharing it between two PCs. Configuring modem on a PC for Internet access, Installation of Windows NT or NetWare Server, Connectivity between Windows PC and NetWare/Windows NT Server by logon.

Tools & Equipments -

Sr No	Name	Quantity
1	Voltmeter	05 Nos
2	Ammter	05 Nos
3	Multimeter	05 Nos
4	Soldering Iron	05 Nos
5	De-soldering iron	05 Nos
6	8085 Microprocessor Kit	05 Nos
7	Microprocessor Peripheral Chips	As per requirement
8	Computer Hardware	08 Nos
9	Computer Software	As per requirement
10	Printer	O2 Nos

Raw Materials - As per requirments

Reference Books :

1) Computer Hardware – Govindarajulu 2) Digital Electronics- R.P.Jain
3) Electronics –V.K.Mehta

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