DETAILED SYLLABUS
FOR
POST GRADUADE DIPLOMA IN HARDWARE MAINTENANCE
(W.E.F. JULY 2003)

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POST GRADUADE DIPLOMA IN HARDWARE MAINTENANCE (PGDHM)

SEMESTER – 1

S. NO	Paper Code	Subject Name	Theory Marks	Pract Marks (Internal)
1.	1PGDHM1	FUNDAMENTALS OF COMPUTERS AND BASIC ELECTRONICS	**60**	**40**
2.	1PGDHM2	COMPUTER ARCHITECTURE	**60**	**40**
3.	1PGDHM3	OPERATING SYSTEMS, INSTALLATION AND UTILITIES	**60**	**40**
4	1PGDHM4	PRACTICAL BY EXTERNAL	-	**100**

SEMESTER – 2

S. NO	Paper Code	Subject Name	Theory Marks	Pract. Marks. (Internal)
1.	2PGDHM1	COMPUTER HARDWARE MAINTENANCE	**60**	**40**
2.	2PGDHM2	COMPUTER PERIPHIRALS AND MAINTENANCE	**60**	**40**
3.	2PGDHM3	COMPUTER NETWORKING AND LINUX	**60**	**40**
4	2PGDHM4	PRACTICAL BY EXTERNAL	-	**100**

Exam Scheme :

1. Only short answer type and objective type questions are to be asked in the theory papers. 12 questions out of 15 questions of 5 marks may be asked to attempt by the student. Each question may be sub divided into 1-5 question.
2. At least 15 practical exercises must be carried out by each of the student in each paper.
3. Practical examiner will be a person who have the experience in the field of Hardware Maintenance.

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1PGDHM1-FUNDAMENTAL OF COMPUTERS AND BASIC ELECTRONICS

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.

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.

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.

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

EQUIPMENTS

Measuring instruments – Multimeters, CRO, Logic Probe
Introduction to Voltage Stabilizers, CVTs, UPS, Inverters

1PGDHM2-COMPUTER ARCHITECTURE

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 etc.

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.

MICROPROCESSORS

Introduction to 8085 microprocessor
Internal Architecture, Pin Layout
Interfacing Memory
Instruction Set of 8085
Basic programming using 8085
Introduction to 8086 microprocessor

INTERFACING WITH MICROPROCESSOR

Interfacing technique with I/O ports
Parallel I/O 8255
Clock generator 8284
Numeric co-processor 8087
Bus controller – 8288
comparison between 8088,80286,80386 SX / DX ,80486, Pentium

OVERVIEW OF SYSTEM

PC evolution: - PC**;** Evolution of PC through Pentium; PC classifications; 8088, 80286, 80386, 80486, Pentium. Introduction to other Microprocessors other than Intel Like AMD, Cyrix etc. and their processor range.

Inside the PC system unity: - PC system; PC system unit layout; System box, Motherboard, Motherboard memory, Expansion slots, Daughter board, SMPS, Display unit, Keyboard, Rear side connectors

Bus Architecture: - PC bus, PC-AT bus, ISA bus, PCI bus, EISA bus and USB

BIOS: ROM BIOS, Hardware-BIOS- DOS interaction, Hardware BIOS windows interaction, and BIOS setup program

Advanced Systems : Card-less Mouse & Keyboards, Infrared Interface.

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1PGDHM3-OPERATING SYSTEMS, INSTALLATION AND UTILITIES

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

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.

DISK OPERATING SYSTEM

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

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 etc.

OPERATING SYSTEM INSTALLATION AND CONFIGURATION

Operating Systems: - Introduction to the OS; Microsoft O perating Systems (DOS Versions and Windows versions);

Installing Windows 95: - Pre -installation Checks; Setup Methods; The Setup Process; Re-starting the Computer and Finishing the Installation; Setup Failure and Recovery; Windows 95 Setup Files; Windows 95 Installation walk -through

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

CONFIGURATION

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

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2PGDHM1-COMPUTER HARDWARE MAINTENANCE

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

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.

ADVANCE TROUBLE SHOOTING

Tools and components
Startup problems , run problems
Display problems
Circuit board repairs.
Disassembly hints for PC– XT / AT

SWITCH MODE POWER SUPPLY

Circuit diagram and pin assignments
Working of SMPS
Input and load requirements
Connecting a PC and peripherals to power supply

POWER SUPPLY MAINTENANCE

Cautions about opening power supply
Over voltage and over current protection
Upgrading the power supply, various test for fault tolerance.
Problem of dissimilar earth and loose connection
Protecting the PC from AC

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2PGDHM 2-COMPUTER PERIPHERALS AND MAINTENANCE

MONITORS

Block diagram of monochrome monitors.
Pixels and resolution
Sync 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 etc.
Fault in various sections of monochrome monitors
Block diagram of color monitors, basic color theory, faults in color section

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

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

DISK DRIVES OVERVIEW AND TERMINOLOGY

HARD DISKS

Disk structure : Cylinders , heads , platters, tracks and sectors, structure of a disk , cluster
Performance: access time, seek time, latency period, data transfer rates, and interleave factors.
1:1 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

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2PGDHM3 COMPUTER NETWORKING AND LINUX

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 signa ling
Bit Synchronization
Baseband and broadband transmission
Network media types , properties and specialities, comparative study

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

NETWORK INSTALLATION AND ADMINISTRATION (USING WINDOWS NT/2000/2003

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

INTERNET CONNECTIVITY

Introduction to Internet.
Basic internet services (email, file transfer ,telnet, chatting)
ISP , connectivity (dial up , leased line , ISDN)
Internet configuration

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

LIST OF EQUIPMENTS REQUIRED

MULTIMETERS (ANALOG AND DIGITAL)
LOGIC PROBES
AD – DC KITS FOR PERFORMING PRACTICALS RELATED TO ANALOG AND DIGITAL ELECTRONICS
8085 MICROPROCESSOR KITS (FROM DYNALOG OR OTHER MAKERS)
CRO FOR MEASURING AND DISPLAYING WAVE FORMS
DIFFERENT TYPES OF MONITORS [CGA (B/W AND COLOR), VGA (B/W AND COLOR)]
DIFFERENT TYPES OF DISK DRIVES (FLOPPY DRIVES 5.25" / 3.5") HARD DISK DRIVES (ST SERIES ,IDE SERIES , SCSI) , CD DRIVES
VARIOUS CARDS (LAN CARDS , DISPLAY CARDS ,FAX MODEM CARDS , DISK DRIVE CONTROLLER CARDS , SOUND CARD,
WORKING COMPUTERS FOR OS INSTALLATION AND NETWORKING
VARIOUS TYPES OF CABLES(CO-AXIAL , CAT 5 , FIBRE OPTIC) AND CONNECTORS (BNC, RJ – 45) USED IN NETWORK CONNECTION
HUBS / SWITCHES USED FOR CONNECTING COMPUTERS
DMP AND INKJET PRINTERS FOR TROUBLESHOOTING

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PARTIAL LIST OF EXPERIMENTS FOR PGDHM

PGDHM-1

1. Measurement of current, voltage and capacitance
2. Verification of ohm's Law
3. Testing semiconductor diodes and their characteristics
4. Testing transistors

PGDHM –2

1. Study of Logic Gates
2. Use of NAND and NOR Gates to construct Basic Gates
3. De-Morgan's Theorem Verification
4. Verification of SOP and POS
5. Simplifying equation using K-MAP
6. Mathematical operation using 8085 Microprocessor
7. 7- Segment display interfacing using 8255.
8. Analysis of various parts of computer.

PGDHM –3

1. Computer assembly
2. Setting up BIOS
3. Operating System Installation (DOS/ Windows)
4. Configuration of various devices
5. Virus Detection and removal

PGDHM - 4

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.

PGDHM – 5

1. Analysis of power supply , Horizontal and Vertical sections of monitor.
2. Simulated faults on above section and their rectification.
3. Analysis of various types of printers (Ink Jet ,DMP, Laser etc.)
4. Analysis of various types of connections (USB, Serial, Parallel)
5. Preventive maintenance of printer.
6. Installing RAM
7. Installation of HDD, FDD, CD drives.
8. Partitioning and formatting hard disk drives.
9. Low level formatting of Hard disk.

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10. Installation of Mouse and Modem.

PGDHM – 6

1. 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
2. Installation of window NT Server & client
3. Various administrative tasks
   a. Creating users
   b. Assigning rights
   c. Creating policies
4. Internet configuration on single PC
5. Sharing Internet account
6. Using FTP and Telnet
7. Linux installation.

PARTIAL LIST OF BOOKS

1. Computer Organisation ,Moris Mano,PHI
2. All About FDD, Manohar Lotia, BPB
3. All About HDD, Manohar Lotia ,BPB
4. Electronic Devices and ckts, Allen Mottershead, PHI
5. Upgrading and Repairing PC,Scott Mueller, PHI
6. Complete PC upgrade and maintenance guide, Mark Minasi, BPB
7. Computer monitor Servicing Manua, Manohar Lotia, BPB
8. All about Keyboard and mouse, Manoha Lotia, BPB
9. All about Printers, Manohar Lotia, BPB
10. Inside the PC, Peter Norton, PHI
11. Introduction to microprocessor, L.A.Laventhal, PHI
12. Integrated Circuit, Botkar, hanna Publisher
13. Linux complete reference