# BHARATHIAR UNIVERSITY, COIMBATORE.
# PG DIPLOMA IN HARDWARE MAINTENANCE
SCHEME OF EXAMINATIONS

| Sem | Subject & Paper | Instruc-tional Hours | Examinations | |
| --- | --- | --- | --- | --- |
| | | | Duration In hours | Maximum Marks |
| I | Paper-I  Fundamental of Computers and Basic Electronics | 75 | 3 | 75 |
| | Paper-II   Computer Architecture | 75 | 3 | 75 |
| | Paper-III   Operating Systems, Installation and Utilities | 75 | 3 | 75 |
| | Paper-IV   Microprocessor | 75 | 3 | 75 |
| | Practical-I | 60 | __ | __ |
| II | Paper-V   Computer Peripherals And Maintenance | 75 | 3 | 75 |
| | Paper-VI   Computer Networking And Linux | 75 | 3 | 75 |
| | Paper-VII   PC Troubleshooting | 75 | 3 | 75 |
| | Paper-VIII   System Safety and Security | 75 | 3 | 75 |
| | Practical-I | -- | 3 | 100 |
| | Practical-II | 60 | 3 | 100 |
| | Total | | | 800 |

## Post Graduate Diploma In Hardware Maintenance
## Semester I
## Paper I - Fundamental Of Computers and Basic Electronics

### Unit I: Elements Of Computer system

What is a computer? -Block diagram of computer - Characteristics of computer, Hardware, Software and Firmware - History and Generation of computers-Classification and types of computers.

### Unit II: Computer Hardware And Input / Output Devices

General function of CPU, ALU, Control unit and memory-The computer memory: RAM and ROM -Secondary storage devices: Disk and optical disk, magnetic tape , general description of floppies and hard disk- Input / Output devices : Monochrome and color monitors, keyboard, mouse, printers and plotters.

### Unit III: Basic Electronics

Current, Voltage, Resistance, Capacitance, Inductance-Types of Resistances, Color codes, Connecting Resistors and capacitors etc.-Power and power dissipation.-Introduction to transformers-Devices used to measure current, voltage, resistance etc.-Introduction to semiconductor diodes.

### Unit IV: Transistors

Theory of transistors-CE, CC CB, transistor amplifiers and their characteristics.-Introduction to rectifiers and filters-Lead identification and checking of transistors-Simple transistor circuits-Introduction to Ics.

### Unit V: Equipments

Measuring instruments: Multimeters, CRO, and Logic Probe-Introduction to Voltage -Stabilizers, CVTs, UPS, Inverters

### Book for Reference:

- Computer Organisation ,Morris Mano,PHI

- Electronic Devices and circuits, Allen Mottershead, PHI

- A text book of Applied Electronics, R.S.Sedha,Chand &Co Ltd,I$^{st}$ Edition 1990 reprint 1998,New Delhi.

- Principles of Electronics, Albert Malvino,Tata Mc Graw Hill Publishing.

- Integrated Circuit, Botkar, Khanna Publisher

## Paper II -Computer Architecture

### Unit I: Number System

Decimal, Binary, Octal Hexadecimal numbers-Presentation and conversion from one system to other-Representation of positive and negative floating point numbers-Different codes used in computers – ASCII, EBCDIC BCD.

### Unit II: Logic Gates And Circuits

AND, OR , NOT , NAND ,NOR and EX-OR-Boolean laws and theorem and truth table-Ideas of combinational sequential logic circuits-Introduction to semiconductor memories.-Demorgan's first theorem- Demorgan's second theorem.

### Unit III:

Simplification of Boolean function: The map method-Product of sum-Sum of product.
Arithmetic circuits: Arithmetic building blocks - Half Adder- Full adder- Half subtractor - Full subtractor. Data processing circuits: Multiplexer-Demultiplexer-Encoder-Decoder**.**

### Unit IV:
Flipflops: RS,Clocked RS,D,JK,JK master slave flipflops.   Counters:
Synchronous-Asynchronous.Central processing unit: General register organization-stack organization-instruction formats-addressing modes-Data transfer and manipulation.

### Unit V:

 Computer arithmetic: Addition and Subtraction-Multiplication algorithm -Division algorithms.

 Input output organisation: Asynchronous data transfer-DMA.

### Book for Reference

- M.Morris Mano-"Digital Logic & Computer  Design", Prentice Hall of India pvt limited,1992.
- M.Morris Mano-"Computer System Architecture", Prentice hall of India ,III edition,2000.
- John P.Hayes -"Computer System Architecture and Organization", McGraw Hill publications III edition, 1998.
- Thomas C.Bastee -"Digital Computer Fundamentals", Tata McGraw Hill publishing , Sixth edition, 2002
- Albert paul Malvino,Donald P.Leach-"Digital Principles & Applications", Mc Graw Hill publications, Fifth edition, 2005.

## Paper III - Operating Systems, Installation and Utilities

### Unit I: Assembling A Personal Computer

Preparation of the Case- Configuration of the Motherboard- Installation of the Processor- Installation of the Memory- Prepare Drives for Installation- Installation of the Floppy Disk Drive- Installation of the Other Drives- Installation of the Motherboard- Connecting Cables to the Motherboard- Installation of the Expansion Cards- Perform the "Smoke Test"- Installation of the Software- Finishing Touches, BIOS /CMOS Setup Program- Various setup Options.

### Unit II: Computer Software

Knowledge of different types of programming language-Packages Vs programs-Necessity of software packages-Application Vs system software-Main software packages available for general use.

### Unit III: Disk Operating System

Idea about operating system-Different functions of operating system-Some facts about -OS and Windows-System files, booting sequence-Internal and external commands-Batch files.

### Unit IV: Viruses, Anti Viruses And Utilities

Introduction to viruses-Types of Viruses-How viruses spread-Virus detection programs-Virus prevention & removal-Anti virus vaccines-Use of disk manager (DM), NDD.

### Unit V: Operating System Installation And Configuration

**Operating Systems:** Introduction to the OS- Microsoft Operating Systems (DOS Versions and Windows versions).

**Installing Windows 98 and XP:** Pre-installation Checks- Setup Methods- The Setup Process- Re-starting the Computer and Finishing to Installation- Setup Failure and Recovery.

**Windows 2000 Setup:** Hardware Requirements- Disk Partitions- File System Choices-Running the Setup Program- Stages of Setup- Windows 2000 root Files- The Recover-Console.

**Configuring Drivers:** Configuring DOS Drivers- Configuring Windows 9X Drivers- Requirements [or Plug and Play- The Device Manager Configuring Printing: -Windows 9X Printing- WindowsNT/2000Printing.

**The Windows Registry And Other Os Configuration Files**: Overview of OS configuration files - DOS (AUTOEXEC.BAT, CONFIG.SYS); Windows 98, Windows NT SYSTEM .DAT, USER.DAT) Windows 2000 (BOOT.INI)

**Editing the Registry:** Registry entry structure-Avoiding Registry backup pitfalls- Modifying entries with REGEDIT and REGEDIT 32.

**System configuration Issues:** Upgrading Windows 9x and NT to Windows 2000 Dual-hooting Windows 2000 with Windows 98 or NT.

**Book for Reference:**

- Operating Systems, H.M.Deitel II Edition Pearson Educationa Incorporation, Asia 2001.

- Andrew S.Tanenbaum,Modern Operating System,"sixth Edition, Prentice Hall of India 1999.

- Operating Systems, Internals and Design Principles by By William Stallings

- Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin, and Greg Gagne

## Paper IV– Microprocessor

### UNIT I:  Microprocessor Architecture:

Block diagram – ALU – Instruction handling area – Control section – Memory devices – Explanation using 8085 – Instructions cycle – Fetch operation – Execute operations – Instruction & Data flow Timing Diagrams – Opcode fetch – Memory read & Memory write, 8086 Microprocessor   Architecture and operation only.

### UNIT II: Microprocessor Instruction Set:

Instruction format – Addressing modes – Types of Instructions – Instructions for 8085 – Subroutine – Stack Operations.

### UNIT III: Assembly Language Programming:

Flow-charting – Loops – Pseudo instructions – Subroutines – Software development tools – Programming and applications: Traffic control system.

### UNIT IV: Interfacing Devices:

Address space partition  Memory  & I/O Interfacing – Data transfer schemes – Interrupts  I/O Ports – Programmable Peripheral Interface – Programmable Interrupt Controller – Programmable DMA Controllers – Programmable Communication Interface  Study A/D Sub systems Applications – Temperature monitoring – Stepper motor control.

### UNIT V:  Microcontroller 9

Intel 8031/8051 Architecture, Special Function Registers (SFR), I/O pins, ports and circuits, Instruction set, Addressing Modes, Assembly Language Programming, Timer and Counter Programming, Serial Communication, Connection to RS 232, Interrupts Programming, External Memory interfacing, Introduction to 16 bit Microcontroller

**BOOKS FOR REFFERENCE:**

- Microprocessor Architecture, Programming and Applications, R.S.Gaonkar, Wiley, New Delhi, 1986.
- Fundamentals of Microprocessors and Microcomputers, B.Ram, Dhanpat Rai & Sons, New Delhi.
- Microprocessor and its applications, A.Nagoor kani
- Electronic Instrumentation and Measurement Techniques – W.D.Cooper and
- A.D.Helfrick, Prentice Hall, India.
- Introduction to Microprocessors A.P.Mathur – T.M.H, New Delhi, 1989.
- Introduction to Microprocessor Software, Hardware, Programming, Lance A.Leventhal.
- Mohamed Ali Mazidi, Janice Gillispie Mazidi, "The 8051 microcontroller and embedded systems", Pearson education, 2004.

### Practical I

### List of Experiments

1. Measurement of current, voltage and capacitance.

2. Verification of ohm's Law.

3. Testing semiconductor diodes and their characteristics.

4. Testing transistors.

5. Study of Logic Gates.

6. Use of NAND and NOR Gates to construct Basic Gates.

7. De-Morgan's Theorem Verification.

8. Verification of SOP and POS.

9. Simplifying equation using K-MAP.

10. Mathematical operation using 8085 Microprocessor.

11.  7- Segment display interfacing using 8255.

12. Analysis of various parts of computer.

13. Computer assembly.

14. Operating System Installation (DOS/ Windows)

15. Configuration of various devices.

16. Virus Detection and removal.

**Post Graduate Diploma In Hardware Maintenance**
**Semester II**
**Paper V- Computer Peripherals and Maintenance**

## Unit I: Motherboard

Idea about faster microprocessor motherboard 80286, 80386,80486, Pentium-Idea about dataflow-Function of different chips in motherboard -Dump and smart chips-identification of different cards and adapters-Pin configuration and details of cables – RS 232 – 25 pins, RS 232 C 9 pins, power -cable testing.

## Unit II: Monitors

Block diagram of monochrome monitors-Pixels and resolution1Sync section, video amplifier-Display basics, test modes and graphic mode-Display adapter cards, HGA, CGA, VGA, EGA and super VGA-How they fail , trouble shooting and elimination , maintenance chart-Monitor adjustments, size, brightness, focus.-Fault in various sections of monochrome monitors-Block diagram of color monitors, basic color theory, faults in color section.

## Unit III: Keyboards

Study of keyboards, types, interface 8048-Interconnection to PC-Common faults and -diagnostics-Introduction to mouse on serial ports-Parallel port card, serial port card, integrated card-Joy stick, light pen, graphics table controller.

## Printers

Types of printers.(DMP,INKJET,LASER,LINE)-Connecting printers to computers-Preventive maintenance of printers-Trouble shooting.

## Unit IV: Memories

How memory works-Memory speed , access time, wait states-Types of memory-Dynamic and Static RAM, memory chip making-Cache memory , shadow RAM, ROM chips -Reading memory error messages , adding RAM-Tips on installing memory chips-Static and handling precautions.

## Unit V: Disk Drives Overview And Terminology

### HARD DISKS:

Disk structure: Cylinders, heads, platters, tracks and sectors, structure of a diskcluster-Performance: access time, seek time, latency period, data transfer rates, and interleave factors - Hard disk controllers: Types of interface between controller and drives-Hard disk software installation: Physical formatting, partitioning, high level formatting-Hard disk installation.

### FLOPPY DISKS:

Types, structure, working principles-Removing, configuring and installing floppy disk drive-Floppy drive testing, trouble shooting and adjustment-IDE controller card- CD-ROM drive: - CD drives mechanism installation of CD drive-Mastering advanced-drive technologies: -CD-ROM:

SCSI\CD-R, CD-RW, DVD-ROM-Working principals, types and installation of Mouse, Scanner, Modem.

**Book for Reference:**

- All About Floppy Disks & Drives, Manahar Lotia, BPB
- All About Hard Disk Drives, Manahar Lotia ,BPB
- Upgrading and Repairing Pcs,Scott Mueller, PHI
- Inside the PC, Peter Norton, PHI
- All about Printers, Manahar Lotia, BPB
- Complete PC upgrade and maintenance guide, Mark Minasi, BPB
- Computer monitor Servicing Manual, Manahar Lotia, BPB
- All about Keyboard and mouse, Manahar Lotia, BPB

**Post Graduate Diploma in Hardware Maintenance**
**Semester II**
**Paper VI - Computer Networking and Linux**

**Unit I: Network Introduction**

Need, advantages-Types – server based, peer, hybrid-Server types-Network topologies-Bus, Star, Ring, Star Bus, Star Ring, Mesh-Network Protocols – Hardware protocols, software protocols-Selecting and design the network for an organization-Signal transmission – Digital signaling, Analog signaling-Bit Synchronization-Baseband and broadband transmission-Network media types, properties and specialities, comparative study.

**Unit II: Theoretical And Real World Network**

OSI and IEEE 802 model-Network Technologies – Ethernet, working principles, 10 & 100 MBPS Ethernet, Token ring, FDDI, ATM, Arcnet-Network scaling – No of computers, distance, software, speed, special requirements-Network connectivity – Hubs, repeaters, bridges, multiplexers-Internet connectivity – Routers, BRouters, Gateways, CSUs/DSUs.

**Unit III: Network Installation And Administration**

**(USING WINDOWS NT/2000/2003)**

Various network operating systems-Server Installation-Client installation-Configuration
Minimum network administration-Troubleshooting.

**UNIT IV: Internet Connectivity**
Introduction to Internet-Basic Internet services (email, file transfer, telnet, chatting)- ISP, connectivity (dial up, leased line, ISDN)-Internet configuration

**Unit V: Linux**
History of Linux -Features, Advantages and Disadvantages - Hardware requirements -File system and basic commands -Installation and configuration of various devices.-Installation and

configuration of network in Linux.-Building LAN with Linux and Linux-Windows Interaction.-Minimum network administration-Troubleshooting.

**Book for Reference:**

- Computer Networks, Andrew S.Tanenbaum, IIII Edition ,Prentice Hall of India 2000.
- Data and computer communication, William Stallings Fifth Edition PHI Publications 1999.
- Guide to Linux Installation and Administration, Second Edition by Nick Wells.
- Internet with webpage,website design bible ,Brian Underdahl and Keith Underhal IDG Books India.
- Complete PC upgrade and maintenance guide, Mark Minasi, BPB

**Semester II**
**Paper VII – PC Troubleshooting**

**Unit I:  Fundamentals**

PC Components and Technologies - System Resources - Motherboards - Motherboard Characteristics -Choosing a Motherboard - Installing a Motherboard- Upgrading the System - BIOS sockets and slots – Intel D850GB – Pentium4 mother board – expansion slots – form factor – upgrading a mother board – chipsets – north bridge – south bridge – CMOS – CMOS optimization tactics – configuring the standard CMOS setup – motherboard BIOS – POST – BIOS features – BIOS and Boot sequences – BIOS shortcomings and compatibility issues – power supplies and power management – concepts of switching regulation – potential power problems – power management.

**Unit II:  System Components and configurations**

**Processors:** Processor Design - Intel Processors- AMD Processors - Choosing a Processor Forthcoming Processors-.  Installing a Processor - Memory -Understanding Memory - Memory Access Methods - CAS Latency - Memory Packaging -.  Installing Memory - Troubleshooting Memory Installation and Operation. Processors and their data bus widths – Difference Between PC/XT and AT Systems – Intel and Compatible processor specifications – Motherboard Form Factors – Which Motherboard Is Which? – PC99 Color –Coding for ports – power supplies –Memory Types – Other Add On Configuration issues – Expansion slots.

## Unit III:  BIOS Configurations and Upgrades

What the BIOS is and what it Does? – When a BIOS Update is necessary. – How BIOS updates are performed – Where BIOS updates Come from – Precautions to take before updating a BIOS – How to Recover from a failed BIOS update – Plug and Play BIOS – Other BIOS Troubleshooting tips – Soft BIOS CPU speed and  Multiplier settings-Determining which BIOS you have-Determining the motherboard manufacture for BIOS upgrades-Accessing the BIOS setup programs-How the BIOS reports Errors-Microid research beep codes-Other BIOS and motherboard manufacturers beep and POST codes-Reading BIOS error codes-BIOS configuration worksheet.

**Unit IV: Serial and Parallel Ports and Devices**

Understanding serial ports-UARTs-High speed Serial ports-Serial Port Configuration-Modems-Parallel Port Connectors-Printers

USB and IEEE 1394 Ports and Devices:Universal serial bus-IEEE -1394

**Unit V: Basic Trouble Shooting And Maintenance**

Maintenance flow charts, routine checks-DIP switch setting-Jumper setting, installing new motherboards-Rum problems, their diagnostics and preventing maintenance-Identification of bad sectors.

**Book for Reference:**

- Upgrading And Repairing PCs, Scott Muellerand Mark E.Soper Techmedia Publications I Edition 2002.
- PC Hardware a Beginners Guide by Ron Gilster Tata McGraw Hill Publication.Build your own PC by Rosenthal,Morris.
- Inside the PC by Peter Norton Tech Media Publication.

<div align="center">

**Semester II**
**Paper VIII – System Safety and Security**

</div>

**Unit I: The Nature of Risk**

Is there a problem? -How safe is safe enough? - The role of computers in accidents - Software myths - Why software engineering is hard - Problems in ascribing causality - A hierarchical model of causality - Root causes of accidents - Do humans cause most accidents? - The need for and role of humans in automated systems.

**Unit II: Introduction to System Safety**

Foundations of system safety (systems theory and systems engineering) - Historical development - Basic concepts (hazard analysis, design for safety, management) - Software system safety - Cost and effectiveness of system safety - Other approaches to safety (industrial engineering, reliability engineering).

**Unit III: Definitions and Models**

Terminology - Accident models - Human task and error models.

**Unit IV: Elements of a Safeware Program**

Managing safety (the role of management, setting policy, communication channels, setting up a system safety organization, place in the organizational structure, documentation) - The system and software safety process (general tasks, real examples)

Hazard analysis (what it is, how to do it, types of models, types of analysis, current models and techniques, limitations, evaluations) .

**Unit V:**
Software hazard analysis and requirements analysis - Designing for safety - Design of the human--machine interface - Verification of safety (testing, software fault tree analysis).

**Book For Reference:**
- Nancy G. Leveson , " Safeware: System Safety And Computers" , University of Washington.
- Anderson, R. (2001).Security Engineering.
- Kahn, D.(1966).The codebreakers: the story of secret writing. Weidenfeld and Nicolson.
- Cheswick, W.R.,Bellovin, S.M. & Rubin,A.D.(2003).Firewalls and Internet security:repelling the Wily hacker.Addison-Wesley(2nd edition).
- Howard, M.& leBlanc,D.(2002).Writing secure code.Microsoft Press(2nd edition)
- Gollmann,D.(1999).Computer security.Wiley.
- Neumann,P.(1994).Computer related risks.Addison-Wesley.
- Biham,E. & Shamir,A.(1993).Differential cryptanalysis of the data encryption standard.Springer-Verlag.
- Cohen,F.B.(1994).A short course on computer viruses.Wiley(2nd edition).

## Semester II
## Practical II

### List of Experiments

1.Analysis of various types of Motherboards

2.Measurement of voltage at different section of motherboard

3.Jumper setting / Dip switch setting

4.Measurement of voltage at different color wires of SMPS

5.Measurement of Power good signal.

6.Analysis of power supply , Horizontal and Vertical sections of monitor.

7.Simulated faults on above section and their rectification.

8.Analysis of various types of printers ( Ink Jet ,DMP, Laser etc.)

9.Analysis of various types of connections ( USB, Serial, Parallel)

10.Preventive maintenance of printer.

11.Installing RAM

12.Installation of HDD, FDD, CD drives.

13.Partitioning and formatting hard disk drives.

14.Low level formatting of Hard disk.

15.Installation of Mouse and Modem.

16.Analysis of Various components used for Networking

　　　a.Various types of cables

　　　b.Connectors ( BNC, Tee, Terminators, RJ- 45 etc.)

　　　c.Hubs and switches

　　　d. NIC

17.Installation of window NT Server & client

18.Various administrative tasks

　　　a.Creating users

　　　b.Assigning rights

　　　c.Creating policies

19.Internet configuration on single PC

20.Sharing Internet account

21.Using FTP and Telnet

22.Linux installation.