GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP
DIRECTORATE GENERAL OF TRAINING

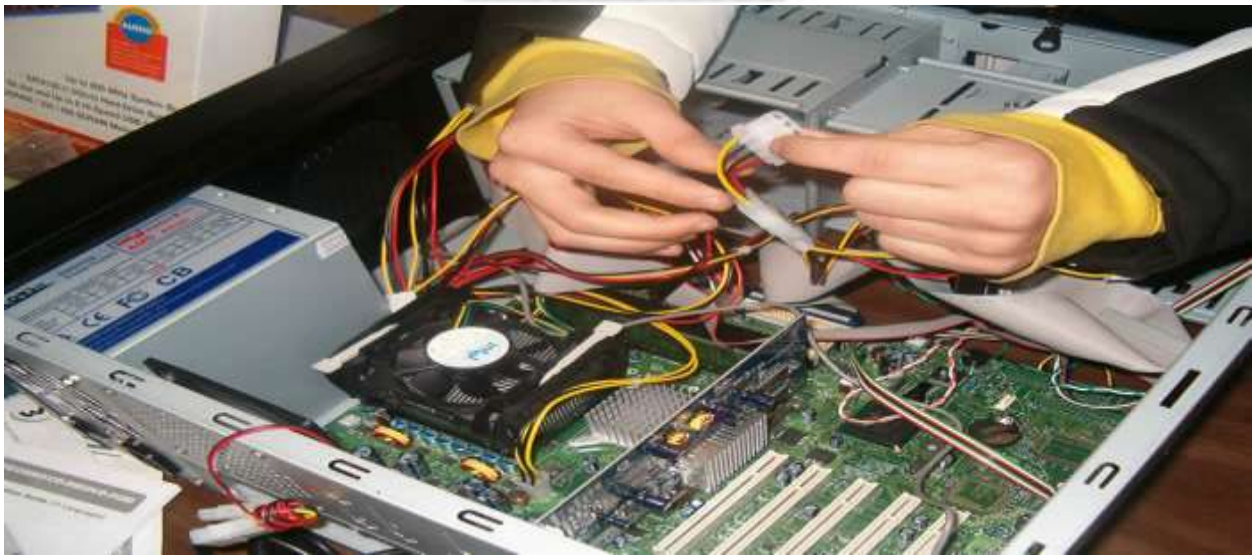
COMPETENCY BASED CURRICULUM

COMPUTER HARDWARE & NETWORK MAINTENANCE

(Duration: One Year)

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL- 4



SECTOR – IT & ITES

COMPUTER HARDWARE & NETWORK MAINTENANCE

(Non-Engineering Trade)

(Revised in 2018)

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL - 4

Developed By

Ministry of Skill Development and Entrepreneurship

Directorate General of Training

CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE

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ACKNOWLEDGEMENT

The DGT sincerely acknowledges contributions of the Industries, State Directorates, Trade Experts, Domain Experts and all others who contributed in revising the curriculum. Special acknowledgement is extended by DGT to the following expert members who had contributed immensely in this curriculum.

List of Expert members participated for finalizing the course curriculum of Computer Hardware & Network Maintenance trade held on 28th Nov 2017 at CSTARI, Kolkata

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41.	Geeta Sikhen , VI	RVTI, Panipat	Member

CONTENTS

1. COURSE INFORMATION

During the one-year duration of Computer Hardware and Network Maintenance trade a candidate is trained on professional skill, professional knowledge & Employability skill. In addition to this a candidate is entrusted to undertake project work and extra-curricular activities to build up confidence. The broad components covered related to the trade are categorized in two semester of six months duration each. The semester wise course coverage is categorized as below:-

1st Semester – In this semester the trainee learns about safety and environment, use of first aid kit. They learn about basics of electrical and electronic component related to hardware and networking system. They will learn to assemble and repair desktop PC with all its internal components. Trainees will able to install different types of operating system and all other application software, customization of OS, updating device driver, setting firewall security, junk file removal, data backup and data recovery techniques. They also learn to assemble and repair Laptop PCs and its internal hardware components. In this semester the trainees also learn to work on office package (word, excel, power point). At the end of this semester trainees can go on industrial visit or projects specified in the syllabus.

2nd Semester – In this semester the trainee learns to install and work with Linux environment. They will able to install and configure different types of printer, plotter, scanner and troubleshoots its faults. The trainees will learn to setup and configure networking system using various network devices using crimping, punching, setting IP addressing techniques. They are able to share and control resource and internet connection over network. They learn to secure networking system from different types of attacks. They also learn to install and configure Windows and Linux server. Finally the trainees will learn about internet and different types of web browsers. At the end of this semester trainees can go on industrial visit or projects specified in the syllabus.

2. TRAINING SYSTEM

2.1 GENERAL

The Directorate General of Training (DGT) under Ministry of Skill Development & Entrepreneurship offers a range of vocational training courses catering to the need of different sectors of the economy/ labour market. The vocational training programs are delivered under the aegis of National Council of Vocational Training (NCVT). Craftsman Training Scheme (CTS) and Apprenticeship Training Scheme (ATS) are two pioneer programs of NCVT for propagating vocational training.

'Computer Hardware & Network Maintenance' trade under CTS is one of the popular courses delivered nationwide through a network of ITIs. The course is of one-year (02 semester) duration. It mainly consists of Domain area and Core area. In the Domain area (Trade Theory and Practical) impart professional skills and knowledge, while the core area (Employability Skill) imparts requisite core skills, knowledge, and life skills. After passing out the training program, the trainee is awarded National Trade Certificate (NTC) by NCVT which is recognized worldwide.

Candidates broadly need to demonstrate that they are able to:

- Read and interpret technical parameters/ documentation, plan and organize work processes, identify necessary materials and tools;
- Perform task with due consideration to safety rules, accident prevention regulations and environmental protection stipulations.
- Apply professional knowledge & employability skills while performing the job and modification & maintenance work.
- Check the system specification and application software as per requirement of the design of job.
- Document the technical parameter related to the task undertaken.

2.2 CAREER PROGRESSION PATHWAYS

- Can join Apprenticeship programs in different types of industries leading to a National Apprenticeship certificate (NAC).
- Can join Crafts Instructor Training Scheme (CITS) in the trade for becoming an instructor in ITIs.

2.3 COURSE STRUCTURE

Table below depicts the distribution of training hours across various course elements during a period of one-year (02 semesters): -

S No.	Course Element	Notional Training Hours
1.	Professional Skill (Trade Practical)	1260
2.	Professional Knowledge (Trade Theory)	252
3.	Employability Skills	110
5.	Library & Extracurricular activities	58
6.	Project Work	160
7.	Revision & Examination	240
	Total	**2080**

2.4 ASSESSMENT & CERTIFICATION

The trainee will be tested for his skill, knowledge and attitude during the period of the course and at the end of the training program as notified by the Government of India (GoI) from time to time. The employability skills will be tested in the first two semesters itself.

a) The **Internal Assessment** during the period of training will be done by **Formative Assessment Method** by testing for assessment criteria listed against learning outcomes. The training institute has to maintain an individual trainee portfolio as detailed in assessment guideline. The marks of internal assessment will be as per the template (Annexure – II).

b) The final assessment will be in the form of summative assessment method. The All India Trade Test for awarding NTC will be conducted by NCVT at the end of each semester as per the guideline of Government of India. The pattern and marking structure is being notified by Govt. of India from time to time. **The learning outcome and assessment criteria will be the basis for setting question papers for final assessment. The examiner during final examination will also check** the individual trainee's profile as detailed in assessment guideline before giving marks for practical examination.

2.4.1 PASS REGULATION

The minimum pass percentage for practical is 60% & minimum pass percentage of theory subjects is 40%. For the purposes of determining the overall result, 50% weightage is applied to the result of each semester examination.

2.4.2 ASSESSMENT GUIDELINE

Appropriate arrangements should be made to ensure that there will be no artificial barriers to assessment. The nature of special needs should be taken into account while undertaking the assessment. Due consideration should be given while assessing for teamwork, avoidance/reduction of scrap/wastage and disposal of scrap/waste as per procedure, behavioral attitude, sensitivity to the environment and regularity in training. The sensitivity towards OSHE and self-learning attitude are to be considered while assessing competency.

Assessment will be evidence based comprising the following:

- Job carried out in labs/workshop
- Record book/ daily diary
- Answer sheet of assessment
- Viva-voce
- Progress chart
- Attendance and punctuality
- Assignment
- Project work

Evidences of internal assessments are to be preserved until forthcoming semester examination for audit and verification by examining body. The following marking pattern to be adopted while assessing:

Performance Level	Evidence
(a) Weightage in the range of 60%-75% to be allotted during assessment	
For performance in this grade, the candidate should produce work which demonstrates attainment of an acceptable standard of craftsmanship with occasional guidance, and due regard for safety procedures and practices	• Demonstration of good skill in the use of hand tools, machine tools and workshop equipment. • Below 70% tolerance dimension achieved while undertaking different work with those demanded by the component/job. • A fairly good level of neatness and consistency in the finish. • Occasional support in completing the project/job.
(b) Weightage in the range of 75%-90% to be allotted during assessment	
For this grade, a candidate should produce work which demonstrates attainment of a reasonable standard of craftsmanship, with little guidance, and	• Good skill levels in the use of hand tools, machine tools and workshop equipment. • 70-80% tolerance dimension achieved while undertaking different work with those

regard for safety procedures and practices	demanded by the component/job. • A good level of neatness and consistency in the finish. • Little support in completing the project/job.
(c) Weightage in the range of more than 90% to be allotted during assessment	
For performance in this grade, the candidate, with minimal or no support in organization and execution and with due regard for safety procedures and practices, has produced work which demonstrates attainment of a high standard of craftsmanship.	• High skill levels in the use of hand tools, machine tools and workshop equipment. • Above 80% tolerance dimension achieved while undertaking different work with those demanded by the component/job. • A high level of neatness and consistency in the finish. • Minimal or no support in completing the project.

3. JOB ROLE

Computer System Hardware Analyst/Hardware Engineer; analyses data processing requirements to plan data processing systems that provide system capabilities required for projected workloads and plans layout and installation of new system or modification of existing system. Confers with Data Processing and Project Managers to obtain information on limitations and capabilities of existing system and capabilities required for data processing projects and projected work load. Evaluates factors such as number of departments serviced by data processing equipment, reporting formats required, volume of transactions, time requirements and cost constraints, and need for security and access restrictions to determine hardware configurations. Analyses information to determine, recommend, and plan layout for type of computers and peripheral equipment, or modifications to existing equipment and system, that will provide capability for proposed project or work load, efficient operation, and effective use of allotted space. May enter data into computer terminal to store, retrieve, and manipulate data for analysis of system capabilities and requirements. May specify power supply requirements and configuration. May recommend purchase of equipment to control dust, temperature, and humidity in area of system installation. May specialize in one area of system application or in one type or make of equipment. May train users to use new or modified equipment. May monitor functioning of equipment to ensure system operates in conformance with specifications.

Data Communication Analyst/Network Administrator; researches, tests, evaluates, and recommends data communications hardware and software: Identifies areas of operation which need upgraded equipment, such as modems, fibre optic cables and telephone wires. Conducts survey to determine user needs. Reads technical manuals and brochures to determine equipment which meets establishment requirements. Visits vendors to learn about available products or services. Tests and evaluates hardware and software to determine efficiency, reliability, and compatibility with existing system, using equipment such as computer terminal and modem. Analyses test data and recommends hardware or software for purchase. Develops and writes procedures for installation, use, and solving problems of communications hardware and software. Monitors system performance. Trains users in use of equipment. Assists users to identify and solve data communication problems. May write technical specifications to send to vendors for bid. May oversee or assist in the installation of communications hardware. May perform minor equipment repairs.

Reference NCO-2015: -

a) 2523.0200 - Computer System Hardware Analyst/Hardware Engineer
b) 2523.0100 - Data Communication Analyst/Network Administrator

4. GENERAL INFORMATION

Name of the Trade	**COMPUTER HARDWARE & NETWORK MAINTENANCE**
NCO - 2015	2523.0200, 2523.0100
NSQF Level	Level-4
Duration of Craftsmen Training	One Year (2 Semesters)
Entry Qualification	Passed 10th class examination under 10+2 system of education with Science and Mathematics.
Unit Strength (No. of Student)	20 (Max. Supernumeraries seats: 6)
Space Norms	70 Sq. m
Power Norms	3.45 KW
Instructors Qualification for:	
(i) Computer Hardware & Network Maintenance Trade	Post Graduate in Computer Science/ Computer Application/ IT/ Electronics with six months experience in the relevant field. ***OR*** Degree in Engineering/ Technology in Computer Science/ IT/ Electronics & Communication from Recognized university with one year experience in the relevant field. ***OR*** Diploma in Computer Science/ IT/ Electronics & Communication from recognized Board/ Institution with two years experience in the relevant field. ***OR*** NTC/ NAC passed in Computer Hardware & Network maintenance trade with three years post qualification experience in the relevant field. ***Desirable Qualification:*** Preference will be given to a candidate with CITS (Craft Instructor Training Scheme) in Computer Hardware & Network Maintenance Trade. ***NOTE*:** **Out of two Instructors required for the unit of 2 (1+1), one must have Degree/ Diploma and other must have NTC/ NAC qualifications.**

(ii) Employability Skill	MBA OR BBA with two-year experience OR Graduate in Sociology/ Social Welfare/ Economics with two-year experience OR Graduate/ Diploma with two-year experience and trained in Employability Skills from DGT institutes. **AND** Must have studied English/ Communication Skills and Basic Computer at 12th/ Diploma level and above. **OR** **Existing Social Studies Instructors duly trained in Employability Skills from DGT institutes.**
List of Tools and Equipment	As per Annexure – I

Distribution of training on hourly basis: (Indicative only)

Total Hrs/ Week	Trade Practical	Trade Theory	Employability Skills	Extracurricular Activity
40 Hours	30 Hours	6 Hours	2 Hours	2 Hours

5. NSQF LEVEL COMPLIANCE

NSQF level for **'Computer Hardware & Network Maintenance'** trade under CTS: **Level 4.**

As per notification issued by Govt. of India dated- 27.12.2013 on National Skill Qualification Framework total 10 (Ten) Levels are defined.

Each level of the NSQF is associated with a set of descriptors made up of five outcome statements, which describe in general terms, the minimum knowledge, skills and attributes that a learner needs to acquire in order to be certified for that level.

Each level of the NSQF is described by a statement of learning outcomes in five domains, known as level descriptors. These five domains are:

a. Process
b. Professional knowledge
c. Professional skill
d. Core skill
e. Responsibility

The Broad Learning outcome of **'Computer Hardware & Network Maintenance'** trade under CTS mostly matches with the Level descriptor at Level-4.

The NSQF level-4 descriptor is given below:

Level	Process Required	Professional Knowledge	Professional Skill	Core Skill	Responsibility
Level 4	Work in familiar, predictable, routine, situation of clear choice	Factual knowledge of field of knowledge or study	Recall and demonstrate practical skill, routine and repetitive in narrow range of application, using appropriate rule and tool, using quality concepts	Language to communicate written or oral, with required clarity, skill to basic Arithmetic and algebraic principles, basic understanding of social political and natural environment	Responsibility for own work and learning

6. LEARNING/ ASSESSABLE OUTCOME

Learning outcomes are a reflection of total competencies of a trainee and assessment will be carried out as per the assessment criteria.

6.1 GENERIC LEARNING OUTCOME

1. Apply safe working practices.
2. Comply with environment regulation and housekeeping.
3. Assist in exigencies and carry out elementary first-aid during emergencies.
4. Work in a team, understand and practice soft skills, technical English to communicate with required clarity.
5. Explain energy conservation, global warming and pollution and contribute in day-to-day work by optimally using available resources.
6. Explain personnel finance, entrepreneurship and manage/organize related task in day-to-day work for personal & societal growth.

6.2 SPECIFIC LEARNING OUTCOME

SEMESTER-I

7. Perform all the functions with Electrical and Electronic Components related to Computer and Networking system.
8. Assembling and repairing of Desktop Computer with all its hardware components.
9. Installation of different Operating System and all other application software.
10. Customization of Operating System and maintenance of system application software.
11. Assembling, repairing of Laptop and its hardware components.
12. Perform the operations of office package (word, excel, power point).

SEMESTER-II

13. Installation of Printer, Scanner and troubleshoot their faults.
14. Setting up and configuring Networking System using various network devices.
15. Sharing and controlling resource and Internet connection through network.
16. Implement Network Security to protect from various attacks on networking.
17. Installation and configuration of Windows and Linux server.
18. Browsing internet and able to communicate through email.

7. LEARNING OUTCOME WITH ASSESSMENT CRITERIA

GENERIC LEARNING/ ASSESSABLE OUTCOME	
LEARNING/ ASSESSABLE OUTCOME	**ASSESSMENT CRITERIA**
1. Apply safe working practices.	1.1 Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements, and according to policy.
	1.2 Recognize and report all unsafe situations according to policy.
	1.3 Identify and take necessary precautions on fire and safety hazards and report according to work policy and procedures.
	1.4 Identify, handle and store/ dispose-off dangerous goods and substances according to policy and procedures following safety regulations and requirements.
	1.5 Identify and observe policies and procedures with regard to illness or accident.
	1.6 Identify safety alarms accurately.
	1.7 Report supervisor/ competent of authority in the event of accident or sickness of any staff and record accident details correctly according to accident/injury procedures.
	1.8 Identify and observe evacuation procedures according to site policy.
	1.9 Identify Personal Productive Equipment (PPE) and use the same as per related working environment.
	1.10 Identify basic first-aid and use them under different circumstances.
	1.11 Identify different fire extinguisher and use the same as per requirement.
2. Comply with environment regulation and housekeeping.	2.1 Identify environmental pollution & contribute to the avoidance of instances of environmental pollution.
	2.2 Deploy environmental protection legislation & regulations.
	2.3 Take opportunities to use energy and materials in an environmentally friendly manner.
	2.4 Avoid waste and dispose waste as per procedure.
3. Assist in exigencies and carry out elementary first-aid during emergencies.	3.1 Demonstrate elementary first-aids.
	3.2 Demonstrate safety practices to be observed in kitchen.
	3.3 Demonstrate use of personal protective dresses.
	3.4 Identify emergency exit route.

	3.5 Demonstrate fire fighting procedure using fire extinguishers.
4. Work in a team, understand and practice soft skills, technical English to communicate with required clarity.	4.1 Obtain sources of information and recognize information.
	4.2 Use documents, regulations and occupationally related provisions.
	4.3 Conduct appropriate and target oriented discussions with higher authority and within the team.
	4.4 Present facts and circumstances, possible solutions & use English and French terminology.
	4.5 Resolve disputes within the team.
	4.6 Conduct written communication.
5. Explain energy conservation, global warming, pollution, and contribute in day-to-day work by using available resources optimally.	5.1 Semester examination to test knowledge on energy conservation, global warming and pollution.
	5.2 Their applications will be assessed during execution of assessable outcome.
6. Explain personnel finance, entrepreneurship and manage/organize related task in day-to-day work for personal & societal growth.	6.1 Semester examination to test knowledge on personnel finance, entrepreneurship.
	6.2 Their applications will be assessed during execution of assessable outcome.

SPECIFIC LEARNING/ ASSESSABLE OUTCOME	
LEARNING / ASSESSABLE OUTCOME	**ASSESSMENT CRITERIA**
SEMESTER-I	
7. Perform all the functions with Electrical and Electronic Components related to Computer and Networking system.	7.1 Construct a simple circuit using AC/DC supply, lamp, fuse and switch.
	7.2 Measure circuit voltage and current using voltmeters and ammeters. Also check voltage between earth and neutral.
	7.3 Measure resistance using Multimeter.
	7.4 Practice of soldering and de soldering techniques, practice using hook-up wires. Soldering resistors on Tag board. Practice using surface mount board/ device.
	7.5 Measure inductance using LCR meter. Calculate Inductive reactance at different input signal frequencies.
	7.6 Rewind a transformer to given specification using winging machine.
	7.7 Test working condition of capacitor. Discharge first then test a charged capacitor. Measure capacitance using RLC meter.
	7.8 Construct and test a half wave and full wave diode rectifiers.
	7.9 Practice Quick test given transistors using Multimeter. Identify opens, shorted junctions.
	7.10 Assemble and test a fixed voltage regulator using 3pin IC.
	7.11 Assemble a simple inverter and converter for use with emergency lamp.
	7.12 Construct small circuit using digital electronic components.
8. Assembling and repairing of Desktop Computer with all its hardware components.	8.1 Open the cabinet and identify various motherboards components, connectors, slots, ports (USB, VGA, DVI, and HDMI), cables and Connectors.
	8.2 Identify Motherboard Components and connections. CPU (Processor) RAM (Memory) Hard Drive Connections Mechanical vs. Solid State Drives ROM Drives Graphic Cards, Sound Cards.
	8.3 Use Post Error Debug Card and understand error Code for fault troubleshooting.
	8.4 Verify components with the configuration of CMOS BIOS set up.
	8.5 Check DDR3 and DDR4 RAM's FSB. Insert it on memory slot. Test and understand various beep sounds in case of trouble.
	8.6 Removing the Processor, Installing the Processor. Understand and identify various different processor sockets.

9. Installation of different Operating System and all other application software.	9.1 Boot the PC through a BOOTABLE DVD of OS. Partition the disk, Format the drive. Install Windows 7 and Windows 10 from DVD Disk.
	9.2 Make Win-7 AND Win-10 dual boot properly. Practice on recovery partition
	9.3 Install and boot Win-10 in UEFI mode.
	9.4 Collecting and installing specific/compatible Device driver from internet. Update the driver software from internet. Uninstall and Rollback the driver.
	9.5 Go to Windows Update in control panel. Check installed update. Change update Setting.
	9.6 Install any popular antivirus software. Online and offline updating of antivirus. View its various options. On and off Firewall option inside antivirus software.
	9.7 Install various application software programs in windows. Install Firefox and chrome browser.
	9.8 Install Linux (Ubuntu, Fedora, Debian, Red hat) OS from bootable usb drive and partition the hard disk manually. Use diskpart command.
	9.9 Practice important Linux commands.
10. Customization of Operating System and maintenance of system application software.	10.1 Open Personalize Setting and find Desktop icon setting, Screen Resolution and various other setting.
	10.2 Open windows explorer and find different drives, files and folders, their size and other properties. Do it through command prompt also.
	10.3 Create and configure user accounts in Windows 7/8/10. Create Administrator and Limited user account.
	10.4 Make Changes to an Account. Reset Limited user account password through Administrative account.
	10.5 Use various free and paid Disk clean up utility to remove junk files from hard disk.
	10.6 Create automated backups to ensure you always have a recent backup.
	10.7 Configure outlook and connect with Gmail, use thunderbird IMAP/POP3 along with security features. Configuration of Browsers.
11. Assembling, repairing of Laptop and its hardware components.	11.1 Assemble and disassembling a Laptop.
	11.2 Upgrade RAM, HDD and other parts.
	11.3 Test fault finding and troubleshooting techniques.
	11.4 Enabling support for SATA technology. Installation of OS using SATA technology drivers.

	11.5 Configuration of camera, mic, WLAN and Bluetooth, touchpad, finger print scanner.
12. Perform the operations of office package (word, excel, power point).	12.1 Format text and editing. Set up page and margins. Tabs and indents.
	12.2 Create Worksheets using Spreadsheet Software.
	12.3 Create Slide shows, insert picture, theme, format text, animation and object.
SEMESTER-II	
13. Installation of Printer, Scanner and troubleshoot their faults.	13.1 Installing a printer and carrying self- test.
	13.2 Tracing the control board and identifying defective components. Servicing of control board.
	13.3 Replacement of toner cartridge of laser printers.
	13.4 Installing plotter and rectify its common faults.
	13.5 Install a Scanner , configure it and use Automatic Document Feeder(ADF), OCR.
	13.6 Find and locate various Scanner related problems and troubleshoot them.
	13.7 Install Barcode and configure it.
	13.8 Install Passbook Printer calibrate, configure.
14. Setting up and configuring Networking System using various network devices.	14.1 Identify various Network device like : (a) Switch (Normal and Managed), (b) Router(Normal and wireless), (c) Rack, Patch Panel, i/o box, (d) Access Point etc.
	14.2 Practice crimping with straight and cross CAT 6 cables.
	14.3 Punching practice in IO Box and patch panel.
	14.4 Create cabling using Fibre Optic cable and connectors.
	14.5 Install & Configure a Peer- to-Peer Network using Windows and Linux Software.
	14.6 Connect computers with Network with Drop cable and using Wi Fi configuration.
	14.7 Configure Layer 3 Switch. Verify IP Routing Process. Configure it from CLI in layer three switch.
	14.8 Create simple VLAN and understand the concepts.
	14.9 Practice IP Addressing technique (IPv4/IPv6) and Subnetting and Supernetting the network.
	14.10 Practice to set up and use SMTP, TELNET, FTP, HTTP, SNMP, LDAP, SSH, NTP, IPP, HTTPS etc.
15. Sharing and controlling resource and Internet connection through	15.1 Configure internet connection to the PC using wireless technology and troubleshoot various connection related problems.
	15.2 Share the internet connection (wire and wireless) in the local network and access it from other machine in LAN.

network.	15.3 Configure internet connection using L2 and L3 switch.
	15.4 Install Proxy Server and configure it.
	15.5 Setup of basic collaboration tool for activities like chat, application sharing, remote desktop access and control, VoIP.
16. Implement Network Security to protect from various attacks on networking.	16.1 Set up basic protection using public keys and MAC address filters.
	16.2 Troubleshoot wired and wireless network.
	16.3 Practice on firewall technologies to secure the network perimeter.
	16.4 Practice LAN security considerations and implement endpoint and Layer 2 security features.
17. Installation and configuration of Windows and Linux server.	17.1 Configure services like Active Directory, DNS and DHCP.
	17.2 Configure IIS Web server (latest version).
	17.3 Configure following on Linux Server: (a) /etc/hosts file, (b) DHCP, (c) DNS, (d) WEB SERVER, (e) NFS and SAMBA.
18. Browsing internet and able to communicate through email.	18.1 Practice web browsing using popular web browsing software, Configuring web browser.
	18.2 Use favourite folder for browsing quickly.
	18.3 Using e-mail: Opening and configuring email client, mailbox: inbox and outbox, Creating and sending e-mail, Replying to an e-mail message, Forwarding and e- mail message, Sorting and searching emails. Sending document/softcopy by email, activating spell checking, using address book, Handling SPAM, Removal of Cookies.

8. SYLLABUS

SYLLABUS -COMPUTER HARDWARE & NETWORK MAINTENANCE			
FIRST SEMESTER – 06 Months			
Week No.	**Ref. Learning Outcome**	**Professional Skills (Trade Practical) With Indicative Hours**	**Professional Knowledge (Trade Theory)**
1	Apply safe working practices	**Familiarization with the Institute and Safety** 1. Visits to workshops, labs, office, stores etc. of the institute. (06 hrs) 2. Demonstrate safety precaution including anti-static protection. (06 hrs) 3. Demonstrate first aid practice. (06 hrs) 4. Demonstrate artificial respiration and practice. (06 hrs) 5. Demonstrate electrical safety precautions. (06 hrs)	**Familiarization with the Institute and Safety** • CHNM course duration, scope, methodology and structure of the training program. • Safety in moving and shifting heavy and delicate equipments. • First aid concept. • About artificial respiration. • Electrical Safety.
2	Perform all the functions with Electrical and Electronic Components related to Computer and Networking system.	**Basics of Electricity** 6. Identify specification of different types of fuses, switches. (03 hrs) 7. Identify of meter types and measuring range. (03 hrs) 8. Construct a simple circuit using AC/DC supply, lamp, fuse and switch. (06 hrs) 9. Measure circuit voltage and current using voltmeters and ammeters. Also check voltage between earth and neutral. (04 hrs) 10. Measure voltage and current using Multi-meter (analog-digital). (05 hrs) 11. Use Multimeter to check fuses, lamps and switches. (05 hrs) 12. Measure DC and AC power	**Basic Electrical concepts** • Concept of current and voltage. AC, DC Supply indicating lamps. Different types of Fuses and their applications. Different types of connectors, switches used in electrical and electronic applications. • Measuring circuit voltage and current using voltmeters and ammeters. AC and DC meters. • Measuring instruments, MC, MI type, Ammeter, Voltmeter, Multimeter for measuring voltage and current. Construction, characteristics/ features and specification. Digital Multimeter • Meaning of Circuit and basic

		using V-I method and using power meter. (04 hrs)	electrical circuits. • Meaning of resistance, continuity and continuity testers. Multimeter for checking continuity. • Concept of Power and measurement using V&I meter and Power meter.
3	-Do-	**Resistors, Soldering and De-soldering** 13. Identify different types of resistors from physical appearance. (02 hrs) 14. Identify resistor value and tolerance using colour code. (04 hrs) 15. Measure resistance using Multimeter. (02 hrs) 16. Practice of soldering and de soldering techniques, practice using hook-up wires. Soldering resistors on Tag board. Practice using surface mount board/ device. (006 hrs) 17. Verify of Ohms Law and Kirchhoff's Laws. (05 hrs) 18. Practice of soldering resistors on PCB and De-soldering. (03 hrs) 19. Experiment using P.T.C and NTC resistors. (02 hrs) 20. Experiment to check VDR's. (02 hrs) 21. Experiment to check LDR's. (002 hrs) 22. Test Pots, Presets. (02 hrs)	**Introduction to Resistors** • Classification, characteristics and application of different types of resistors. Carbon film, metal film, wire wound, cermets and surface mounted. • Colour coding of resistors. alculating, measuring resistance value and its tolerance value. Wattage of resistors, specific resistance and their importance. • Resistors in series and parallel. • Soft soldering and precautions to be taken form a making a good solder joint. Types of solder and need of soldering paste. • Ohms law and Kirchooff's Laws. • Printed circuit boards and its application. • De-soldering tools. • Temperature dependent resistors and their applications.(PTC and NTC).. • Voltage dependent resistors (VDR). • Photoelectric effect, Light Dependent resistors. • Variable resistors, pots, presets, types and application. Log and Linear resistors.
4	-Do-	**Inductance** 23. Identification of different types of inductors and its	**Introduction to Inductor and Inductance** • Definition of inductance.

		specifications. (03 hrs) 24. Measure inductance using LCR meter. Calculate Inductive reactance at different input signal frequencies. (06 hrs) 25. Demonstrate self and mutual induction. (05 hrs) 26. Check step down Transformers. (05 hrs) 27. Rewind a transformer to given specification using winging machine. (04 hrs) 28. Finding losses and efficiency of given transformers. (04 hrs) 29. Identifying and testing high frequency transformers used in electronic circuits. (03 hrs)	Properties. Types of inductors and their application. • Inductive reactance, measuring inductance and inductive reactance. Meaning of lead, lag. Effect of inductor on power factor. Frequency dependence of inductive reactance. • Self and Mutual inductance. Coefficient of coupling. • Transformers. Turns ratio. Transformer winding. Winding machines. • Transformer losses and efficiency. • Uses, losses, efficiency type of cores and uses for LF, HF, VHF transformer. • Transformers used in high frequency applications • Basics of EMI, EMC, and MCB.
5	-Do-	**Capacitance and Resonance circuits** 30. Identify of different types of capacitors from colour code and typographic code. (003 hrs) 31. Test working condition of capacitor. Discharge first then test a charged capacitor. Measure capacitance using RLC meter. (03 hrs) 32. Measure capacitive reactance at different frequencies. (03 hrs) 33. Measure capacitance and capacitive reactance of capacitors in series and capacitors in parallel. (03 hrs) **Electronic Components** 34. Identify terminals of different types of diodes. Record its	**Introduction Capacitor, Capacitance and Resonance circuits** • Working principle of capacitors. Electrostatic action, di electric constant. Unit of capacitance and capacitive reactance. Types of Capacitors-electrolytic, ceramic, polyester, tantalum, mica, surface mounted. Colour coding, and tolerance. • Measuring capacitance and capacitive reactance. • Behavior of capacitance at different frequencies. • Capacitors in series and parallel. • Meaning of Resonance. Application of resonance. Series and parallel resonance circuits.

		specifications referring to diode datasheet. (02 hrs) 35. Plot forward and reverse characteristics of diode Testing working condition of diodes. (04 hrs) 36. Construct and test a half wave and full wave diode rectifiers. (06 hrs) 37. Construct and test a Bridge rectifier with and without filter. (06 hrs)	**Electronic Components: Diodes.** • Semiconductor, intrinsic and extrinsic semiconductors, P and N type semiconductor. Development of P.N. junction barrier potential. Effect of temperature. Breakdown voltage. • Different types of Diodes. Diode terminals. Diode specifications using data book. • Forward and reverse characteristics of diode. Testing diodes using Multimeter. • Half wave and Full wave rectifiers using diodes. Transformer requirements. Calculating output DC, ripple factor. • Bridge rectifier. Calculating output DC, ripple factor. • Filters for rectifiers. Calculating output DC, ripple factor.
6	-Do-	38. Draw Zener diode characteristics, Simple voltage regulator using zener diode. (06 hrs) **Transistor and Amplifiers** 39. Identify types transistors based on their physical appearance. Identify the leads of the given assorted types of transistors. (06 hrs) 40. Practice Quick test given transistors using Multimeter. Identify opens, shorted junctions. (06 hrs) 41. Test and measure various electronics components. (04 hrs)	• Zener diode-Its characteristics and application for voltage regulation. Calculating the series resistor for required current rating. • Specifications of a regulated power supply and testing a power supply for its specifications. **Introduction to Transistor and Amplifiers** • Working principle of PNP, Bipolar transistors. Types of transistors and applications. Leads of transistors and their identification. • Forward and reverse bias of

		Power supply 42. Assemble and test a fixed voltage regulator using 3pin IC. (04 hrs) 43. Assemble and test a variable voltage regulator using IC. (04 hrs)	transistor or Junction. General values of junction resistances. Quick testing a transistor-using Multimeter. • Transistor configuration -CB, CE,CC ,alpha, beta. Types of Biasing of transistor amplifiers, comparison and applications. Thermal runaway. Steady and Dynamic characteristics. Testing- get frequency response, gain bandwidth product, signal to noise ratio. **Introduction to Power Supply** • Unregulated, regulated DC power supply specifications. Application of different types of power supply for specific application types. • Series regulator using transistor. Short circuit protection. Overload protection. • Fixed Voltage regulators using IC's. • Variable voltage regulators using IC's.
7	-Do-	44. Assemble a simple inverter and converter for use with emergency lamp. (04 hrs) 45. Identify the parts and controls of a UPS. Practices switch-on and switch-off procedures. (06 hrs) **Other Electrical & Electronics Accessories.** 46. Identify and Test Sensors. Try to use it on electronic circuit. (04 hrs) 47. Identify and Test Relays.	• Mains voltage stabilizers. • Inverters and converters. • Un-interrupted power supply, types and applications. **Other Electrical & Electronics Accessories.** • Relays, types and its working principles. • Basic LOGIC GATES and truth table.

		Try to use it on electronic circuit. (04 hrs) 48. Identification of digital circuits. Verify the truth table of two input OR, NOR, AND, NAND, NOT gates and test truth table of multiple input logic gates. (08 hrs) 49. Construct small circuit using digital electronic components. (04 hrs)	
8 - 9	Assembling and repairing of Desktop Computer with all its hardware components.	**Desk Top: PC Repair Safety** 50. Identify Important Safety Basics, specification and application of basic hand tools. How to handle components to ensure their longevity. (05 hrs) 51. Know the danger of static electricity. Use of anti static pads, anti static wrist wraps. Steps to protect a PC from lightning strikes and power outages. (04 hrs) **Hardware Identification** 52. Identify the front and rear panel ports and connectors on a PC cabinet. (03 hrs) 53. Open the cabinet and identify various motherboards components, connectors, slots, ports (USB, VGA, DVI, and HDMI), cables and Connectors. (10 hrs) 54. Collect data from circuit board. (03 hrs) 55. Check Power Supplies and Power Supply Connections. (04 hrs) 56. Identify Motherboard Components and connections. CPU (Processor) RAM (Memory) Hard Drive Connections Mechanical vs.	**Introduction to Computers** • Introduction to computers, classification, generations, applications. Basic blocks of a digital computer. • Hand Tools Basics and Specifications. • Types of cabinets, relation with mother board form factor. Precautions to be taken while opening and closing PC cabinet. • Main devices, components, Cards, boards inside a PC(to card or device level only). • Types and specifications of the cables and connectors used for interconnecting the devices, boards, cards, components inside a PC. • Precautions to be taken while removing and/or re-connecting cables inside a PC. **Introduction to PC Hardware** • Types of I/O devices and ports on a standard PC for connecting I/O devices. • Function of keyboard, brief principle, types, interfaces, connectors, cable. • Function of Mouse, brief principle, types, interfaces,

		Solid State Drives ROM Drives Graphic Cards, Sound Cards. (10 hrs) 57. Use Post Error Debug Card and understand error Code for fault troubleshooting. (05 hrs) 58. Use of SMPS Tester for fault troubleshooting. (05 hrs) 59. Use of PCI slot testing tool for fault troubleshooting. (05 hrs) 60. Identify connectors with data and power cables, connector used to connect external devices. (01 hr) 61. Verify components with the configuration of CMOS BIOS set up. (02 hrs) 62. Install & configure add-on cards. (03 hrs)	connectors, cable. • Function of monitor, brief principle, resolution, size, types, interfaces, connectors, cable. • Function of Speakers and Mic, brief principle, types, interfaces, connectors, cable. • Function of serial port, parallel port, brief principle of communication through these ports, types of devices that can be connected, interface standards, connectors, cable. • Function of Post Error Debug Card and its use. • Function of SMPS Tester and its use. • Function of PCI slot testing tool and its use. • Precaution to be taken while connecting /removing connectors from PC ports. Method of ensuring firm connection.
10	-Do-	**Hardware: Remove-Test-Replace/ Install** 63. Check various front panel connections on motherboard (power switch, reset switch and HDD Led).Check power and reset switch connection. Replace faulty power switch from cabinet and assemble a new one. (04 hrs) 64. Check DDR3 and DDR4 RAM's FSB. Insert it on memory slot. Test and understand various beep sounds in case of trouble. (03 hrs) 65. Find the CMOS/ROM BIOS chip on mother board. (01 hr) 66. Install a Hard Drive. Identify and check data and power	**Assemble Hardware** • Specifications of processors (Intel Celeron, P4family, Xeon dual core, quad core, core2 duo, i3, i5, i7 and AMD). • Memory devices, types, principle of storing. Data organization 4bit, 8 bit, word. • Semiconductor memories, RAM, ROM, PROM, EMPROM, EEPROM, Static and dynamic. • Example of memory chips, pin diagram, pin function. • Concept of track, sector, cylinder. FD Drive components read write head, head actuator, spindle motor, sensors, PCB. • Precaution and care to be

		cable and SATA and SACH ports in motherboards. (04 hrs) 67. Install internal and external DVD ROM Drive. (02 hrs) 68. Troubleshoot defects related to SMPS, its cable, connector and servicing procedure. Removing a Power Supply. Installing a Power Supply. Use SMPS tester. (06 hrs) 69. Install a Graphic and sound cards. Remove them safely. (02 hrs) 70. Install and Removing cooling Fans on pc cabinet. (01 hr) 71. Removing the Motherboard carefully and Install it again. (02 hrs) 72. Removing the Processor, Installing the Processor. Understand and identify various different processor sockets. (03 hrs) 73. Installing different type of CPU Cooler. (01 hr) 74. Find the CMOS Battery. Test it with multimeter. Replace it. (01 hr)	taken while dismantling Drives. • Drive bay, sizes, types of drives that can be fitted. Precautions to be taken while removing drive bay from PC. • HDD, advantages, Principle of working of Hard disk drive, cylinder and cluster, types, capacity, popular brands, standards, interface, jumper setting. Drive components-hard disk platens, and recording media, ,air filter, read write head, head actuator, spindle motor, circuit board, sensor, features like head parking, head positioning, reliability, performances, shock mounting capacity. HDD interface IDE, SCSI-I/2/3 comparative study. Latest trends in interface technology in PC and server HDD interface. Concept of SATA and SACH. • Precautions to be taken while fitting drives into bays and bay inside PC cabinet. • CMOS setting.(restrict to drive settings only). • Meaning and need for Using Scan disk and defrag. • Basic blocks of SMPS, description of sample circuit. • Vendor/sources of PC hardware components.
11-13	Installation of different Operating System and all other application software.	**OS installation** 75. Boot the PC through a BOOTABLE DVD of OS. Partition the disk, Format the drive. Install Windows 7 and Windows 10 from DVD Disk.	**Introduction to Hard disk Partition and formatting and OS installation** • What's Inside a Hard Drive? How Hard Disks Work • Inside: Hard Drive

		(10 hrs) 76. Make bootable USB DRIVE (use any open source software) and install both OS again. (06 hrs) 77. Make Win-7 AND Win-10 dual boot properly. Practice on recovery partition (08 hrs) 78. Make windows Linux dual boot. Understand Boot loader. The Windows boot manager vs. an alternative boot manager. Rectify errors in dual boot. (08 hrs) 79. Practice keyboard shortcuts of mouse activities. (08 hrs) 80. Understand the difference between UEFI firmware and tradition BIOS. Check various motherboard if it is UEFI supported or not. (08 hrs) 81. Install and boot Win-10 in UEFI mode. (08 hrs) 82. Use third party hard disk partitioning applications. (10 hrs) 83. Imaging: create a Windows system image. (08 hrs) 84. How to Backup/Restore your Windows partition with the bootable image. (08 hrs) 85. Practise Windows 7 and 10 registry tweaks. (08 hrs)	Motherboard • Desktop Hard Drive Buyer's Guide • What is RAID? Using Multiple Hard Drives for Performance and Reliability • Partitioning a hard disk (primary and extended partitions). Bad Sectors in Hard disk, • Master Boot Record, in-place installation, Registry fixing, performance level check, Shortcut fixing, Fixing Startup process, log, difference between MBR and GPT etc. • Types of software. System software-OS, Compiler. Application software-like MS office. High level, low level language, Computer application scientific industrial and business.
14	Customization of Operating System and maintenance of system application software.	**OS features, System utilities** 86. Open Personalize Setting and find Desktop icon setting, Screen Resolution and various other setting. (04 hrs) 87. Open windows explorer and find different drives, files and folders, their size and other properties. Do it through command prompt also. (02 hrs) 88. Open control panel and get	**OS features, System utilities** • Functions of an operating system. Disk operating system. • Concept of GUI, Modes of starting on different occasions. • Desktop, Icon, selecting, choosing, drag and drop. • My computer (User folder in Desktop), network places. • Recycle bin, task bar, start

		familiar with different options and their appropriate use (taskbar and start menu, Programs and features, Display, System, Sound, Devices and Printers etc). (10 hrs) 89. Open command prompt in windows 7 and 10.Open disk drives, folders and files. Execute important commands like DIR, ATTRIB, DEL, RD, DISKPART, COPY, MOVE etc. Use Power shell commands. (14 hrs)	menu, tool bar, and menus. • Windows Explorer. Properties of files and folders. • Executing application programs.
15	Installation of different Operating System and all other application software.	**Device Driver, OS Update and Firewall Security** 90. Open Device Manager, find various devices and install appropriate driver software (audio, video, chipset, LAN, WLAN, printer and monitor). Use & practice WMIC console. (04 hrs) 91. Collecting and installing specific/compatible Device driver from internet. Update the driver software from internet. Uninstall and Rollback the driver. (01 hr) 92. Understand process and services and open task manager and practice its use (Process, services, performance). Start and stop and change the priority of a process. Use event viewer, System Monitor and Performance Logs. (02 hrs) 93. Boot in SAFE MODE. Disable and enable device driver from there. Understand the significance of Safe Mode. (02 hrs) 94. Fix the master boot record.	**Device Driver, OS Update and Firewall Security** • Properties of connected devices. • Applications under windows accessories. • Windows Help. Finding files, folders, computers. • Control panel. Installed devices and properties • Updating of OS, Different configurations of Computer system and its peripherals, Compatible with different hardware/software. • Pre-installation Prerequisites, Install procedure, Rollback or Un- install procedure, Tests of various device driver software.

		(01 hr) 95. Configure config.sys file. (01 hr) 96. View System Information to check various configuration of the PC(check if the system is 32 bit or 64 bit). (01 hr) 97. Use Disk cleanup and Disk Defragmenter (Check if your hard drive has bad sectors using 3rd party open source software). (02 hrs) 98. Go to drive property, click on tool and check the drive for errors. Do this from command prompt through commands. (02 hrs) 99. Go to Windows Update in control panel. Check installed update. Change update Setting. (02 hrs) 100. Open firewall option from control panel. Enable and disable firewall. Allow and block application and port. (02 hrs) 101. Navigate to WINDOWS SYSTEM32 folder and view and understand the importance of various system files and folders found there. (04 hrs) 102. Find the hosts file and understand LOCALHOST, open it on notepad and take backup. Use the hosts file to block any URL. (03 hrs) 103. View the content and find the difference between Program Files and Program Files (x86). (01 hr) 104. Create a restore point. Practice System restore and try to restore system to a previous restore pint. Try it	

		through command line. (02 hrs)	
16	Customization of Operating System and maintenance of system application software.	**User Account Customization** 105. Create and configure user accounts in Windows 7/8/10. Create Administrator and Limited user account. (06 hrs) 106. Make Changes to an Account. Reset Limited user account password through Administrative account. (10 hrs) 107. Change the storage location of the personal folders. (02 hrs) 108. Change the storage location of Installed software. (02 hrs) 109. Set Parental Controls in Windows 7, 8, 10. (04 hrs) 110. Use Fast User Switching in Windows. (02 hrs) 111. View Hidden Files and Folders Lock Down Windows 7/8/10 With User Account Control. (02 hrs) 112. Delete User Accounts in Windows. (02 hrs)	**User Account in Windows** • Users and user account. Types of user accounts, user access levels, Privileges, types of privileges, various scope, permissions, permission parameters, user and group permission, time based permission, expiration of permission etc.
17	Installation of different Operating System and all other application software.	**Antivirus and Application Software installation** 113. Install any popular antivirus software. Online and offline updating of antivirus. View its various options. On and off Firewall option inside antivirus software. (03 hrs) 114. Run a full system scan and booting in Safe Mode. (03 hrs) 115. Set up Parental Controls using antivirus software. (02 hrs) 116. Fix your browser from redirecting to other websites	**Antivirus and Application Software** • Version of a software, Service pack, Software Installation. • Post-installation – Backup procedure & specifications, Restore procedure, Periodical View check. • Awareness of legal aspects of using computers and software such as copyright, patent licencing etc. • Reliable sources of downloading software, antivirus etc.

		(browser hijack). (02 hrs) 117. Try to manually remove a virus through commands. (06 hrs) 118. Trying to get rid of a nasty virus. Special utilities that work wonders. (02 hrs) 119. Install various application software programs in windows. Install Firefox and chrome browser. (02 hrs) 120. Run the programs from command prompt. (02 hrs) 121. Extract or uncompress a compressed file. How to compressor make files into one file (use program like Winzip/Winrar). (04 hrs) 122. Uninstall application software. Unable to remove a program from Windows Add/Remove programs then use registry to delete the program. (04 hrs)	
18	Customization of Operating System and maintenance of system application software.	**Junk File Removal** 123. Use various free and paid Disk clean up utility to remove junk files from hard disk. (03 hrs) 124. Try to find out the folder in root directory where junk files are stored and delete them manually. (02 hrs) 125. Find browser setting and clear history and temporary file. (02 hrs) **Data backup and data recovery software** 126. Use various types of media to backing up your data, and when each method is appropriate. (04 hrs) 127. Create automated backups to ensure you always have a recent backup. (04 hrs)	**Junk File** • Junk files, deleted files, un deleting files, configuration of internet browser. **Data backup and data recovery software** • Maintenance of Temp folder, internet history, cookies, bookmark, Concepts of SAN, NAS and cloud storage. **Introduction To Mail Client Software (Outlook)** • Add and use contacts, Calendar basics, Recall and replace sent messages, Send automatic replies when you're out of the office, The ins and outs of BCC, Use

		128. Learn how to manually backup data. (02 hrs) 129. How to make an exact copy (clone) of a hard drive. (02 hrs) 130. Use Data Recovery software. Recover emails, files, and data from a crashed hard drive or computer. (02 hrs) **Outlook Configure & Backup** 131. Configure outlook and connect with Gmail, use thunderbird IMAP/POP3 along with security features. Configuration of Browsers. (03 hrs) 132. Backup and Restore Outlook. (02 hrs) 133. How to restore the Outlook default installation, toolbars and settings. (02 hrs) 134. Restore Deleted Items from an Outlook PST-file. (02 hrs)	Instant Search to find Calendar items, Use Instant Search to find contacts, Use Instant Search to find messages and text, Add holidays to your calendar, Create or delete a search folder, Import and export v Cards to Outlook contacts, Make the switch to Outlook 2013,Reach out with contact groups(distribution lists), Send or delete an email stuck in your outbox, Take calendars to the next level, Track email with read receipts, Password protect your mailbox, Use rules to manage your email.
19-20	Assembling, repairing of Laptop and its hardware components.	**Laptop PCs** 135. Identify and use of tools and gadgets required for repair & servicing laptop. Safety precaution and handling components of laptops. (05 hrs) 136. Identify of laptop sections, components and connector. (05 hrs) 137. Assemble and disassembling a Laptop. (10 hrs) 138. Check of various parts of a laptop. (03 hrs) 139. Check of batteries and adaptors. Configuration of energy saving mode. (03 hrs) 140. Replace different parts of laptops. (05 hrs) 141. Upgrade RAM, HDD and other parts. (05 hrs) 142. Test fault finding and	**Laptop and its internal structure** • Introduction of laptop and comparison of various Laptops. • Block diagram of laptop & description of all its sections. • Study of parts of a laptop. Input system: Touchpad, Trackball, Track point, Docking station, Upgrade memory, hard disk, Replacing battery • Configuring wireless internet in a laptop, • Latest Tools & Gadgets For Desktop/Laptop Repairs.

		troubleshooting techniques. (05 hrs) 143. POST codes and their meaning, fixing of problems based on codes. Check and configure CMOS BIOS set up. (05 hrs) 144. Enabling support for SATA technology. Installation of OS using SATA technology drivers. (05 hrs) 145. Configuration of camera, mic, WLAN and Bluetooth, touchpad, finger print scanner. (05 hrs) 146. Latest Tools & Gadgets For Desktop/Laptop Repairs. (02 hrs) 147. Connecting external peripherals and their configuration. Use of KVM switch. (02 hrs)	
21	Perform the operations of office package (word, excel, power point).	**Using Office (Word, Excel, Power Point) package** 148. Create and saving document files using Word Processing Software. (02 hrs) 149. Format text and editing. Set up page and margins. Tabs and indents. (02 hrs) 150. Create multicolumn documents. Insert pictures in documents. (02 hrs) 151. Create tables. (02 hrs) 152. Practice Mail merge. (02 hrs) 153. Modify page setup and print documents. (02 hrs) 154. Create Worksheets using Spreadsheet Software. (02 hrs) 155. Format cells and use formula in cells. (02 hrs) 156. Create relation between sheets. (02 hrs) 157. Create Graphs and tables.	**Word processing Software** • Introduction to word processing and comparison of features. Creating and saving document files using Word Processing Software. • Formatting test and editing. • Setting page and margins. Tabs and indents. • Creating multicolumn documents. • Inserting pictures in documents. **Spreadsheet Software** • Introduction to spread sheet. • Creating Worksheets using Spreadsheet Software. • Formatting cells. • Using formula in cells. • Graphs and tables. • Advanced features.

		Practice filtering and data sorting in excel. (02 hrs) 158. Print spread sheets. (02 hrs) 159. Create power point presentation and familiarise with basic application components. (02 hrs) 160. Create Slide shows, insert picture, theme, format text, animation and object. (05 hrs) 161. Modify slide page setup and print the slides. (01 hr)	**Power Point Presentation** • Introduction to Power Point and its advantages. • Creating Slide Shows. • Fine tuning the presentation and good presentation technique.
22-23	**Project work/ Industrial visit** **Broad Areas:** a) Disassemble a given Desktop/ Laptop PC totally following the safety precautions. b) Reassemble the Desktop/Laptop PC and test for its satisfactory performance. c) Install Operating System and necessary driver, taking backup and restore system. d) Rectify a defective system and make it as smooth working system. e) Troubleshoot / Repair / Replace an SMPS/RAM. f) Check Hard disk error, partition, format different types of Hard disk drives.		
24-25	Revision		
26	Examination		

Note: -

1. *Some of the sample project works (indicative only) are given against each semester.*
2. *Instructor may design their own project and also inputs from local industry may be taken for designing such new project.*
3. *The project should broadly cover maximum skills in the particular trade and must involve some problem solving skill. Emphasis should be on Teamwork: Knowing the power of synergy/ collaboration, work to be assigned in a group (Group of at least 4 trainees). The group should demonstrate Planning, Execution, Contribution and Application of Learning. They need to submit Project report.*
4. *If the instructor feels that for execution of specific project more time is required than he may plan accordingly in appropriate time i.e., may be in the previous semester or during execution of normal trade practical.*

SYLLABUS - COMPUTER HARDWARE & NETWORK MAINTENANCE			
SECOND SEMESTER – 06 Month			
Week No.	**Ref. Learning outcome**	**Professional Skills (Trade Practical) With Indicative Hours**	**Professional Knowledge (Trade Theory)**
27	Installation of different Operating System and all other application software.	**Linux operating system** 162. Install Linux (Ubuntu, Fedora, Debian, Red hat) OS from bootable usb drive and partition the hard disk manually. Use diskpart command. (12 hrs) 163. Preparing functional system LINUX. (03 hrs) 164. Adding new users, software, material components. (03 hrs) 165. Making back-up copies of the index and files. (03 hrs) 166. Dealing with the files permissions and indexes. (03 hrs) 167. Practice important Linux commands. (06 hrs)	**Linux operating system** • Basic Linux commands. • Linux file system, The Shell, Users and fill permissions, vi editor, X window system, Filter Commands, Processes. • Shell Scripting. • Concept of UNIX.
28-29	Installation of Printer, Scanner and troubleshoot their faults.	**Printer and Plotters** 168. Testing front panel controls. Interface pins, cables, measurement of voltages and waveforms. (02 hrs) 169. Installing a printer and carrying self- test. (02 hrs) 170. Replacing ribbon in a DMP. (01 hr) 171. Testing and Rectifying defective cable. (02 hrs) 172. Removing, cleaning and replacing a new printer head. (02 hrs) 173. Testing and servicing Printer power supply. (02 hrs) 174. Changing rollers and other mechanical parts. (03 hrs) 175. Tracing the control board	**Printer and Plotters** • Types of printers, Dot Matrix printers, laser printer, Ink jet printer, line printer. Block diagram and function of each unit head assembly, carriage, and paper feed mechanism. Front panel controls and interfaces. Pin details of interface port. • Installation of a printer driver and self test. • Ribbon types used, refilling of ribbons. • Printer cable testing defects, effect and servicing. • Printer head, types, cleaning and replacing procedures. • Printer power supply, circuit

		and identifying defective components. Servicing of control board. (06 hrs) 176. Replacement of toner cartridge of laser printers. (01 hr) 177. Refilling toner cartridge of laser printers. (02 hrs) 178. Drum cleaning and replacement in of laser printers. (02 hrs) 179. Testing and servicing Printer power supply of laser printers. (02 hrs) 180. Changing mechanical parts of laser printers. (02 hrs) 181. Tracing the control board circuit and identifying defective components. Servicing of control board of laser printers. (06 hrs) 182. Replacement of ink cartridge of deskjet/inkjet printers. (01 hr) 183. Refilling ink cartridge of deskjet/inkjet printers. (02 hrs) 184. Drum cleaning and replacement in deskjet/inkjet printers. (02 hrs) 185. Testing and servicing Printer power supply of deskjet/inkjet printers. (02 hrs) 186. Changing mechanical parts of deskjet/inkjet printers. (03 hrs) 187. Tracing the control board and identifying defective components. Servicing of control board of deskjet / inkjet printers. (06 hrs) 188. Use of diagnos.tics software for serving printers. (02 hrs)	analysis, defects, servicing. • Carriage motor assembly, paper feed assembly, sensors Procedure for dismantling and replacing mechanical parts. • Printer control board, circuit, function, probable defects, servicing. • Working principle of LASER printer. • Refilling toner cartridges, equipment available for refilling and procedure. • Printer drum, function, cleaning and replacing procedure. • Mechanical parts and sensors on printer, function, replacement procedure. • Working principle of Inkjet/Deskjet printers. • Working principle of Plotter and its common faults.

		189. Replacement of mechanical parts and sensors of printer. (04 hrs) 190. Installing plotter and rectify its common faults. (03 hrs)	
30-31	-Do-	**Scanner and MFD** 191. Install a Scanner , configure it and use Automatic Document Feeder(ADF), OCR. (04 hrs) 192. Find and locate various Scanner related problems and troubleshoot them. (05 hrs) 193. Install Barcode and configure it. (02 hrs) 194. Troubleshoot barcode related faults. (03 hrs) 195. Install Network Scanner and configure it. (03 hrs) 196. Find Network Scanner related problems and troubleshoot. (05 hrs) 197. Install Multifunction Printer and configure it. (04 hrs) 198. Find Multifunction Printer related problems and troubleshoot. (05 hrs) 199. Connecting and using high speed line printers. (05 hrs) 200. Replacing spares of line printers. (04 hrs) 201. Install Passbook Printer calibrate, configure. (05 hrs) 202. Find Passbook Printer related problems and troubleshoot. (05 hrs) 203. Install Network Printer and configure it. (05 hrs) 204. Find Network Printer related problems and troubleshoot. (05 hrs)	**Scanner and MFD** • Working principles of Scanner, Barcode Scanner, Network Scanner. • Working principles and configuration of Multifunction Printer, Passbook printer, High Speed Printer, Line Printer, Network Printer.
32	Setting up and configuring Networking System using various	**Components of the Computer Network** 205. Identify various Network tools like : (a) Wire crimper,	**Network Components** • Introduction to Computer Networks – Advantages of Networking, Peer-to-Peer and Client/Server Network.

	network devices.	(b) Wire Map Testers, (c) Multifunction Cable Tester, (d) LAN Tester, (e) Tone Generator etc. (10 hrs) 206. Identify various Network device like : (a) Switch (Normal and Managed), (b) Router(Normal and wireless), (c) Rack, Patch Panel, i/o box, (d) Access Point etc. (10 hrs) 207. Understand the Layout of network on your lab and campus. (10 hrs)	• Network Topologies – Star, Ring, Bus, Tree, Mesh, Hybrid. • Type of Networks – Local Area Networks (LAN), Metropolitan Area Networks (MAN), Personal Area Network(PAN), Controller Area Network(CAN), Wide Area Networks (WAN). • Internet, Ethernet, Wi-Fi, Bluetooth, Mobile Networking, Wire and wireless Networking. • Difference between Intranet and Internet. Extranet, 3G, 4G.
33-35	-Do-	**Crimping, Punching and Network configuration** 208. Practice crimping with straight and cross CAT 6 cables. (12 hrs) 209. Punching practice in IO Box and patch panel. (12 hrs) 210. Create cabling using Fibre Optic cable and connectors. (18 hrs) 211. Create cabling in a lab with HUB/Switch and IO Boxes and patch panel. (15 hrs) 212. Fit Switch Rack. (12 hrs) 213. Install & Configure a Peer-to-Peer Network using Windows and Linux Software. (15 hrs) 214. Connect computers using Bluetooth, WI-FI, hotspot. (06 hrs)	**Crimping & Punching** • Communication Media and Connectors – Unshielded twisted-pair (UTP), shielded twisted-pair (STP), Fiber Optic and coaxial cable: RJ-45, RJ-11, BNC. • Understanding color codes of CAT5 cable. 568A and 568B convention. **Network Cabling** • Introduction to Data Communication – Analog and Digital Signals, Simplex, Half-Duplex and Full-Duplex transmission mode. **Network Model** • The functions of different layers in OSI and TCP/IP model. • Concept of wireless networking, wireless survey.
36-37	-Do-	**Configuration of Data communication equipments** 215. Connect computers with Network with Drop cable and using Wi Fi configuration. (09 hrs) 216. Configure Basic	**Configuration of Data communication equipments** • Network Components - Modems, Firewall, Hubs, Bridges, Routers, Gateways, Repeaters, Transceivers, Switches, Access point, etc.

		Programmable switch (layer two) and practice to set up Spanning Tree Protocol (STP) from Command Line Interface (CLI). (18 hrs) 217. Configure Layer 3 Switch. Verify IP Routing Process. Configure it from CLI in layer three switch. (15 hrs) 218. Create simple VLAN and understand the concepts. (12 hrs) 219. Use Packet tracer Simulator Software. (06 hrs)	• Types, functions, advantages and applications of Network Component. • Layer 2 manage switch configuration and use it on network. • Latest emerging concepts using open source simulators. • Layer 3 switch configuration. • VLAN Basic and configurations. • Understand the use of Network simulation software and the process of use it.
38	-Do-	**IP Addressing & TCP/IP** 220. Practice IP Addressing technique (IPv4/IPv6) and Subnetting and Supernetting the network. (20 hrs) 221. Install and Configure TCP/IP Protocol. Practice FTP, Telnet and Nslookup. (05 hrs) 222. Use popular TCP/IP (windows and Linux) Utilities like PING, IPCONFIG, HOSTNAME, ROUTE, TRACERT etc. (05 hrs)	**IP Addressing & TCP/IP** • Protocols, TCP/IP, FTP, Telnet etc. • Classes of IP Addressing. • Setting IP Address(IP4/IP6) & Subnet Mask.
39	-Do-	**Other Network Protocols** 223. Practice to set up and use SMTP, TELNET, FTP, HTTP, SNMP, LDAP, SSH, NTP, IPP, HTTPS etc. (12 hrs) 224. Configure a wireless router in the lab and practice port forwarding with security features. (12 hrs) 225. Practice on configuring DHCP. (06 hrs)	**Other Network Protocols** • Simple Mail Transfer Protocol (SMTP) • Telnet • File Transfer Protocol (FTP), • Hyper Text Transfer Protocol (HTTP) • Simple Network Management Protocol (SNMP). • LDAP (Lightweight Directory Access Protocol). • Introduction to Network Security. • Concept of Dynamic Host Control Protocol.
40-41	Sharing and controlling resource and Internet connection	**Sharing Resource & Internet connection** 226. Configure internet connection to the pc through wire. Check	**Sharing Resource & Internet connection** • Concept of committed bandwidth.

	through network.	its process. Find the fault and troubleshoot the problems. (04 hrs) 227. Configure internet connection to the PC using wireless technology and troubleshoot various connection related problems. (04 hrs) 228. Share the internet connection (wire and wireless) in the local network and access it from other machine in LAN. (04 hrs) 229. Configure Access Point. Configure both cloud based and frame based access point. Practice LAN controller of access point. (06 hrs) 230. Configure internet connection using L2 and L3 switch. (06 hrs) 231. Setup and Configure security features in wired and wireless LAN with internet connection. (06 hrs) 232. Sharing Resource and Advance Sharing Setting. (13 hrs) 233. Demonstrate MPLS network. (02 hrs) 234. Install Proxy Server and configure it. (10 hrs) 235. Use free VPN software. (05 hrs)	• Concept of Internet. • Architecture of Internet. DNS Server. • Internet Access Techniques. • ISPs and examples (Broadband, Dialup, Wifi). • Concept of Social Networking Sites, Video Calling & Conferencing. • Concept of Virus and its Protection using Anti Virus, UTM and Firewall. • SSID • Concept of wireless controllers. • Concept of SD WAN. • Concept of resource sharing through network. • Working principle of Proxy Server. Objective of using it. Features of Proxy Server. • Concept of VPN.
42	Implement Network Security to protect from various attacks on networking.	**Network Protection and troubleshooting** 236. Set up basic protection using public keys and MAC address filters. (08 hrs) 237. Integrate wired/ wireless network. (02 hrs) 238. Understand and use Power over Ethernet (PoE). (01 hr) 239. Troubleshoot wired and wireless network. (14 hrs) 240. Preventing various attacks on	**Network Protection and troubleshooting** • Collaborating using wired and wireless networks, Protecting a Network, Network performance study and enhancement. • Techniques & strategies to prevent various attacks on networking.

		networking. (05 hrs)	
43	Sharing and controlling resource and Internet connection through network.	**Control & monitoring of network devices** 241. Setup of basic collaboration tool for activities like chat, application sharing, remote desktop access and control, VoIP. (10 hrs) 242. Setup IP camera for basic surveillance scenario, logging and monitoring of devices / locations. (10 hrs) 243. Use Linux Network Tools to check / maintain / Manage Network. (10 hrs)	**Control & monitoring of network devices** • Remote desktop software like NetMeeting, Team Viewer etc. • Audit process of a switch/router/APs etc. • Surveillance using network devices, collaboration on network for team optimization and support activities. • Remote management of devices. • Network monitoring and maintaining techniques.
44	Installation and configuration of Windows and Linux server.	**Install and configure Windows Server** 244. Configure services like Active Directory, DNS and DHCP. (15 hrs) 245. Configure IIS Web server (latest version). (10 hrs) 246. Configure of broadband modem and sharing internet connection. (05 hrs)	**Introduction to Windows Server** • Server concepts, installation step, configuration of server. • Concept of Active Directory and DNS. • Setting up of DHCP, Routing and remote access.
45	-Do-	**Install and configure Linux Server** 247. Configure following on Linux Server: (a) /etc/hosts file, (b) DHCP, (c) DNS, (d) WEB SERVER, (e) NFS and SAMBA. (14 hrs) 248. Find package installed on your system(dpkg, yum, dnf) using systemctl command for configuration and monitoring daemon and services. (15 hrs) 249. Use of grep command for search. (01 hr)	**Linux Server** • Basic configurations. • Editing /etc/hosts file. • Concept of DHCH, DNS, WEB SERVER(Apache), SUMBA • Linux package and package installer. • Concept of virtual server and containers, cloud computing
46	Implement Network Security to protect from various attacks on networking.	**Network Security** 250. Practice on firewall technologies to secure the network perimeter. (15 hrs) 251. Practice LAN security	**Network Security** • Modern Network Security. • Threats and the basics of securing a network. • Secure Administrative Access.

		considerations and implement endpoint and Layer 2 security features. (10 hrs) 252. Configure Wi-fi to implement security considerations. (05 hrs)	• LAN security considerations. • Aadhar based authentication. • Wi-fi security considerations.
47	Browsing internet and able to communicate through email.	**Internet and Web Browser** 253. Practice web browsing using popular web browsing software, Configuring web browser. (05 hrs) 254. Search for content using popular search engines. (05 hrs) 255. Use favourite folder for browsing quickly. (05 hrs) 256. Download & Printing Web pages. (05 hrs) 257. Using e-mail: Opening and configuring email client, mailbox: inbox and outbox, Creating and sending e-mail, Replying to an e-mail message, Forwarding and e-mail message, Sorting and searching emails. Sending document/softcopy by email, activating spell checking, using address book, Handling SPAM, Removal of Cookies. (10 hrs)	**Internet and Web Browser** • World Wide Web and website Web Browsing and popular web browsing software. Introduction to Search Engines, Popular Search engines. • Concept of Favorites Folder. • Concept ofElectronic Mail. Email Addressing, BCC and CC, Inbox, Outbox, Address book, SPAM. **IT Act & Law** • Introduction to Cyber Security. • Introduction to Cyber Laws & IT Act. • Importance of privacy and techniques to manage it.
48-49	**Project work/ Industrial visit** **Broad Areas:** a) Install windows server Operating System. Make it domain controller. Add Client machine to the domain. b) Install Linux server Operating System. Install Samba Service and add windows clients. c) Install Layer2 and Layer 3 switch and create a VLAN having minimum four groups. d) Create a Normal web server in windows/Linux server and host simple html website on it. Access the website from other machine in the network.		
50-51	**Revision**		
52	**Examination**		

Note: -

1. *Some of the sample project works (indicative only) are given against each semester.*
2. *Instructor may design their own project and also inputs from local industry may be taken for designing such new project.*
3. *The project should broadly cover maximum skills in the particular trade and must involve some problem solving skill. Emphasis should be on Teamwork: Knowing the power of synergy/ collaboration, work to be assigned in a group (Group of at least 4 trainees). The group should demonstrate Planning, Execution, Contribution and Application of Learning. They need to submit Project report.*
4. *If the instructor feels that for execution of specific project more time is required than he may plan accordingly in appropriate time i.e., may be in the previous semester or during execution of normal trade practical.*

9. SYLLABUS - CORE SKILLS

CORE SKILL – EMPLOYABILITY SKILL	
First Semester	
1. English Literacy	**Duration : 20 hrs** **Marks : 09**
Pronunciation	Accentuation (mode of pronunciation) on simple words, Diction (use of word and speech)
Functional Grammar	Transformation of sentences, Voice change, Change of tense, Spellings.
Reading	Reading and understanding simple sentences about self, work and environment
Writing	Construction of simple sentences Writing simple English
Speaking/ Spoken English	Speaking with preparation on self, on family, on friends/ classmates, on known people, picture reading, gain confidence through role-playing and discussions on current happening, job description, asking about someone's job, habitual actions. Cardinal (fundamental) numbers, ordinal numbers. Taking messages, passing on messages and filling in message forms, Greeting and introductions, office hospitality, Resumes or curriculum vita essential parts, letters of application reference to previous communication.
2. IT Literacy	**Duration : 20 hrs** **Marks : 09**
Basics of Computer	Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of the computer.
Computer Operating System	Basics of Operating System, WINDOWS, The user interface of Windows OS, Create, Copy, Move and delete Files and Folders, Use of External memory like pen drive, CD, DVD etc. Use of Common applications.
Word Processing and Worksheet	Basic operating of Word Processing, Creating, Opening and Closing Documents, Use of shortcuts, Creating and Editing of Text, Formatting the Text, Insertion &Creation of Tables. Printing document. Basics of Excel worksheet, understanding basic

	commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets.
Computer Networking and Internet	Basic of Computer Networks (using real life examples), Definitions of Local Area Network (LAN), Wide Area Network (WAN), Internet, Concept of Internet (Network of Networks), Meaning of World Wide Web (WWW), Web Browser, WebsSite, Web page and Search Engines. Accessing the Internet using Web Browser, Downloading and Printing Web Pages, Opening an email account and use of email. Social media sites and its implication. Information Security and antivirus tools, Do's and Don'ts in Information Security, Awareness of IT - ACT, types of cyber crimes.
3. Communication Skills	**Duration : 15 hrs** **Marks : 07**
Introduction to Communication Skills	Communication and its importance Principles of effective communication Types of communication - verbal, non-verbal, written, email, talking on phone. Non-verbal communication -characteristics, components-Para-language Body language Barriers to communication and dealing with barriers. Handling nervousness/ discomfort.
Listening Skills	Listening-hearing and listening, effective listening, barriers to effective listening, guidelines for effective listening. Triple- A Listening - Attitude, Attention & Adjustment. Active listening skills.
Motivational Training	Characteristics essential to achieving success. The power of positive attitude. Self awareness Importance of commitment Ethics and values Ways to motivate oneself Personal goal setting and employability planning.
Facing Interviews	Manners, etiquettes, dress code for an interview Do's &don'ts for an interview

Behavioral Skills	Problem solving Confidence building Attitude
Second Semester	
4. Entrepreneurship Skills	**Duration : 15 hrs** **Marks : 06**
Concept of Entrepreneurship	Entrepreneur - Entrepreneurship - Enterprises: Conceptual issue Entrepreneurship vs. management, Entrepreneurial motivation. Performance &record, Role &function of entrepreneurs in relation to the enterprise & relation to the economy, Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.
Project Preparation & Marketing Analysis	Qualities of a good entrepreneur, SWOT and risk analysis. Concept &Application of PLC, Sales &Distribution management. Difference between small scale &large scale business, Market survey, Method of marketing, Publicity and advertisement, Marketing mix.
Institution's Support	Preparation of project. Role of various schemes and institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non-financing support agencies to familiarize with the policies / programmes, procedure & the available scheme.
Investment Procurement	Project formation, Feasibility, Legal formalities i.e., Shop act, Estimation &costing, Investment procedure - Loan procurement - Banking processes.
5. Productivity	**Duration : 10 hrs** **Marks : 05**
Benefits	Personal/ Workman - Incentive, Production linked Bonus, Improvement in living standard.
Affecting Factors	Skills, Working aids, Automation, Environment, Motivation - How it improves or slows down productivity.
Comparison with Developed Countries	Comparative productivity in developed countries (viz. Germany, Japan and Australia) in select industries, e.g. Manufacturing, Steel, Mining, Construction etc. Living standards of those countries, wages.
Personal Finance Management	Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and insurance.
6. Occupational Safety, Health and Environment Education	**Duration : 15 hrs** **Marks : 06**

Safety & Health	Introduction to occupational safety and health Importance of safety and health at workplace.
Occupational Hazards	Basic hazards, chemical hazards, vibroacoustic hazards, mechanical hazards, electrical hazards, thermal hazards. occupational health, occupational hygiene, occupational diseases/ disorders & its prevention.
Accident &Safety	Basic principles for protective equipment. Accident prevention techniques - control of accidents and safety measures.
First Aid	Care of injured &sick at the workplaces, First-aid &transportation of sick person.
Basic Provisions	Idea of basic provision legislation of India. Safety, health, welfare under legislative of India.
Ecosystem	Introduction to environment. Relationship between society and environment, ecosystem and factors causing imbalance.
Pollution	Pollution and pollutants including liquid, gaseous, solid and hazardous waste.
Energy Conservation	Conservation of energy, re-use and recycle.
Global Warming	Global warming, climate change and ozone layer depletion.
Ground Water	Hydrological cycle, ground and surface water, Conservation and harvesting of water.
Environment	Right attitude towards environment, Maintenance of in-house environment.
7. Labour Welfare Legislation	**Duration : 05 hrs** **Marks : 03**
Welfare Acts	Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Payment Wages Act, Employees Provident Fund Act, The Workmen's Compensation Act.
8. Quality Tools	**Duration : 10 hrs** **Marks : 05**
Quality Consciousness	Meaning of quality, Quality characteristic.
Quality Circles	Definition, Advantage of small group activity, objectives of quality

	circle, Roles and function of quality circles in organization, Operation of quality circle. Approaches to starting quality circles, Steps for continuation quality circles.
Quality Management System	Idea of ISO 9000 and BIS systems and its importance in maintaining qualities.
House Keeping	Purpose of housekeeping, Practice of good housekeeping.
Quality Tools	Basic quality tools with a few examples.

ANNEXURE-I

LIST OF TOOLS & EQUIPMENTS			
COMPUTER HARDWARE & NETWORK MAINTENANCE (for batch of 20 Candidates)			
S No.	**Name of the Tools and Equipment**	**Specification**	**Quantity**
A. TRAINEES TOOL KIT			
1.	Connecting screwdriver	100 mm	21 nos.
2.	Neon tester	500 V.	21 nos.
3.	Screw driver set	(set of 5)	21 nos.
4.	Insulated combination pliers	150 mm	21 nos.
5.	Insulated side cutting pliers	150 mm	21 nos.
6.	Long nos.e pliers	150 mm	21 nos.
7.	Soldering iron	25 W. 240 V.	21 nos.
8.	Electrician knife		21 nos.
9.	Tweezers	100 mm	21 nos.
10.	Digital Multimeter		21 nos.
11.	Soldering Iron Changeable bits	15 W	21 nos.
12.	De- soldering pump		21 nos.
B. LIST OF TOOLS			
13.	Crimping tool (pliers)		2 Nos.
14.	Soldering Iron	25W	6 Nos.
15.	Magneto spanner set		2 Nos.
16.	Screw driver	150mm	4 Nos.
17.	Steel rule	150mm	2 Nos.
18.	Scriber straight	150mm	2 Nos.
19.	Soldering Iron	240W	1 No.
20.	Allen key set	(set of 9)	2 Nos.
21.	Tubular box spanner	(set of 6nos.)	1 No
22.	Magnifying lenses	75mm	3 Nos.
23.	Continuity tester		6 Nos.
24.	Soldering iron	10W	6 Nos.
25.	Cold chisel	20mm	1 No.
26.	Scissors	200mm	1 No.
27.	Handsaw	450mm	1 No.
C. TOOLS AND EQUIPMENT: (Computer Hardware - Installation and Maintenance)			
28.	Server Computer		01 no

29.	Desktop Computer		10 nos.
30.	Laptop, Notebook for demonstration		04 nos.
31.	Laptop, Notebook		10 nos.
32.	Intel Mobile Desktop based PC with LCD monitor		01 no
33.	Printers: Laserjet, deskjet, passbook, mfd		01 each
34.	Network Printer		01 no
35.	5KVA online UPS		02 nos.
36.	LAN Cards, Wi-fi LAN Cards		06 nos. each.
37.	LCD/DLP Projector		01 no
38.	Power Meter		02 nos.
39.	Crimping Tools		06 nos.
40.	Computer Toolkits		06 Nos.
41.	Computer Spares:		As required
42.	Motherboards (of different make)		4 nos.
43.	Cabinets		4 nos.
44.	Processors (of different make)		4 nos.
45.	Hard Disk	(500 GB or better)	4 nos.
46.	Optical Drives		4 nos.
47.	LCD/LED Monitors		2 nos.
48.	Pen Drives		4 nos.
49.	External Hard disk		2 nos.
50.	External DVD Writer		2 nos.
51.	Keyboards		4 nos.
52.	Mouse		4 nos.
53.	Anti static pads		4 nos.
54.	Anti static wrist wraps		4 nos.
55.	SMPS		4 nos.
56.	Digital Multimeters		10 nos.
57.	Blu-Ray drive and player		2 nos.
58.	External Hard Disk		2 nos.
59.	Digital Camera		2 nos.
60.	HD Display		2 nos.
61.	Network storage		2 nos.
62.	Card Reader		2 nos.
63.	Game video card		2 nos.
64.	Web Cam		2 nos.
65.	Surround sound speakers		2 nos.
66.	Different types of memory cards		2 nos. each
67.	Laptop kits		12 nos.
68.	Laptop spares	Cabinet with display, memory, hard disk, battery pack,	As required

		keyboard membrane, chargers	
69.	SMPS Trainer kit		2 nos.
70.	UPS Trainer kit		2 nos.
71.	Power electronics Trainer kit		2 nos.
72.	Post error debugging card		4 Nos.
73.	SMPS Tester		4 Nos.
74.	PCI slot Testing tool		4 Nos.
D. SOFTWARE			
75.	Windows Server Operating System		2 licenses
76.	Windows Operating System		2 licenses
77.	Linux Operating System		2 nos.
78.	Network Management Software		01 No.
79.	MS Office		2 nos.
80.	Antivirus software		2 nos.
81.	Data recovery software		2 nos.
E. FURNITURE AND OTHER EQUIPMENTS			
82.	Computer Tables		10 nos.
83.	Computer Chairs		20 nos.
84.	Printer Table		1 no
85.	Class room chairs		20 nos.
86.	Air conditioners (optional)		2 nos.
87.	Scanner		1 no
88.	Modem		1 no
89.	Telephone Line		1 no
90.	Broadband Internet connection		1 no
91.	Fire fighting equipments		As required
92.	Hardware and Network Trainer Kit		6 nos.
F. COMPUTER NETWORKING			
93.	Wireless Network Adapter		10 nos.
94.	Wireless Access Point		6 nos.
95.	Router		2 nos.
96.	Managed Layer	2 Ethernet Switch 24 port	4 nos.
97.	Managed Layer	3 Ethernet Switch 24 port (one POE enable)	2 nos.
98.	Network Training System		2 nos.
99.	LAN Protocol Simulation and Analyser Software		2 nos.
100.	Network and Internet security trainer		2 nos.
101.	LAN cable tester		2 nos.

102.	Network cables – UTP		As required
103.	Network Cables – coaxial, flat, ribbon		As required
104.	LAN Cards, wi-fi LAN Card		05 nos. each
105.	Connectors for cables		As required
106.	Power Meter		2 nos.
107.	Media Convertor		4 each
108.	24 port UTP jack panel		2 nos.
109.	SC Couplers		12 nos.
110.	SC Pigtails		12 nos.
111.	RJ	45 connector	As required
112.	Multimeter		2 nos.
113.	Crimping Tools		6 nos.
114.	NVR		1 no
115.	POE adapters kit		2 nos.
116.	IP Camera (Outdoor / Indoor)		2 no each
117.	Analog camera with dvr		2 nos.
G. RAW MATERIAL			
118.	White Board Marker		1 Dozens
119.	Duster Cloth	(2’ by 2’)	20 Pcs
120.	Cleaning Liquid	500 ml	2 Bottles
121.	Xerox Paper (A4)		As required
122.	Full Scape Paper (White)		1 reams
123.	PCB, solder flux etc & electronic components		As required
124.	Wires, cables Plug sockets switches of various types and other consumables		As required
125.	Resistors, Capacitors, Inductors, Diodes, LED, Transistors, Thyristors, ICs etc.		As required
126.	Spare Transformers and power devices required for servicing SMPS		As required
127.	Various types of Button Cells		As required
128.	Dry Cell		As required
129.	Hand Brush		As required
130.	Silicon grease		As required
131.	Heat sink agent		As required
132.	RAM	512 MB	As required
133.	Cartridges for printer		As required
134.	Optical Mouse	P/S2 or USB	As required

135.	P/S2 OR USB Key Board		As required
136.	SMPS		As required
137.	CMOS Battery		As required
138.	3 Pin Power Chord		As required
139.	Cat 5/5e/6 cable		300 meters
140.	Flat Cable		100 meters
141.	Stapler Small		2 pcs
142.	Stapler Big		1 pcs
143.	AAA battery for remote		As required
144.	AA battery for clock		As required
145.	Pen Drives	8 GB	4 Nos.
146.	CDs		20 Nos.
147.	DVDs		10 Nos.
148.	Wall Clock		1 pcs
149.	Anti static pads		As required
150.	Anti static wrist wraps		As required
151.	Soldering wire and paste		As required
152.	RJ – 45 Connector		As required
153.	Telephone cable		As required
154.	Co-axial cable		As required
155.	RJ-11 connector		As required
156.	BNC connector, T connector, terminator		As required
157.	Keystone jack		As required
158.	Patch / Jack Panel		As required
159.	Patch / Mounting cord		As required
160.	RJ-45 Info outlet with faceplate		As required
161.	RJ-45 I/O Box		As required
162.	RJ – 45 Cable extender		As required
163.	8-port HUB		04 Nos.
164.	LAN Card		04 Nos.
165.	Wi-fi LAN Card both PCI and USB		02 Nos. each

Note: *All the tools and equipment are to be procured as per BIS specification.*

TOOLS & EQUIPMENT FOR EMPLOYABILITY SKILLS		
S No.	**Name of the Equipment**	**Quantity**
1.	Computer (PC) with latest configurations and Internet connection with standard operating system and standard word processor and worksheet software.	10 nos.
2.	UPS - 500VA	10 nos.
3.	Scanner cum Printer	01 no.
4.	Computer Tables	10 nos.
5.	Computer Chairs	20 nos.
6.	LCD Projector	01 no.
7.	White Board 1200mm x 900mm	01 no.
Note: *Above Tools & Equipments not required, if Computer LAB is available in the institute.*		

ANNEXURE-II

FORMAT FOR INTERNAL ASSESSMENT

Name & Address of the Assessor:			**Year of Enrollment:**
Name & Address of ITI (Govt./Pvt.):			**Date of Assessment:**
Name & Address of the Industry:			**Assessment location: Industry/ ITI**
Trade Name:	**Semester:**		**Duration of the Trade/course:**
Learning Outcome:			

S No.	**Maximum Marks (Total 100 Marks)**		**15**	**5**	**10**	**5**	**10**	**10**	**5**	**10**	**15**	**15**	**Total Internal Assessment Marks**	**Result (Y/N)**
	Candidate Name	**Father's/Mother's Name**	Safety Consciousness	Workplace Hygiene	Attendance/ Punctuality	Ability to Follow Manuals/ Written Instructions	Application of Knowledge	Skills to Handle Tools & Equipment	Economical Use of Materials	Speed in Doing Work	Quality in Workmanship	VIVA		
1														
2														