Name of the Course: CHM (Computer Hardware Maintenance) O Level

Course Code: LTC-2

Duration of the Course (in hours): 400 Hours

Yearly Session: Jan to June session, July to December session.

Fees: 22326/- (Including Registration Fees, Course fees, Examination fees, Caution Money) which is inclusive of the present Service Tax. Note- Registration Fees, Course fees, Examination fees is free for SC/ST candidates.

Minimum Eligibility: 10+2 / ITI/Diploma

Total duration of the Courses: 400 Hours
Theory and Conceptual Classes: 214 Hours
Practical Classes: 186 Hours

The theory exam would be of 100 marks & the practical exam would be of 50 marks. To pass the course, 50% marks are required in both theory and practical component in all six courses.

H1: PC Hardware & Components

Course Prerequisites:
Basic electricity and digital electronics, basic knowledge about the computer systems (identification with/without working units) will be an added advantage.

Learning outcome of the Course
On completion program the students will be able to understand the fundamentals of Hardware, handling, testing & troubleshooting of personal computer problems.

Course details
Section 1: PC hardware Hours: 6
The PC hardware consisting input, processing and output sections and basic building components. Introduction to computer hardware components of mother boards, CPU, chip-
set, various ports, slots, connectors, addon cards, etc., Protection of PC hardware, anti static wrist band, protection and safety devices.

Section 2: Primary Memory

Section 3: Secondary storage
HDD like IDE, SATA, e-SATA, SCSI, Introduction to HDD controllers like SCSCI controllers and RAID controllers their requirement and configuration. Backup devices magnetic tape drives, UBS Pen-drives, External HDDs, CDROM, CDRW, DVD, Blue-Ray Discs, etc.

Section 4: Power Supply
Switched Mode Power supply block diagram, working principles, testing and troubleshooting, power rating, requirement of SMPS wattage depending parameters like processor, HDDs used, etc.

Section 5: Cabinet types
Various types of cabinets of PCs & it's handling, servers, gaming PCs. Introduction to server cabinets, Rack mount and blade servers.

Practicals
Practical-I (Hardware Components Identification): Identify and handling of Internal components in the PC Cabinets like SMPS and its connection to Motherboard and various devices, Motherboard, CPU, Chipset, Slots, Memory modules, memory slots, Hard Disc Drives, CDROM/DVD/Blue-Ray Disc, etc. 5 Hrs

Practical-II (System Integration) : Assembly of PC using various parts, Interconnection between devices, cable polarities and connections, SMPS installation and power connection. Various types of Add-on Cards, Motherboard slot and their application. 5 Hrs

Practical-III (OS and Application Software Installation) : Multiple HDD installation and creation single large volume out of it, Installation of Operating System like Windows7, Windows8, Windows 2008, various Linux flavors like Ubuntu, SUSE, RedHat, Introduction to VMware Virtualization etc. 10 Hrs

Practical-IV (Troubleshooting) : Troubleshooting of various hardware problems like SMPS failure, Display not there, missing OS or re-installation of user software or system software. CDROM, DVD lens cleaning or replacement, CMOS setup, Battery replacement on motherboard in case BIOS is not retaining correct values. Driver software Downloading and installation, Antivirus Software installation, scanning for viruses, removing .tmp files from WINDOWS machine, etc. 10 Hrs
H2: PC Architecture

Course Prerequisites:
Basic knowledge of Digital Electronics, Number Systems (Decimal, Binary, Octal, Hexa).

Learning outcome of the Course
Able to diagnose the problem Desktop / Laptop / Mobile / Note pad etc. and repair

Course details
Section 1: Introduction to Microprocessor
Evolution of Microprocessor, architecture of Microprocessor
Hours: 6

Section 2: ARM PROCESSORS
Hours: 12

Section 3: Troubleshooting & General PC Problems
Introduction, General Troubleshooting rules, Preventive Maintenance.
Typical Motherboard BIOS, BIOS Features, BIOS & Boot Sequences, BIOS Shortcoming & Compatible Issues, BIOS Troubleshooting, BIOS Upgrades.
POST, Error Code: Beep Code, Post Code, Post Reader Card
Basic Memory Concepts: Introduction, Installing Memories, Upgrade Options & Strategies
Printers: Printer Technology, How Printer Works, Attaching Printer, Installing Network Printer Drivers, Common Printer Problems & Solution
Hours: 12

Practicals
Study of different types of motherboards.
Study of jumper settings on Pentium mother boards.
Installation of memory modules.
Study of various adapter cards and their functioning and installation.
Study of different buses and the number of pins in the different slots corresponding to different buses.
Opening the PC and identification and study of its different blocks, assembling and disassembling.
Study of various types of display Graphic cards
Assembly and disassembly of different Desktop / Laptop / Mobile / Note pad etc.
Identification of all chips and crystals on laptop and desktop motherboard
Installation of DVD/USB..
Study of faults diagnosis based on different beeps.
Practical Hours: 20
12. Configure CMOS, BIOS setup.
15. How to access the configured space of ISA slot.
16. Study of Desktop /Laptop /Mobile/ Note pad etc specification.
17. Study of preventive maintenance of latest gazettes.
18. Examining various error codes and their causes.
19. Study of various Operating systems.
20. Replacing Mobile Processor, FPC belts, DVI cables, switches, speakers, web cams, ventilation fans, Bluetooth cards, WI-FI cards, WI-FI antenna cables of laptops.

H3: Advanced networks and networking peripherals

Course Prerequisites:
Basic understanding of computers networks and Internet,
MSCIT course will be an added advantage

Learning outcome of the Course

Subject contents are designed with an intention to provide an Introduction to Computer Networks, other relevant networks and extensively used Network peripherals. It also focuses on various types of internet connections, network services, network security and finally deals with general troubleshooting and maintenance of Networks and networking peripherals.

Course details
Section 1: Networking Basics
What is networking, Basic types of network, server client & peer to peer, Types of topologies, Types of Networks, Local Area Network(LAN), Metropolitan Area Networks (MAN) and Wide Area Networks (WAN), Personalized area Network (PAN), Storage area network (SAN), campus area Network(CAN), Network attached storage (NAS) , OSI & TCP/IP Model and layers, The need of layered solutions.

Section 2: Network components & Management
Transmission mediums (wired, radio frequency, electromagnetic waves) , types of cables, Modems, routers, switches, Hubs, Wireless Routers, Network management, effect of Natural elements on Networks.

Section 3: Data Communication, protocols and filters
Data Transmission Mode, Digital and Analog Data Transmission , circuit Switching and packet switching , Introduction to Communication Protocols(TCP, UDP, ICMP, DHCP, HTTP, POP, FTP, IMAP etc), data Packets Structure, Packet Filters, Application-Level , Circuit-Level and Dynamic Packet Filters, packet filtering with Proxy.

Section 4: Transmission Media and Networking Connectivity Hardware
Network interface cards–Ethernet, Cabling Concepts (designing, installing, and maintaining modern communications infrastructures and electronic physical security systems. Fiber optics, wireless networks) CAT 5 & 6 Structured Cabling, Crimping etc.
Section 5: Types of Internet connections and protocols
Dialup, DSL/ADSL, Cable broadband, cable TV, leased line, satellite(V-Sat), Wi-Fi, Wi-Max, (3G-4G) Internet service provider (ISP), Networking protocol, Internet protocol (IP), IP grouping.

Section 6: Network services
Introduction to Internet, World Wide Web, E-mails, Chat, Search Engines, types of portals, Social Networking, cloud based application, Virtual private network (VPN), Enterprise private network (EPN), Intranets and extranets, Audio/video intercoms, Video teleconferencing, various Security cameras, voice over internet protocol (VOIP).

Section 7: Network security
Need of network security, Types of Attacks(Active and Passive), Threats, Vulnerabilities, Access control, security in wireless networks, Introduction to firewalls, Intrusion detection system (IDS), Intrusion prevention system (IPS), need of network security in E-commerce and E-governance.

Practicals
Sr. no. List of Practical’s
1 Demonstration of LAN-client/server, user creation, password protection and peer to peer network
2 Demonstration and installation of networking cables co-axial, twisted pair, optic fibre, crimping of cables straight cable, cross cable, RJ 45
3 Installation of Network card in system and connecting system in LAN
4 Using basic Networking commands- like ping, IP Config, etc with various switches.
5 Demonstration and installation of networking components Modems, routers, switches, Hubs, Wireless Routers
6 IP configuration and working with various protocols
7 Personalized Area Network Setup
8 wireless network setup
9 VPN and EPN setup
10 Broadband Router installation in networks
11 Working with advance network diagnosis and connectivity command
12 Software based Firewall Installation & understanding firewall logs
13 Installation and working of Audio/video intercoms,
14 Installation and working of Video teleconferencing
15 Installation and working of Security cameras (CCTV)
16 Working and understanding of FTP and remote access
17 Demonstration of Networking administration services
18 Demonstration of VOIP
19 Demonstration of IDS/IPS
20 Demonstration of E-commerce/E-tendering

H4: Operating System, Software & Tools
Course Prerequisites:
Basic understanding of computers Operating system ,

Learning outcome of the Course

Subject contents are designed with an intention to provide an Introduction to the Operating system (windows 7,8 & Linux), types of software , software engineering basic, and understanding various programming languages and platforms, it also focuses on inbuilt diagnostic tools of windows. with additional information about file system, memory management, system backup and restore, viruses and anti viruses.

Course details

Section 1: Basics of Operating System
Computer organization, Central Processing Unit , Introduction to Operating system, types of Operating system (single user , multiuser etc ), Concepts of process management, concurrency, scheduling, synchronization, Different types of operating system (DOS, UNIX, LINUX, Windows 7, Windows 8, Mac , Android etc.
Working with existing programs in WINDOWS 7,8 and Linux, working with files and folders, working with different explorers, study of control panel and its settings.

Hours: 5

Section 2: Memory management and file systems
Types of Memory – RAM, ROM etc, Understanding working of internal and external Storage devices. Memory units, memory structure and management.
Introduction to FAT/NTFS, difference between FAT/NTFS. data storage and data access principles of FAT/NTFS, FAT and MFT structure, attributes in FAT/NTFS, file management and memory management in FAT/NTFS, data deletion and data recovery Concept. formatting,

Hours: 5

Section 3: Operating system Back-up and restore
System Image backup, backup and restore, freeing up disk space, defragmentation, taking updates, network firewall, spyware and unwanted software protection, run maintenance, and other operating system security features

Hours: 4

Section 4: Advanced operating system concepts

Hours: 6

Section 5: Viruses & anti-viruses
What are virus, types of virus , worms, malware, adware, spyware, virus signatures , how antivirus works, concept behind Virus prevention and removing, various Antivirus programs

Hours: 4
and installation, difference between virus removal and quarantine, introduction to zero
day/zero hour attacks, no single antivirus is perfect

Section 6: Operating system security
Creating accounts with proper privileges, Authentication, program threats, system threats, 
network threats in various operating system. Protected objects and methods of protection, 
Memory address protection, Control of access to general objects, File protection 
mechanism, file & resource access control security in various operating system.

Section 7: Introduction to Software and software engineering
Types of software’s, Application Software and System Software, device drivers, firmware's. 
development software’s.
Definitions, Characteristics of Software, Software Life Cycle Models, Requirement Analysis, 
Prototyping, Specification, Analysis model, Software Design: Abstraction, modularity, 
Software architecture, Architectural design and procedural design – Data flow oriented 
design. User Interface Design: Human computer interface design, basic understanding and 
working of various programming/scripting languages and platform.

Practicals

1. Installation of Windows 7, 8, Linux
2. Study of control panel and settings
3. Adding of new hardware, and software
4. Creating and administration of User accounts
5. Installing/scheduling/Running of Anti-virus program
6. Taking the backup of directories, files & complete hard disk
7. Installation of Windows NT Server/Linux, clients and practice of using the network
8. Running of Scan disk and Disk defragmenter as part of preventive maintenance
9. Use of different commands of Windows 7,8 in command prompt.
11. Installation of Multiple operating Systems
12. Configuring System as server.
13. Creating a backup files on CD/ DVD etc.
14. Personalizing desktop
15. Creating partition and file system in Windows/Linux
16. Adding and removing user accounts.
17. understanding windows registry
18. Basic programs in various programming languages
19. understanding system configuration of various development platforms
20. Trouble shooting Linux

H5: Personality Development

Course Prerequisites:
Student should be prepared for changing some habits, attitudes, beliefs and outlooks etc.

Learning outcome of the Course
Student will be capable for performing better in their roles as leader/ manager/ well behaved/ well mannered personality in their future.

Course details
Section 1: Personality Development

PERSONALITY DETERMINANTS
Self Awareness, Self-analysis, Self-disclosure, Personality, Attitudes, Perceptions
Building Positive Personality, Habits, Personal Grooming (Dressing Well) & Etiquettes
Health and Hygiene, Body Language

Section 2: Self Esteem and Stress Management

SELF ESTEEM
Poor Self-Esteem vs. Healthy Self-Esteem, Consequences of Low Self-Esteem, Steps to Better Self-Esteem, Self Efficacy, Self-motivation,
Time management, Stress Management, Job Demands, Job Security, Relations With Your Supervisor And Co-Workers, Emotional Component- Factors That Determine Our Attitude, Types of Attitude, Etiquette

Section 3: Communication

Introduction to Communication
Classification Of Communication, Verbal & Non-Verbal, Purpose, Process, Elements, Effective Communication, Major Difficulties In Communication, Barriers To Communication, Successful Communication

Section 4: Emergencies and management

Health emergencies, first aid, electric shock, protection from electricity, other emergencies and management in emergencies.

Section 5: Environmental Studies

Pollution, types, disadvantages of pollution and how to reduce.
Means for improving environment,

Practicals

1. Write about Positive personalities.
2. Write about your Good or Bad Habbits.
3. Write some Good Ideas about Social Work.
4. Group discussion on any of the topic on personality.
5. Mock events / competitions.
7. Personality building exercises, Yoga, Physical activities - Humour
8. Collect some thoughts about Motivation write it down on Drawing Sheet in Bold Letters

Practical Hours: 16
9. Collect Information about Good Books for Motivation read carefully & collect Good Thoughts
10. Discussion with Teacher on Positive Attitude
11. Collect new & statics of e-waste from news papers
12. Deminstration and application of First aid techniques,
H6: Devices and Applications

80 Hours

Course Prerequisites:
Basic knowledge of computer and its Devices.

Learning outcome of the Course

1. Students will be able to identify existing configuration of the computer and peripherals and also to troubleshoot and repair common problems with these devices of computers.

2. Students will be able to understand the applications of devices.

Course details

Section 1: Input Devices and Applications
Hours: 8

Section 2: Display devices classification and its use
Hours: 6
Types of display, Liquid Crystal Display, Models of LCD Display, How LCD display works, Cold cathode fluorescent lamp (CCFL), display layers, Components of LCD module, Comparison of display, Manufacturers, LCD panels, TFT-LCD, layers of TFT screen, CCFL inverter, CCFL for TFT LCD backlighting. CCFL lamp, TFT-LCD VGA connector. Different between LCD & TFT.

Section 3: Output Devices and Applications
Hours: 8

Section 4: Secondary Storage Device media and Applications
Hours: 8

Section 5: Trouble Shooting related to device and its use
Hours: 10
I/O Devices, Display Devices, Storage Devices, Power Device

Practicals

1. Identification of Components(input/output)
2. Identification of Ports
3. Functions of each devices
4. Installation of Input Devices (mouse, keyboard, scanner micro phone, webcam, Digital camera etc.)
5. Installation and use of display devices (CRT, LCD, LED)
6. Installation of Output Devices (printers, speakers, multimedia devices)
7. Working structures of 3D printers
8. Troubleshooting on devices (input/output)
9. Installation and use of projectors
10. Working status of FAX machines
11. Test of knowledge on storage devices (Hard disk, DVD, CD, Memory cards)