GOVERNMENT OF THE PUNJAB

# TECHNICAL EDUCATION & VOCATIONAL TRAINING AUTHORITY

CURRICULUM FOR

## COMPUTER HARDWARE

***(3 – Months Course)***

CURRICULUM SECTION

**ACADEMICS DEPARTMENT**

96-H, GULBERG-II, LAHORE

## TRAINING OBJECTIVES.

Objective of this course is to impart theoretical and practical knowledge about electricity, electronics and computer to the trainees so that they are able to start a career as computer technician and earn their livelihood by repairing computer and other peripheral devices. At the end of the course a trainee should have learnt:

- Operating system (CLI , GUI)
- Basic concept of Electricity / Electronics.
- Assembling and disassembling of computer.
- Usage of software as well as test equipments.
- Installation, troubleshooting & repairing of computers and their peripherals.
- Techniques of Computer Networking and fault finding / troubleshooting of Computer Networks

## CURRICULUM SALIENTS

| | |
|---|---|
| Name of Course | Computer Hardware |
| Entry Level | Matriculation |
| Duration of course | 3-Months |
| Total Training Hours | 300 Hours |
| Training Hours Per Day | 5 Hours Per Day |
| Training Methodology | Practical 80%<br>Theory 20% |
| Medium of Instruction: | Urdu / English |

## SKILL COMPETENCY DETAILS: -

After the completion of this course, the student will be equipped with the following skills:

1. Be able to assemble / unassembled PC's.
2. Be able to use all test equipments that are used for testing and measurements.
3. Be proficient in commonly used single user/multi-user operating system like DOS, Windows etc
4. Be able to use various diagnostic software's that are helpful for troubleshooting of the computers.
5. Be able to configure computer system and troubleshooting of software's.
6. Carry out cabling / wiring for computer network, installing hubs, repeaters etc.
7. Troubleshoot and diagnose network faults and rectify them
8. Can use tools efficiently that are helpful for mechanical handling of the computers and other peripheral devices.

# KNOWLEDGE PROFICIENCY DETAILS:

At the end of the course a trainee must have acquired basic knowledge of

1. Safety precautions that are needed to work with electrical power supply and other electrical circuits.
2. Use, care and maintenance of electronics technician's tools and measuring cum test equipment.
3. AC, DC Fundamentals, Electromagnetism and fundamental laws of electricity
4. Construction, characteristics and working principles of Capacitor, Resistor, Inductor, Transformer, Diode, Transistor, ICs and other electronic devices.
5. Basic working principles of Rectifier Circuits, Amplifiers, Integrated Circuits, Oscillator, Regulator, Converters, Logic Circuits (Combinational & Sequential)
6. Fundamental concept of computer & its peripherals and their working
7. Faultfinding and trouble shooting techniques in computer & computer peripherals.
8. Operating system (single user & multi user OS) & basic concept of programming.
9. Basis concepts and principals of Data Communication & Computer Networks.

## CURRICULUM DELIVERY STRUCTURE

| Area | Curriculum Delivery | Revision | Final Test | Total |
|---|---|---|---|---|
| W E E K | **1 – 10** | **11** | **12** | **12** |
| | **10** | **1** | **1** | **12** |

# SCHEME OF STUDIES

## Computer Hardware

**(3 – Months Course)**

| Sr. No. | Main Topics | Theory Hours | Practical Hours | Hours Total |
|---|---|---|---|---|
| 1 | Basic Electricity, Electronics and Digital Electronics | 20 | 80 | 100 |
| 2 | Computer Hardware Fundamentals | 10 | 40 | 50 |
| 3 | Computer Networking Fundamentals and Cabling Installation | 5 | 20 | 25 |
| 4 | Computer Software Fundamentals | 5 | 20 | 25 |
| 5 | Computer Assembly, Testing, Trouble Shooting and Maintenance | 20 | 80 | 100 |
| **Total** | | **60** | **240** | **300** |

# DETAIL OF COURSE CONTENTS

## (Computer Hardware 3- Months Course)

| Sr. No. | Details of topics | Theory (Hours) | Practical (Hours) |
|---|---|---|---|
| **1** | **Basic Electricity, Electronics and Digital Electronics**<br>**1.1 Basic Electricity & Electronics**<br>1.1.1 Electrical Quantities & Definitions<br>1.1.2 Voltage, Current & power<br>1.1.3 Inductance<br>1.1.4 Capacitance<br>1.1.5 Magnetic Field, Flux<br>1.1.6 Types of Magnets, Magnetic Induction<br>1.1.7 Electromagnetic induction<br>1.1.8 Resistors Behavior, Types, Symbols & Colour Coding<br>1.1.9 Capacitors Types, Symbols and its behavior & colour coding.<br>1.1.10 Inductors Types, Symbols and its behavior<br>1.1.11 Semiconductor Materials, PN Junction Diode<br>1.1.12 Diode Biasing and Zener Diode<br>1.1.13 Half & Full Wave Rectification,<br>1.1.14 Transistors Construction, Symbols and its Working principals<br>1.1.15 Transistors Biasing<br>1.1.16 Transistors as Switch and Amplifier<br>1.1.17 Introduction & constructional of SCR, TRIAC, UJT<br>**1.2 Digital Electronics**<br>1.2.1 Number Systems<br>1.2.2 Decimal, Binary, Hexadecimal and Octal Number System and Conversion<br>1.2.3 Addition, Subtraction, Multiplication and division of Binary Numbers | **10** | **52** |

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|---|---|---|---|
| | 1.2.4 Logic Gates, AND, OR, NOT (inverted), NOR, NAND, XOR and XNOR<br>1.2.5 Digital Integrated Circuits DIP, SIP, ZIP and QUIP, Pin Grid Array, DTL, TTL, CMOS & ECL | **4** | **28** |
| **2** | **Computer Hardware Fundamentals**<br>**2.1 Introduction and identification of computer component**<br>2.1.1 Casing, Mouse, Keyboard & Video<br>2.1.2 Printer, Scanners, Video Camera, Microphone And Speakers<br>**2.2 Power Supply**<br>2.2.1 PC Power Supply, Functions and Signals,<br>2.2.2 Good Power, Power On Off, Power Supply Components & Voltages<br>**2.3 Mother Boards**<br>2.3.1 Features and Function,<br>2.3.2 MB Design and Factors<br>**2.4 Processor**<br>2.4.1 Intel CPU Chips, Other CPU Chips, AMD, Cyrix, MMX Technology & Processor Modes.<br>**2.5 BIOS and Boot Operations**<br>2.5.1 Background on BIOS & BIOS Chips<br>2.5.2 ROM BIOS & POST Process<br>**2.6 Memory**<br>2.6.1 RAM Types and Characteristic, SIMM, DIMM, SODIMM & DRAM<br>2.6.2 Conventional Memory, Volatile and non-volatile memory & Virtual memory<br>2.6.3 Cache Internal and External Memory,<br>**2.7 Data Storage Devices**<br>2.7.1 Hard Disk Drives & Controller<br>2.7.2 Master Versus Slave Designation, IDE Device Per Channel<br>2.7.3 Floppy Disks, CD ROM and DVD ROM | **10** | **40** |

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|---|---|---|---|
| **3** | **Computer Networking Fundamentals and Cabling Installation**<br>**3.1 Introduction to Computer Networks**<br>3.1.1 Advantages of Networks & Structure of Communications Network<br>**3.2 Network Topologies**<br>3.2.1 Topologies and Design Goals, Star Topology, Hierarchical Topology & Horizontal Topology<br>3.2.2 Introduction, Traffic Control and Accountability, Checking Error, Connection Oriented and Connectionless Networks<br>**3.3 OSI Model**<br>3.3.1 Introduction to Standard Organization and OSI Model, Standard Organization<br>3.3.2 The Layers Of OSI & OSI Status<br>**3.4 Local Area Networks (LAN)**<br>3.4.1 Primary Attributes of LAN, IEEE & 802 Standard<br>3.4.2 LAN Topologies and Protocols<br>3.4.3 Switching and Routing In Networks<br>**3.5 TCP/IP**<br>3.5.1 Introduction, TCP/IP and Internetworking, Related Protocols & Major Feature of IP/TCP Segments<br>**3.6 Cabling Installation**<br>3.6.1 Cabling, Cable Characteristics, State Cable & Crossover Cable<br>3.6.2 Ethernet Network Cable Designations, Installing and Configuring an NIC<br>3.6.3 Network Tools, Cable Tester, Net Work Wiring<br>3.6.4 IP Checking and Troubleshooting Techniques | **5** | **20** |
| | **Computer Software Fundamentals**<br>**4.1 Software Components**<br>4.1.1 Software Basics, System vs Application Software, Operating System, DOS, Windows and Features of Windows | **5** | **20** |

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| **4** | **4.2 PC Boot Process**<br><br>4.2.1 BIOS, Boot Sequence, The Role of Config, Sys, Autoexec & BAT files<br><br>4.2.2 DOS Commands (copy, Xcopy, dir, CD, format, md, cls etc) File Management commands<br><br>4.2.3 Windows Architecture Managing Applications, Managing Disks and PC Components, Managing Files (FAT vs NTFS) & Partitioning Disk Printing<br><br>4.2.4 Examining Hardware & Software, Viewing Devices & Printers, The Device Manager, Drivers & Power Management, Setting Default Actions & Programs, Installing & Uninstalling Software, Alternate Hardware & Software Tools<br><br>4.2.5 Disk Management Procedure, Partitioning, Formatting, Repairing, Defragmenting , FDISK, Format, Scandisk, The FAT System and Directories & Defrag Sys<br><br>4.2.6 Operating System Installations and Procedures, File System, Disk Preparation, DOS Installation, Windows, device Drivers and Windows, Windows, Changing Installed Options and Configuring Installation | | |
| **5** | **Computer Assembly, Testing, Trouble Shooting & Maintenance**<br><br>**5.1 Casing, Types of casings**<br>5.1.1 Mini, Mid and Full; Desktop, tower; XT, AT, ATX and air ventilation.<br><br>5.1.2 Drive bays and switches.<br><br>**5.2 Power Supply, types, fuses and switches.**<br><br>**5.3 Mother Board Physical form and formats of mother board.**<br><br>**5.4 RAM Identifying types and memory capacity of RAM chips.**<br><br>**5.5 Processor Identification markings on different processors.**<br><br>**5.6 Hard Disk Type and compatibility**. | | |

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|---|---|---|---|
| | 5.6.1 Issues in connecting different controllers and data cables to various hard disks.<br><br>5.6.2 Correct way of connecting power supply connectors to hard disks.<br><br>5.6.3 Hard disk installation under BIOS through auto detection and manual entry of head, sector, cylinder count.<br><br>**5.7 CD-ROM Master slave configuration.**<br><br>**5.8 Types of floppy disk drives and their installation**.<br><br>**5.9 Expansion Cards PCI and ISA card insertion/removal practices.**<br><br>**5.10 Modem Merits of internal and external modems.**<br><br>**5.11 Assembly Working out components needed to assemble a computer of given specifications.**<br><br>**5.12 Computer Test equipment needed for testing.**<br><br>**5.13 Testing Monitor Knowledge**.<br><br>**5.14 Testing Printer Feeding and removal of paper.**<br><br>**5.15** Trouble **shooting PC hardware Power.** | **8**<br><br>**15** | **16**<br><br>**42** |
| **Total** | | **60** | **240** |

# LIST OF TOOLS AND EQUIPMENT

**(For a class of 25 students)**

# COMPUTER HARDWARE

(3 - Months Course)

| Sr. No. | *Tools / Equipments* | *Quantity* |
|---|---|---|
| 1. | Server (Specification as per TEVTA Policy) | 01 |
| 2. | Client Computers (Specification as per TEVTA Policy) | 25 |
| 3. | DSL Internet Connection (minimum 1 MB) | 01 |
| 4. | Printer (Specification as per TEVTA Policy) | 01 |
| 5. | Scanner (Specification as per TEVTA Policy) | 01 |
| 6. | Networking | --- |
| 7. | Multimeter (Digital & Analogue) | 05 each |
| 8. | Solder Iron | 05 Nos |
| 9. | Soldering Sucker | 05 Nos |
| 10. | T-Set | 05 Nos |
| 11. | Crimping Tool | 05 Nos |
| 12. | Cable Tester | 05 Nos |

| | | |
|---|---|---|
| 13. | Cable Cutter | 05 Nos |
| 14. | Pliers | 05 Nos |

## The specifications of IT Equipment should be as per latest Notification issued by the MIS Department of TEVTA

# LIST OF LABS

| Sr. | Name of Labs | Remarks |
|---|---|---|
| 1 | Computer Hardware Lab | 1 No. |
| 2 | Computer Software LAB | 1 No. |
| 3 | Electronics LAB | 1 No. |

# Minimum Qualification /Experience of Trainer

1. BCS (04-Year) OR BS / M.Sc. in Computer Science from HEC recognized University with Minimum 04 Years Teaching Experience.

OR

2. DAE Electronics / DAE CIT with relevant field experience of 6-years.

## Employability of Pass outs

The course carries much value and recognized in the private, semi government, and government sectors as well as abroad for jobs as:

- Computer Hardware Engineer
- Assistant Network Administrator

**Computer Hardware (3-Month course)**

| Sr. No | Reference Books |
|---|---|
| 1 | Computer Fundamental by P.K Sinha /<br>Introduction to Computer by Peter Norton |
| 2 | The Complete Reference (Linux) by Richard Peterson |
| 3 | Basic Electronics by B.L Theraja 2 Basic electronics by grobe |
| 4 | CompTiA A+ Certification by Mire Meyers |
| 5 | CompTiA A+ Certification by Mire Meyers |
| 6 | Data and Computer Communication by William Stallings |
| 7 | Windows 7 Desktop support and Administration by Darril Gibson Microsoft |
| 8 | Microsoft Windows Server 2008, Server Administration by Darril Gibson |
| 9 | Cisco Certified Network Associate by Todd Lammle, CCSI |
| 10 | Functional English |
| 11 | Work Ethics |