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

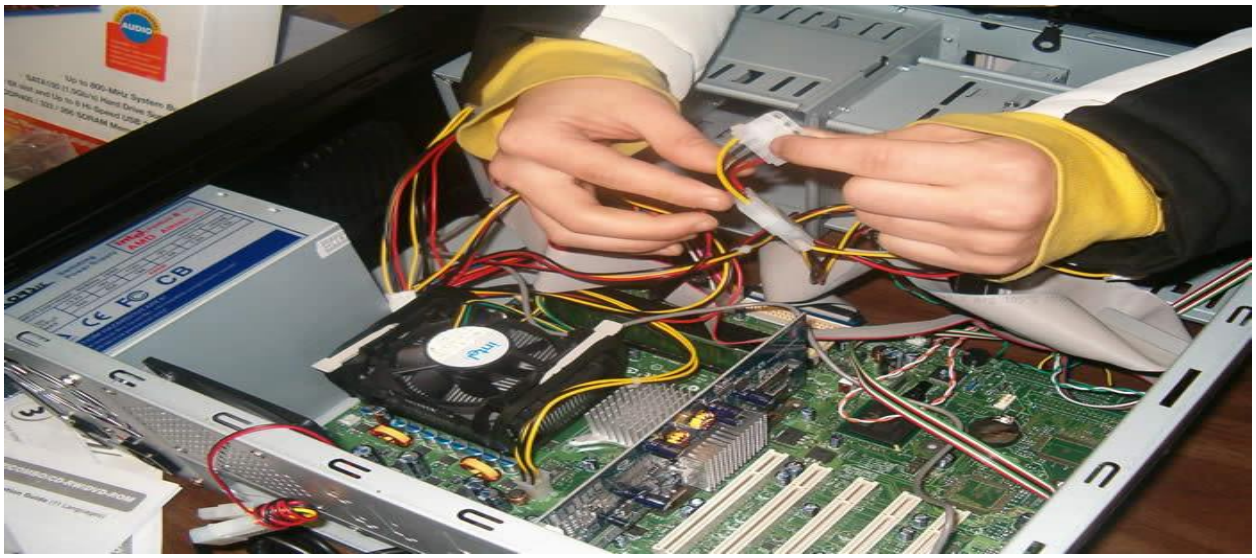
COMPETENCY BASED CURRICULUM

COMPUTER HARDWARE & NETWORK MAINTENANCE

(Duration: One Year)

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL- 4



SECTOR –IT & ITES

Directorate General of Training

COMPUTER HARDWARE
&
NETWORK MAINTENANCE

(Non-Engineering Trade)

(Revised in 2019)

Version: 1.2

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL - 4

Developed By

Ministry of Skill Development and Entrepreneurship

Directorate General of Training

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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 related to job role. In addition to this a candidate is entrusted to undertake project work and extra-curricular activities to build up confidence. The broad components covered under Professional Skill subject are as below:

During the period of one year 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. The trainees also learn to work on office package (word, excel, power point). At mid of the year trainees can go on industrial visit or projects specified in the syllabus. 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 the year 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 Directorate General of Training (DGT). Craftsman Training Scheme (CTS) with variants and Apprenticeship Training Scheme (ATS) are two pioneer programs of DGT for strengthening vocational training.

'Computer Hardware & Network Maintenance' trade under CTS is one of the popular course delivered nationwide through a network of ITIs. The course is of one-year 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 DGT 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 PROGRESSION PATHWAYS

- Can join industry as Technician and will progress further as Senior Technician, Supervisor and can rise up to the level of Manager.
- Can become Entrepreneur in the related field.
- 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.
- Can join Advanced Diploma (Vocational) courses under DGT as applicable.

2.3 COURSE STRUCTURE

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

S No.	Course Element	Notional Training Hours
1.	Professional Skill (Trade Practical)	1200
2.	Professional Knowledge (Trade Theory)	240
3.	Employability Skills	160
	Total	**1600**

2.4 ASSESSMENT & CERTIFICATION

The trainee will be tested for his skill, knowledge and attitude during the period of course through formative assessment and at the end of the training programme through summative assessment as notified by the DGT from time to time.

a) The Continuous Assessment (Internal) 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 formative assessment template provided on www.bharatskills.gov.in

b) The final assessment will be in the form of summative assessment. The All India Trade Test for awarding NTC will be conducted by Controller of examinations, DGT as per the guidelines. The pattern and marking structure is being notified by DGT 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

For the purposes of determining the overall result, weightage of 100% is applied for six months and one year duration courses and 50% weightage is applied to each examination for two years courses. The minimum pass percent for Trade Practical and Formative assessment is 60% & for all other subjects is 33%. There will be no Grace marks.

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 and records of internal (Formative) assessments are to be preserved until forthcoming 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 skills and accuracy in the field of work/ assignments. • A fairly good level of neatness and consistency to accomplish job activities. • Occasional support in completing the task/ 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	• Good skill levels and accuracy in the field of work/ assignments.

standard of craftsmanship, with little guidance, and regard for safety procedures and practices	• A good level of neatness and consistency to accomplish job activities. • Little support in completing the task/ 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 and accuracy in the field of work/ assignments. • A high level of neatness and consistency to accomplish job activities. • Minimal or no support in completing the task/ job.

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**
Trade Code	DGT/1050
NCO - 2015	2523.0200, 2523.0100
NSQF Level	Level-4
Duration of Craftsmen Training	One Year (1600 Hours)
Entry Qualification	Passed 10th Class examination with Science and Mathematics or its equivalent
Minimum Age	14 years as on first day of academic session.
Eligibility for PwD	LD, CP, LC, DW, AA, LV, AUTISM, SLD
Unit Strength (No. of Student)	24 (There is no separate provision of supernumerary seats)
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 from UGC recognized university with six months experience in the relevant field. **OR** B.Voc/Degree in Engineering/ Technology in Computer Science/ IT/ Electronics & Communication from UGC recognized university with one year experience in the relevant field. **OR** 03 years Diploma in Computer Science/ IT/ Electronics & Communication from AICTE recognized Board/ Institution or relevant Advanced Diploma (Vocational) from DGT with two years experiences in the relevant field. **OR** NTC/ NAC passed in Computer Hardware & Network maintenance trade with three years experience in the relevant field. **<u>Essential Qualification:</u>** Relevant National Craft Instructor Certificate (NCIC) in any of the

	variants under DGT. ***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. *However both of them must possess NCIC in any of its variants.***
(ii) Employability Skill	MBA/ BBA / Any Graduate/ Diploma in any discipline with Two years' experience with short term ToT Course in Employability Skills from DGT institutes. (Must have studied English/ Communication Skills and Basic Computer at 12th / Diploma level and above) **OR** Existing Social Studies Instructors in ITIs with short term ToT Course in Employability Skills from DGT institutes.
(iii) Minimum Age for Instructor	21 Years
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
40 Hours	30 Hours	6 Hours	4 Hours

5. LEARNING OUTCOME

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

5.1 LEARNING OUTCOMES (TRADE SPECIFIC)

1. Perform all the functions with Electrical and Electronic Components related to Computer and Networking system drawing following safety precautions.
2. Assemble and repair Desktop Computer with all its hardware components.
3. Install different Operating System and all other application software.
4. Customize Operating System and maintenance of system application software.
5. Assemble and repair Laptop and its hardware components.
6. Perform the operations of office package (word, excel, power point).
7. Install Printer, Scanner and troubleshoot their faults.
8. Set up and configure Networking System using various network devices.
9. Share and control resource and Internet connection through network.
10. Implement Network Security to protect from various attacks on networking.
11. Install and configure Windows and Linux server.
12. Browse internet and communicate through email.

6. ASSESSMENT CRITERIA

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

	identify various different processor sockets.
3. Install different Operating System and all other application software.	Boot the PC through a BOOTABLE DVD of OS. Partition the disk, Format the drive. Install Windows 7 and Windows 10 from DVD Disk.
	Make Win-7 AND Win-10 dual boot properly. Practice on recovery partition
	Install and boot Win-10 in UEFI mode.
	Collecting and installing specific/compatible Device driver from internet. Update the driver software from internet. Uninstall and Rollback the driver.
	Go to Windows Update in control panel. Check installed update. Change/ update Setting.
	Install any popular antivirus software. Online and offline updating of antivirus. View its various options. On and off Firewall option inside antivirus software.
	Install various application software programs in windows. Install Firefox and chrome browser.
	Install Linux (Ubuntu, Fedora, Debian, Red hat) OS from bootable USB drive and partition the hard disk manually. Use diskpart command.
	Practice important Linux commands.
4. Customize Operating System and maintenance of system application software.	Open Personalize Setting and find Desktop icon setting, Screen Resolution and various other setting.
	Open windows explorer and find different drives, files and folders, their size and other properties. Do it through command prompt also.
	Create and configure user accounts in Windows 7/8/10. Create Administrator and Limited user account.
	Make Changes to an Account. Reset Limited user account password through Administrative account.
	Use various free and paid Disk clean up utility to remove junk files from hard disk.
	Create automated backups to ensure you always have a recent backup.
	Configure outlook and connect with Gmail, use thunderbird IMAP/POP3 along with security features. Configuration of Browsers.

5. Assemble and repair Laptop and its hardware components.	Assemble and disassembling a Laptop.
	Upgrade RAM, HDD and other parts.
	Test fault finding and troubleshooting techniques.
	Enabling support for SATA technology. Installation of OS using SATA technology drivers.
	Configuration of camera, mic, WLAN and Bluetooth, touchpad, finger print scanner.
6. Perform the operations of office package (word, excel, power point).	Format text and editing. Set up page and margins. Tabs and indents.
	Create Worksheets using Spreadsheet Software.
	Create Slide shows, insert picture, theme, format text, animation and object.
7. InstallPrinter, Scanner and troubleshoot their faults.	Installing a printer and carrying self-test.
	Tracing the control board and identifying defective components. Servicing of control board.
	Replacement of toner cartridge of laser printers.
	Installing plotter and rectify its common faults.
	Install a Scanner, configure it and use Automatic Document Feeder (ADF), OCR.
	Find and locate various Scanner related problems and troubleshoot them.
	Install Barcode and configure it.
	Install Passbook Printer calibrate, configure.
8. Set up and configure Networking System using various network devices.	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.
	Practice crimping with straight and cross CAT 6 cables.
	Punching practice in IO Box and patch panel.
	Create cabling using Fibre Optic cable and connectors.
	Install & Configure a Peer- to-Peer Network using Windows and Linux Software.
	Connect computers with Network with Drop cable and using Wi Fi configuration.
	Configure Layer 3 Switch. Verify IP Routing Process. Configure it from CLI in layer three switch.

	Create simple VLAN and understand the concepts.
	Practice IP Addressing technique (IPv4/IPv6) and Sub netting and Super netting the network.
	Practice to set up and use SMTP, TELNET, FTP, HTTP, SNMP, LDAP, SSH, NTP, IPP, HTTPS etc.
9. Share and control resource and Internet connection through network.	Configure internet connection to the PC using wireless technology and troubleshoot various connection related problems.
	Share the internet connection (wire and wireless) in the local network and access it from other machine in LAN.
	Configure internet connection using L2 and L3 switch.
	Install Proxy Server and configure it.
	Setup of basic collaboration tool for activities like chat, application sharing, remote desktop access and control, VoIP.
10. Implement Network Security to protect from various attacks on networking.	Set up basic protection using public keys and MAC address filters.
	Troubleshoot wired and wireless network.
	Practice on firewall technologies to secure the network perimeter.
	Practice LAN security considerations and implement endpoint and Layer 2 security features.
11. Install and configure Windows and Linux server.	Configure services like Active Directory, DNS and DHCP.
	Configure IIS Web server (latest version).
	Configure following on Linux Server: (a) /etc/hosts file, (b) DHCP, (c) DNS, (d) WEB SERVER, (e) NFS and SAMBA.
12. Browse internet and communicate through email.	Practice web browsing using popular web browsing software, Configuring web browser.
	Use favourite folder for browsing quickly.
	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.

7. TRADE SYLLABUS

SYLLABUS FOR COMPUTER HARDWARE & NETWORK MAINTENANCE TRADE			
DURATION: ONE YEAR			
Duration	**Reference Learning Outcome**	**Professional Skills (Trade Practical) With Indicative Hours**	**Professional Knowledge (Trade Theory)**
Professional Skill 210 Hrs; Professional Knowledge 42 Hrs	Perform all the functions with Electrical and Electronic Components related to Computer and Networking system following safety precautions.	**Familiarization with the Institute and Safety** 1. Visits to workshops, labs, office, stores etc. of the institute. (06hrs) 2. Demonstrate safety precaution including anti-static protection. (06hrs) 3. Demonstrate first aid practice. (06hrs) 4. Demonstrate artificial respiration and practice. (06hrs) 5. Demonstrate electrical safety precautions. (06hrs)	**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. (06hrs)
		Basics of Electricity 6. Identify specification of different types of fuses, switches. (03hrs) 7. Identify of meter types and measuring range. (05hrs) 8. Construct a simple circuit using AC/DC supply, lamp, fuse and switch. (05hrs) 9. Measure circuit voltage and current using voltmeters and ammeters. Also check voltage between earth and neutral. (02hrs)	**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,

		10. Measure voltage and current using Multi-meter (analog- digital). (05hrs) 11. Use Multimeter to check fuses, lamps and switches. (05hrs) 12. Measure DC and AC power using V-I method and using power meter.(05hrs)	Voltmeter, Multimeter for measuring voltage and current. Construction, characteristics/ features and specification. Digital Multimeter • Meaning of Circuit and basic 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. (06hrs)
		Resistors, Soldering and De-soldering 13. Identify different types of resistors from physical appearance. (03hrs) 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. (06 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	**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. Calculating, 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.

		NTC resistors. (02 hrs) 20. Experiment to check VDR's. (02 hrs) 21. Experiment to check LDR's. (02 hrs) 22. Test Pots, Presets. (02 hrs)	• 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. (06 hrs)
		Inductance 23. Identification of different types of inductors and its 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)	**Introduction to Inductor and Inductance** • Definition of inductance. 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. (06 hrs)
		Capacitance and Resonance circuits 30. Identify of different types of capacitors from colour code and typographic code. (03 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 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	**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. **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

		filter. (06 hrs)	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.
		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) **Power supply** 42. Assemble and test a fixed voltage regulator using	• 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 transistor or Junction. General values of junction resistances. Quick testing a

		3pin IC. (04 hrs) 43. Assemble and test a variable voltage regulator using IC. (04 hrs)	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. (12hrs)
		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	• 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

		Sensors. Try to use it on electronic circuit. (04 hrs) 47. Identify and Test Relays. 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)	table. (06 hrs)
Professional Skill 90 Hrs; Professional Knowledge 18 Hrs	Assemble and repair 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,	**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.

		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. 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)	**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, 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. (12hrs)

		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 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	**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 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

		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)	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. (06hrs)
Professional Skill 90 Hrs; Professional Knowledge 18 Hrs	Install different Operating System and all other application software.	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. (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	**Introduction to Hard disk Partition and formatting and OS installation** • What's Inside a Hard Drive? How Hard Disks Work • Inside: Hard Drive 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

		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)	partitions). Bad Sectors in Hard disk, • Master Boot Record, in-place installation, Registry fixing, performance level check, Shortcut fixing, Fixing Start-up 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. (18 hrs)
Professional Skill 30 Hrs; Professional Knowledge 06 Hrs	Customize Operating System and maintenance of system application software.	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. (06 hrs)
Professional Skill 30 Hrs; Professional Knowledge 06 Hrs	Install different Operating System and all other application software.	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	**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. (06 hrs)

		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. (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 updates 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)	
Professional Skill 30 Hrs; Professional Knowledge 06 Hrs	Customize 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)	**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. (06 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)	
Professional Skill 30 Hrs; Professional Knowledge 06 Hrs	Install different Operating System and all other application software.	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 (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	**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. (06 hrs)

		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)	
Professional Skill 30 Hrs; Professional Knowledge 06 Hrs	Customize 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 Instant Search to find Calendar items, Use Instant Search to find contacts, 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 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. (06 hrs)
Professional Skill 60 Hrs; Professional Knowledge 12 Hrs	Assemble and repair Laptop and its hardware components.	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 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

		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 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)	• Configuring wireless internet in a laptop, • Latest Tools & Gadgets for Desktop/Laptop Repairs. (12 hrs)
Professional Skill 30 Hrs; Professional Knowledge	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	**Word processing Software** • Introduction to word processing and comparison of features. Creating and saving document files

06 Hrs		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. 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)	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. **Power Point Presentation** • Introduction to Power Point and its advantages. • Creating Slide Shows. • Fine tuning the presentation and good presentation technique. (06 hrs)
Professional Skill 30 Hrs;	Install different Operating System and all other	**Linux operating system** 162. Install Linux (Ubuntu, Fedora, Debian, Red hat)	**Linux operating system** • Basic Linux commands. • Linux file system, The Shell,

Professional Knowledge 06 Hrs	application software.	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)	Users and fill permissions, vi editor, X window system, Filter Commands, Processes. • Shell Scripting. • Concept of UNIX. (06 hrs)
Professional Skill 90 Hrs; Professional Knowledge 18 Hrs	Install Printer, Scanner and troubleshoot their faults.	**Printer and Plotters** 168. Testing front panel controls. Interface pins, cables, measurement of voltage sand wave forms. (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 analysis, defects, servicing.

		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 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	• 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. (12 hrs)

		components. Servicing of control board of DeskJet/ inkjet printers. (06 hrs) 188. Use of diagnostics software for serving printers. (02 hrs) 189. Replacement of mechanical parts and sensors of printer. (04 hrs) 190. Installing plotter and rectify its common faults. (03 hrs)	
		Scanner and MFD 191. Install a Scanner, configure it and use Automatic Document Feeder (ADF), OCR. (02 hrs) 192. Find and locate various Scanner related problems and troubleshoot them. (03 hrs) 193. Install Barcode and configure it. (01 hrs) 194. Troubleshoot barcode related faults. (02 hrs) 195. Install Network Scanner and configure it. (01 hrs) 196. Find Network Scanner related problems and troubleshoot. (02 hrs) 197. Install Multifunction Printer and configure it. (0 2hrs) 198. Find Multifunction Printer related problems and troubleshoot. (02 hrs) 199. Connecting and using high speed line printers. (02 hrs) 200. Replacing spares offline	**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. (06 hrs)

		printers. (02 hrs) 201. Install Passbook Printer calibrate, configure. (02 hrs) 202. Find Passbook Printer related problems and troubleshoot. (03 hrs) 203. Install Network Printer and configure it. (03 hrs) 204. Find Network Printer related problems and troubleshoot. (03 hrs)	
Professional Skill 210 Hrs; Professional Knowledge 42 Hrs	Set up and configuring Networking System using various network devices.	**Components of the Computer Network** 205. Identify various Network tools like : (a) Wire crimper, (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 Components** • Introduction to Computer Networks – Advantages of Networking, Peer-to-Peer and Client/Server Network. • 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. (06 hrs)
		Crimping, Punching and Network configuration 208. Practice crimping with straight and cross CAT 6 cables. (12hrs)	**Crimping & Punching** • Communication Media and Connectors – Unshielded

		209. Punching practice in IO Box and patch panel. (06hrs) 210. Create cabling using Fibre Optic cable and connectors. (12hrs) 211. Create cabling in a lab with HUB/Switch and IO Boxes and patch panel. (12hrs) 212. Fit Switch Rack. (06hrs) 213. Install &Configure a Peer-to-Peer Network using Windows and Linux Software. (06hrs) 214. Connect computers using Bluetooth, WI-FI, hotspot. (06hrs)	twisted-pair (UTP), shielded twisted-pair (STP), Fibre Optic and coaxial cable: RJ-45, RJ-11, BNC. • Understanding colour 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. (12 hrs)
		215. Connect computers with Network with Drop cable and using Wi Fi configuration. (09 hrs) 216. Configure Basic 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 switches. (15 hrs) 218. Create simple VLAN and understand the concepts. (12 hrs)	**Configuration of Data communication equipments** • Network Components - Modems, Firewall, Hubs, Bridges, Routers, Gateways, Repeaters, Transceivers, Switches, Access point, etc. • 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

		219. Use Packet tracer Simulator Software. (06 hrs)	configurations. • Understand the use of Network simulation software and the process of use it. (12 hrs)
		220. Practice IP Addressing technique (IPv4/IPv6) and Sub netting and Super netting the network. (20 hrs) 221. Install and Configure TCP/IP Protocol. Practice FTP, Telnet and NS lookup. (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. (06 hrs)
		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. (06 hrs)
Professional Skill 60 Hrs;	Share and controlling resource	226. Configure internet connection to the pc	**Sharing Resource & Internet connection**

Professional Knowledge 12 Hrs	and Internet connection through network.	through wire. Check 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 committed bandwidth. • 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. (12 hrs)

Professional Skill 30 Hrs; Professional Knowledge 06 Hrs	Implement Network Security to protect from various attacks on networking.	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 networking. (05 hrs)	**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. (06 hrs)
Professional Skill 30 Hrs; Professional Knowledge 06 Hrs	Share and control resource and Internet connection through network.	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. (06 hrs)
Professional Skill 60 Hrs; Professional Knowledge 12 Hrs	Install and configure 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	**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. (06 hrs)

		internet connection. (05 hrs)	
		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 system control 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 (06 hrs)
Professional Skill 30 Hrs; Professional Knowledge 06 Hrs	Implement Network Security to protect from various attacks on networking.	250. Practice on firewall technologies to secure the network perimeter. (15 hrs) 251. Practice LAN security considerations and implement endpoint and Layer 2 security features. (10 hrs) 252. Configure Wi-Fi to implement security considerations. (05 hrs)	**Network Security** • Modern Network Security. • Threats and the basics of securing a network. • Secure Administrative Access. • LAN security considerations. • Aadhar based authentication. • Wi-Fi security considerations. (06 hrs)
Professional Skill 30 Hrs; Professional Knowledge 06 Hrs	Browse internet and able to communicate through email.	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)	**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 of Electronic Mail. Email Addressing, BCC and

		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)	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. (06 hrs)
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.			

SYLLABUS FOR CORE SKILLS

1. Employability Skills (Common for all CTS trades) (160 Hrs)

Learning outcomes, assessment criteria, syllabus and Tool List of Core Skills subjects which is common for a group of trades, provided separately in www.bharatskills.gov.in

ANNEXURE-I

List of Tools & Equipments			
COMPUTER HARDWARE & NETWORK MAINTENANCE (for batch of 24 Candidates)			
S No.	**Name of the Tools and Equipment**	**Specification**	**Quantity**
A. TRAINEES TOOL KIT			
1.	Connecting screw driver	100 mm	24 Nos.
2.	Neon tester	500 V.	24 Nos.
3.	Screw driver set	(set of 5)	24 Nos.
4.	Insulated combination pliers	150 mm	24 Nos.
5.	Insulated side cutting pliers	150 mm	24 Nos.
6.	Long nose pliers	150mm	24 Nos.
7.	Soldering iron	25W.240V.	24 Nos.
8.	Electrician knife		24 Nos.
9.	Tweezers	100 mm	24 Nos.
10.	Digital Multimeter		24 Nos.
11.	Soldering Iron Changeable bits	15W	24 Nos.
12.	De-soldering pump		24 Nos.
B. LIST OF TOOLS			
13.	Crimping tool(pliers)		2 Nos.
14.	Soldering Iron	25W	6 Nos.
15.	Magneto spanner set		2 Nos.
16.	Screwdriver	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 of9)	2 Nos.
21.	Tubular box spanner	(setof6nos.)	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		1 No.

29.	Desktop Computer	CPU: 32/64 Bit i3/i5/i7 or latest processor, Speed: 3 GHz or Higher. RAM:-4 GB DDR-III or Higher, Wi-Fi Enabled. Network Card: Integrated Gigabit Ethernet, with USB Mouse, USB Keyboard and Monitor (Min. 17 Inch. Licensed Operating System and Antivirus compatible with trade related software.	12 Nos.
30.	Laptop, Notebook for demonstration		04 Nos.
31.	Laptop, Notebook		12 Nos.
32.	Intel Mobile Desktop based PC with LCD monitor		01 No.
33.	Printers: LaserJet, DeskJet, passbook, mfd		01 each
34.	Network Printer		01No.
35.	5KVA online UPS		As required
36.	LAN Cards, Wi-Fi LAN Cards		06nos.each.
37.	LCD/DLP Projector		01No.
38.	Power Meter		02Nos.
39.	Crimping Tools		06Nos.
40.	Computer Toolkits		06Nos.
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	(1 TB or higher)	4 Nos.
46.	Optical Drives		4 Nos.
47.	LCD/LED Monitors		2 Nos.
48.	Pen Drives		4 Nos.
49.	External Hard disk		2Nos.
50.	External DVD Writer		2Nos.
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		12Nos.
57.	Blu-Ray drive and player		2Nos.
58.	External Hard Disk		2Nos.
59.	Digital Camera		2Nos.
60.	HD Display		2Nos.
61.	Network storage		2Nos.

62.	Card Reader		2Nos.
63.	Game video card		2Nos.
64.	Web Cam		2Nos.
65.	Surround sound speakers		2Nos.
66.	Different types of memory cards		2 Nos. each
67.	Laptop kits		12Nos.
68.	Laptop spares	Cabinet with display, memory, hard disk, battery pack, keyboard membrane, chargers	As required
69.	SMPS Trainer kit		2 Nos.
70.	UPS Trainer kit		2 Nos.
71.	Power electronics Trainer kit		2 Nos.
72.	Poster or 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		1No.
79.	MS Office		2 Nos.
80.	Antivirus software		2 Nos.
81.	Data recovery software		2 Nos.
E. FURNITURE AND OTHER EQUIPMENTS			
82.	Computer Tables		12Nos.
83.	Computer Chairs		24Nos.
84.	Printer Table		1No.
85.	Class room chairs		24 Nos.
86.	Air conditioners (optional)		As required
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		12Nos.
94.	Wireless Access Point		6Nos.
95.	Router		2 Nos.
96.	Managed Layer	2 Ethernet Switch 24port	4 Nos.

97.	Managed Layer	3 Ethernet Switch 24port (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		05Nos.each
105.	Connectors for cables		As required
106.	Power Meter		2Nos.
107.	Media Convertor		4 each
108.	24 port UTP jack panel		2Nos.
109.	SC Couplers		12Nos.
110.	SC Pigtails		12Nos.
111.	RJ	45connectors	As required
112.	Multimeter		2Nos.
113.	Crimping Tools		6Nos.
114.	NVR		1 No.
115.	POE adapters kit		2Nos.
116.	IP Camera (Outdoor / Indoor)		2Nos.each
117.	Analog camera with DVR		2 Nos.
G. RAW MATERIAL			
118.	White Board Marker		1 Dozen
119.	Duster Cloth	(2’ by2’)	24Pcs
120.	Cleaning Liquid	500 ml	2 Bottles
121.	Xerox Paper (A4)		As required
122.	PCB, solder flux etc& electronic components		As required
123.	Wires, cables Plug sockets switches of various types and other consumables		As required
124.	Resistors, Capacitors, Inductors, Diodes, LED, Transistors, Thyristors, ICs etc.		As required
125.	Spare Transformers and power devices required for servicing SMPS		As required
126.	Various types of Button Cells		As required
127.	Dry Cell		As required

128.	Hand Brush		As required
129.	Silicon grease		As required
130.	Heat sink agent		As required
131.	RAM	512MB	As required
132.	Cartridges for printer		As required
133.	Optical Mouse	P/S2 or USB	As required
134.	P/S2 OR USB Key Board		As required
135.	SMPS		As required
136.	CMOS Battery		As required
137.	3 Pin Power Chord		As required
138.	Cat 5/5e/6 cable		300 meters
139.	Flat Cable		100 meters
140.	Stapler Small		2 pcs.
141.	Stapler Big		1 pc.
142.	AAA battery for remote		As required
143.	AA battery for clock		As required
144.	Pen Drives	8 GB	4Nos.
145.	CDs		24 Nos.
146.	DVDs		12Nos.
147.	Wall Clock		1 pc
148.	Anti static pads		As required
149.	Anti static wrist wraps		As required
150.	Soldering wire and paste		As required
151.	RJ – 45 Connector		As required
152.	Telephone cable		As required
153.	Co-axial cable		As required
154.	RJ-11 connector		As required
155.	BNC connector, T connector, terminator		As required
156.	Keystone jack		As required
157.	Patch / Jack Panel		As required
158.	Patch / Mounting cord		As required
159.	RJ-45 Info outlet with faceplate		As required
160.	RJ-45 I/O Box		As required
161.	RJ – 45 Cable extender		As required
162.	8-port HUB		04Nos.
163.	LAN Card		04Nos.
164.	Wi-Fi LAN Card both PCI and USB		02Nos. each

ANNEXURE - II

The DGT sincerely acknowledges contributions of the Industries, State Directorates, Trade Experts, Domain Experts, trainers of ITIs, NSTIs, faculties from universities 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			
S No.	**Name & Designation Sh/Mr./Ms.**	**Organization**	**Mentor Council Designation**
1.	B.V.S. Sesha Chari, Director	CSTARI, Kolkata	Chairman
2.	Prodip Mukhopadhyay, General Manager	WEBEL, Kolkata	Member
3.	Atanu Das, Scintist- 'F'	NIC, Kolkata	Member
4.	Maniknata Das, Scientist 'F'	ERTL(E), Kolkata	Member
5.	Arindam Saha, Scintist- 'E'	C-DAC, Kolkata	Member
6.	Rajib Kr. Das, Deputy Director	STPI, Kolkata	Member
7.	Koushik Nath, VP. EN&IS	CISCO Systems, Kolkata	Member
8.	Dipankar Dhabak, Business Analyst	IBM, Kolkata	Member
9.	Buddhadev Mondal, Associate	Cognizant Technology Solution	Member
10.	Arijjit Sengupta, Programmer Analyst	Cognizant Technology Solution	Member
11.	Debashish Chakraborty, Faculty	George Telegraph Training Institute, Sealdah	Member
12.	Soumik Pyne, Faculty	The George Telegraph Training Institute	Member
13.	Subhankar Chakraborty, RSM	CIPL, RBD Road, Kolkata	Member
14.	Binoy Mondal, Sr. Executive	VARA United LTD.	Member
15.	Avishek Paul, Asst. Professor	Techno India	Member
16.	Amit Kumar Mandal, Asst. Professor	Techno India	Member
17.	Amlan Raychaudhuri, Asst. Professor	B.P. Poddar Institute of Management & Technology	Member
18.	Anindya Sundar Das Gupta, Instructor (IT)	Women ITI, Banipur, Habra-743233	Member

19.	Sk. Altaf Hossain	ATI Kolkata, Dasnagar, Howrah-711105	Member
20.	N. Nath, ADT	CSTARI, Kolkata	Member
21.	B. Das, ADT	CSTARI, Kolkata	Co-ordinator
22.	K.V.S. Narayana, T.O.	CSTARI, Kolkata	Member
23.	B.K. Nigam, T.O.	CSTARI, Kolkata	Member
24.	R.N. Manna, T.O.	CSTARI, Kolkata	Member
25.	Akhilesh Pandey, T.O.	CSTARI, Kolkata	Member
26.	Tarun Kumar Dagha, T.O.	CSTARI, Kolkata	Member

List of the Mentor council members

S No.	Name & Designation Sh/Mr./Ms.	Organization	Mentor Council Designation
1.	Dr. Sanjeev Kumar Gupta, Head, Technical Wing	National Institute of Electronics and Information Technology, Electronics Niketan, 6, CGO Complex, New Delhi 110 003	Chairman
2.	R Chandrasekaran, Chief Executive, Technology & Operations	Cognizant Technology Solutions India Pvt. Ltd., 12th & 13th Floor, "A" wing, Kensington Building Hiranandani Business Park, Powai, Mumbai - 400 076	Member
3.	Srikantan Moorthy, SVP & Head, Education & Research	Infosys Electronics City, Hosur Road, Bangalore 560 100	Member
4.	Deepak Jain, Senior VP & Global Head-Work Force Planning	WIPRO, Doddakannelli, Sarjapur Road, Bangalore - 560 035	Member
5.	K. Ganesan Vice President -Global Head Talent Acquisition Group TCS House, Raveline street Fort, Mumbai - 400 001	TCS, TCS House, Raveline street, Fort, Mumbai - 400 001	Member
6.	Avinsh Vashishta, Chairman & GU Managing Director	Accenture Services Pvt. Ltd., 71, Cunningham Road, Bangalore – 560052	Member
7.	Ravi Shankar B.	Mindtree Ltd, Global Village, RCVE Post, Mysore Road, Bangalore 59	Member

8.	Mr. Umesh Gupta, Network of ICT Entrepreneurs and Enterprises	USO House, USO Road, 6 Special Institutional Area, New Delhi-110067	Member
9.	Prof. S.C. De Sarkar,	Indian Institute of Technology Bhubaneswar, Bhubaneswar-751 013	Member
10.	Dr. Arti Kashyup, Associate Professor	Academic Block, Indian Institute of Technology Mandi, PWD Rest House, Near Bus Stand, Mandi - 175 001, Himachal Pradesh	Member
11.	Dr. B. Mahanty, Professor	Indian Institute of Technology Kharagpur, Kharagpur, India - 721302	Member
12.	Dr. Narayanaswamy N S, Associate Professor	D/o Computer Science and Engg Indian Institute of Technology Madras IIT P.O., Chennai 600 036	Member
13.	Ms. Koushalya Barik,AD (VE)	National Institute of Open Schooling, Noida	Member
14.	Prof. Ashis.K. Pani, Professor, XLRI Jamshedpur	XLRI Jamshedpur	Member
15.	Shri S.K. Prasad	National Institute of Open Schooling, Noida	Member
16.	P N Nayak, Head - Organizational Training	HCL Services Ltd., (A subsidiary of HCL INFOSYSTEMS LTD.), Hyderabad Campus, Road No 2, Hardware Technology Park, Kancha Imarat, Pahadi Shareef, Hyderabad – 500005	Member
17.	Hemant Darbadi, Ex. Director	CDAC, Pune University Campus, Pune-411007	Member
18.	Arnab Bhattacharya, Associate Professor	Department of Computer Science and Engineering, IIT, Kanpur	Member
19.	Ms. Sheetal Chopra, Dy. Director	NIELIT, Delhi, 2nd Floor Parshwanath Mero Mall, Indralok Metro Station, New Delhi	Member
20.	Dr. Vijayarajeswaran, Managing Director	VI Micro Systems Pvt. Ltd, Chennai	Member

21.	Pramod Tripathi, SEO	National Institute of Open Schooling, Noida	Member
22.	Shri Naresh Chandra, Jt. Director, DGT, HQ	DGT, New Delhi	Mentor
23.	B.K. Singha, DDT	CSTARI, Kolkata	Representative of CSTARI
24.	Shri Sundar Rajan, DPA Gr. B	NIMI, Chennai	Representative of NIMI
25.	Dr. M. Jayprakasan, DDT	ATI, Chennai	Member
26.	V. Babu, DDT	DGT, New Delhi	Member
27.	K. Singh, DDT	ATI, Ludhiana	Member
28.	Annapurna, TO	ATI Hyderabad	Member
29.	S.K. Acharya, VI (CHNM)	NVTI, NOIDA	Member
30.	B.Biswas, TO	RDAT Kolkata	Member
31.	Sanjay Kr. Gupta, VI –COPA	RVTI Vadodara	Member
32.	Kunal Shanti Priya, VI	ITI, Daltonganj, Jharkhand	Member
33.	Anwar Muhammed, VI	RVTI, Trivendrum	Member
34.	Sunil. M.K. TO	CTI, Chennai	Member
35.	Narmada, VI	RVTI, Bangalore	Member
36.	Rohit Sama, ATO	ITI Shantinagar, Hyderabad	Member
37.	J. Herman, Assistant Training Officer	Govt. ITI (W), Nagarkoil, TN	Member
38.	P. Parthiban, Assistant Training Officer (ITESM)	Govt ITI(W), Salem, TN	Member
39.	S. Raja, ADT	DET, Telangana	Member
40.	Mohd. Akram,	ITI, Shanthi Nagar, Hyderabad	Member
41.	Geeta Sikhen , VI	RVTI, Panipat	Member

ABBREVIATIONS:

CTS	Craftsmen Training Scheme
ATS	Apprenticeship Training Scheme
CITS	Craft Instructor Training Scheme
DGT	Directorate General of Training
MSDE	Ministry of Skill Development and Entrepreneurship
NTC	National Trade Certificate
NAC	National Apprenticeship Certificate
NCIC	National Craft Instructor Certificate
LD	Locomotor Disability
CP	Cerebral Palsy
MD	Multiple Disabilities
LV	Low Vision
HH	Hard of Hearing
ID	Intellectual Disabilities
LC	Leprosy Cured
SLD	Specific Learning Disabilities
DW	Dwarfism
MI	Mental Illness
AA	Acid Attack
PwD	Person with disabilities


कौशलं बलम्