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

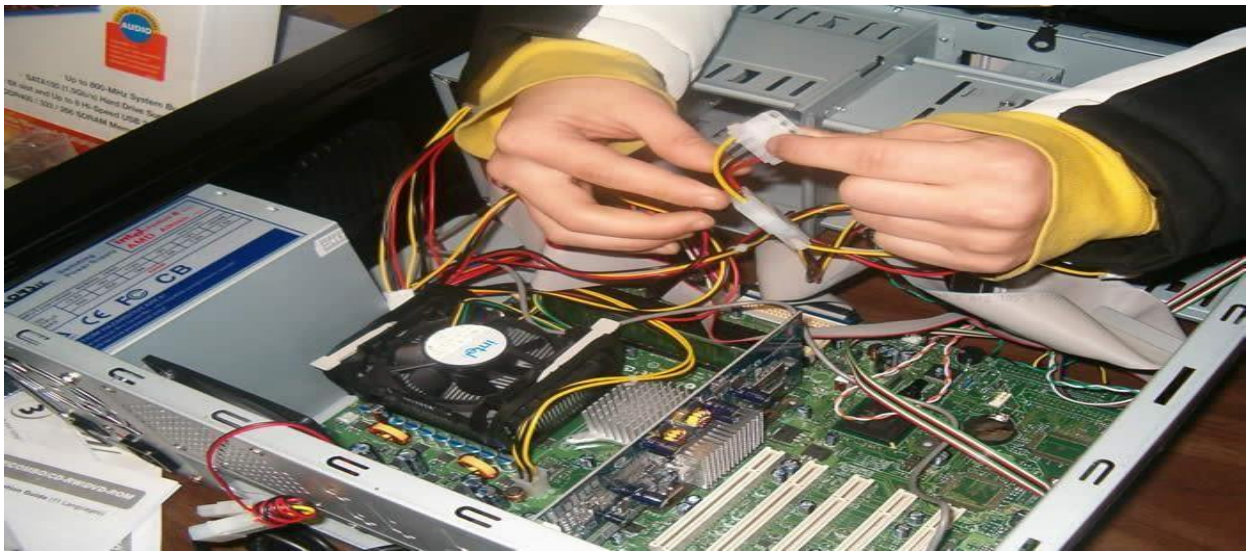
COMPETENCY BASED CURRICULUM

COMPUTER HARDWARE & NETWORK MAINTENANCE

(Duration: One Year)
Revised in July 2022

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL- 3



SECTOR –IT & ITES

Directorate General of Training

COMPUTER HARDWARE
&
NETWORK MAINTENANCE

(Non-Engineering Trade)

(Revised in July 2022)

Version: 2.0

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL - 3

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
		1st Year
1	Professional Skill (Trade Practical)	840
2	Professional Knowledge (Trade Theory)	240
3	Employability Skills	120
	Total	**1200**

Every year 150 hours of mandatory OJT (On the Job Training) at nearby industry, wherever not available then group project is mandatory

4	On the Job Training (OJT)/ Group Project	150

Trainees of one-year or two-year trade can also opt for optional courses of up to 240 hours in each year for 10th/ 12th class certificate along with ITI certification or add on short term courses.

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%.

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
- Computer based multiple choice question examination
- Practical Examination

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 for formative assessment

Performance Level	Evidence
(a) Marks 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) Marks 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 regard for safety procedures and practices	• Good skill levels and accuracy in the field of work/ assignments. • A good level of neatness and consistency to accomplish job activities. • Little support in completing the task/ job.
(c) Marks 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

Reference NOS: (a**)** SSC/N0101 (b) SSC/N0202), (c) SSC/N0305, (d) SSC/N0901, (e) SSC/NOS0922)

4. GENERAL INFORMATION

Name of the Trade	**COMPUTER HARDWARE & NETWORK MAINTENANCE**
Trade Code	DGT/1050
NCO - 2015	2523.0200, 2523.0100
NOS Covered	SSC/N0101, SSC/N0202), SSC/N0305, SSC/N0901, and SSC/NOS0922
NSQF Level	Level-3
Duration of Craftsmen Training	One Year (1200 Hours)
Entry Qualification	Passed 10th class examination with Science and Mathematics or with vocational subject in same sector 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:	
1. 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. **Essential Qualification:**

	Relevant Regular / RPL variants of National Craft Instructor Certificate (NCIC) 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.***
2. Employability Skill	MBA/ BBA / Any Graduate/ Diploma in any discipline with Two years' experience with short term ToT Course in Employability. (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.
3. Minimum Age for Instructor	21 Years
List of Tools and Equipment	As per Annexure – I

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. Demonstrate implementation of safe working practices, environment regulation, and housekeeping. NOS(SSC/N0101 and SSC/N0202)
2. Demonstrate testing and troubleshooting for power supplies in I/O devices and trace circuit of PC SMPS. NOS(SSC/N0101 and SSC/N0202)
3. Advance Computer Hardware. NOS(SSC/N0101 and SSC/N0202)
4. Preventive Maintenance and Troubleshooting of PC. NOS(SSC/N0101 and SSC/N0202)
5. Assemble and repair Desktop Computer with all its hardware components. NOS(SSC/N0101 and SSC/N0202)
6. Install different Operating System and all other application software. NOS (SSC/N0305, SSC/N0901, and SSC/NOS0922)
7. Customize Operating System and maintenance of system application software. NOS(SSC/N0101 and SSC/N0202)
8. Assemble and repair Laptop and its hardware components. NOS (SSC/N0101 and SSC/N0202)
9. Perform the operations of office package (word, excel, power point). NOS(SSC/N0305, SSC/N0901, and SSC/NOS0922)
10. Install Printer, Scanner and troubleshoot their faults. NOS(SSC/N0101 and SSC/N0202)
11. Set up and configure Networking System using various network devices. NOS(SSC/N0101 and SSC/N0202)
12. Share and control resource and Internet connection through network. NOS(SSC/N0305, SSC/N0901, and SSC/NOS0922)
13. Collaboration, surveillance and maintenance through network. NOS(SSC/N0305,SSC/N0901,and SSC/NOS0922)
14. Implement Network Security to protect from various attacks on networking. NOS(SSC/N0305,SSC/N0901,and SSC/NOS0922)
15. Install and configure Windows and Linux server. NOS(SSC/N0305,SSC/N0901,and SSC/NOS0922)
16. Browse internet and communicate through email. NOS(SSC/N0305,SSC/N0901,and SSC/NOS0922)
17. Explain Virtualization, Cloud concepts & services. NOS (SSC/N0305, SSC/N0901, and SSC/NOS0922)

6. ASSESSMENT CRITERIA

LEARNING OUTCOMES	ASSESSMENT CRITERIA
1. Demonstrate implementation of safe working practices, environment regulation, and housekeeping. NOS (SSC/N0101 and SSC/N0202)	Explain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements and according to site policy.
	Check and report all unsafe situations according to site policy.
	Demonstrate necessary precautions on fire and safety hazards and report according to site policy and procedures.
	Evaluate and observe site policies and procedures in regard to illness or accident.
	Demonstrate basic first aid and use them under different circumstances.
	Explain different fire extinguisher and use the same as per requirement.
2. Demonstrate testing and troubleshooting for power supplies in I/O devices and trace circuit of PC SMPS. NOS(SSC/N0101 and SSC/N0202)	Explain working principle of DIAC, SCR, TRIAC.
	Demonstrate the characteristics and application of amplifiers.
	Explain commonly used op-amps, Amplifiers in integrated circuit forms.
	Explain application and limitation of shunt and series regulators.
	Check comparisons of linear and Switch mode power supplies.
	Check, trouble shoot SMPS with emphasis on power supplies used in PC's and its I/O devices.
	Observe safety norms while handling the components.
3. Advance Computer Hardware. NOS(SSC/N0101 and SSC/N0202)	Identify, change settings and secure BIOS and UEFI .
	Update firmware, CPU, Motherboard, Storage Devices and Peripheral components.
	Installation of Application Software
4. Preventive Maintenance and Troubleshooting of PC. NOS(SSC/N0101 and SSC/N0202)	Troubleshooting of Common problems of a PC and its solution.
	Preventive maintenance of Storage devices, motherboard, power supplies, CPU, memory and display unit.
	Use of Multimeter and a Power Supply Tester to troubleshoot hardware problems.
5. Assemble and repair of Desktop Computer with	Open the cabinet and identify various motherboards components, connectors, slots, ports (USB, VGA, DVI, and HDMI), cables and Connectors.

all its hardware components. NOS(SSC/N0101 and SSC/N0202)	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.
6. Install different Operating System and all other application software. NOS(SSC/N0305,SSC/N0901, and SSC/NOS0922)	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.
7. Customize Operating System and maintenance of system application software. NOS(SSC/N0305, SSC/N0901, and SSC/NOS0922)	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.
8. Assemble and repair Laptop and its hardware components. NOS(SSC/N0305, SSC/N0901, and SSC/NOS0922)	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.
9. Perform the operations of office package (word, excel, power point). (SSC/N0305, SSC/N0901, and SSC/NOS0922)	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.
10. Install Printer, Scanner and troubleshoot their faults. (SSC/N0101 and SSC/N0202)	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.
11. 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.

NOS(SSC/N0101 and SSC/N0202)	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.
12. Share and control resource and Internet connection through network.NOS (SSC/N0305, SSC/N0901, and SSC/NOS0922)	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 another machine in LAN.
	Configure internet connection using L2 and L3 switch.
	Install Proxy Server and configure it.
13. Collaboration, surveillance and maintenance through network. (SSC/N0305, SSC/N0901, and SSC/NOS0922)	Setup of basic collaboration tool for activities like chat, application sharing, remote desktop access and control, VoIP.
14. Implement Network Security to protect from various attacks on networking. SSC/N0305, SSC/N0901, and SSC/NOS0922)	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.
15. Install and configure	Configure services like Active Directory, DNS and DHCP.
	Configure IIS Web server (latest version).

Windows and Linux server. (SSC/N0305, SSC/N0901, and SSC/NOS0922)	Configure following on Linux Server: (a) /etc/hosts file, (b) DHCP, (c) DNS, (d) WEB SERVER, (e) NFS and SAMBA.
16. Browse internet and communicate through email. SSC/N0305, SSC/N0901, and SSC/NOS0922)	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.
17. Explain Virtualization, Cloud concepts & services. SSC/N0305, SSC/N0901, and SSC/NOS0922	Create cloud concepts.
	Use common cloud services such as Office 365, Google Drive, Dropbox.

6. 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 20 Hrs; Professional Knowledge 6 Hrs	Demonstrate implementation of safe working practices, environment regulation, and housekeeping. (Mapped NOS: SSC/N0101 and SSC/N0202)	**Familiarization with the Institute and Safety** 1. Visits to workshops, labs, office, stores etc. of the institute. (04hrs) 2. Demonstrate safety precaution including anti-static protection. (04hrs) 3. Demonstrate first aid practice. (04hrs) 4. Demonstrate artificial respiration and practice. (04hrs) 5. Demonstrate electrical safety precautions. (04hrs)	**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)
Practical 44 Hrs Theory 12 Hrs	Demonstrate testing and troubleshooting for power supplies in I/O devices and trace circuit of PC (Mapped NOS: SMPS. NOS(SSC/N0101 and SSC/N0202)	***SMPS*** 6. Construct and test a Thyristor based power supply. (08Hrs.) 7. Testing op-amp, testing and analyzing results of an OP- Amp. Wire and test a Multistage IC amplifier. (12Hrs) 8. Construct and test a 3-pin Voltage regulator. Construct and test an IC variable output Voltage regulator. (12Hrs) 9. Trace circuit of PC SMPS.	DIAC, SCR, TRIAC- working principle, specifications, applications. Circuits and application. Differential amplifiers, OP-Amps, principle, characteristics, advantages, applications. List a few commonly used op-amps, Amplifiers in integrated circuit forms. IC oscillators -IC 555 Other types of linear IC's and applications. Voltage regulator -zener diode, principle, application, limitations. Shunt and series regulators, applications, limitation. IC voltage

		Fault finding of SMPS used in PC. Troubleshoot SMPS used in PC's/Laptops and Power supplies used in PC I/O devices. (12Hrs)	regulators-fixed/variable, specifications, testing. Multiple output regulators, package details of some common IC regulator Comparison of linear and Switch mode power supplies. Working of SMPS. Types, specifications and applications. Trace SMPS circuits. Approach to faultfinding and Troubleshooting of SMPS with emphasis on the knowledge of power supplies in PC's and its I/O devices. (12Hrs)
Professional Skill 53 Hrs; Professional Knowledge 18 Hrs	Assemble and repair Desktop Computer with all its hardware components. (Mapped NOS: SC/N0101 and SSC/N0202)	**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. (02 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. (02 hrs) **Hardware Identification** 52. Identify the front and rear panel ports and connectors on a PC cabinet. (02 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. (04 hrs) 54. Collect data from circuit board. (02 hrs) 55. Check Power Supplies and Power Supply Connections. (02 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. (04 hrs) 57. Use Post Error Debug Card and understand error Code for fault troubleshooting. (02 hrs) 58. Use of SMPS Tester for fault troubleshooting. (02 hrs) 59. Use of PCI slot testing tool for fault troubleshooting. (02 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. (01 hrs) 62. Install & configure add-on cards. (02 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 sound in case of trouble. (02 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. (01 hrs) 68. Troubleshoot defects related to SMPS, its cable, connector and servicing procedure. Removing a Power Supply. Installing a Power Supply. Use SMPS tester. (04 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. (02 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 30 Hrs; Professional Knowledge 10 Hrs	Advance Computer Hardware (Mapped NOS: SSC/N0101 and SSC/N0202)	**75. <u>Practice the following:</u>** • Set up BIOS and UEFI (1 hr) • Secure BIOS and UEFI (2 hrs) • Configure / Settings of SMPS (2 hrs) • Upgrade Power Supply (2 hrs) • Upgrade Motherboard (3 hrs) • Upgrade CPU (2 hrs) • Upgrade Storage Device (3 hrs) • Upgrade Peripheral (3 hrs) • Update Firmware (2 hrs) • Install windows (2 hrs) • Install Application software's (3 hrs)	**<u>Explain the following</u>:** • POST , BIOS , CMOS , UEFI • BIOS and UEFI Security • Watt and Voltage • Power Fluctuation Types • Power Protection Devices • CPU Architecture • Enhance CPU Operations • Multicore Processors • CPU Cooling Mechanism • Concept of RAID • RAID Levels • Legacy Ports • Video and Graphics Ports • USB Cables and Connectors

		Project : Assemble new PC and Install required software (5 hrs)	• SATA Cables and Connectors • Twisted Pair Cables and Connectors • Coax Cables and Connectors • SCSI and IDE • Monitor Characteristics • Monitor Terms and Display standards • Using Multiple Monitor • Thick and Thin clients • NAS • Safe Disposal Methods • Safety Data Sheets
Professional Skill 30 Hrs; Professional Knowledge 10 Hrs	Preventive Maintenance and Troubleshooting of PC (Mapped NOS: SSC/N0101 and SSC/N0202)	**76. <u>Preventive Maintenance:</u>** • Use Multimeter for checking power supply in the PC and peripherals (2 Hrs) • Identify and Troubleshoot Common Problems and Solutions of PC (3 hrs) • Identify and troubleshoot Common Problems and Solutions for Storage Devices (2 hrs) • Identify and trouble shoot Common Problems and Solutions for Motherboards and Internal Components (3 hrs) • Identify and trouble shoot Common Problems and Solutions for Power Supplies (5 hrs) • Identify and troubleshoot Common Problems and Solutions for CPUs and Memory (5 hrs) • Identify and troubleshoot Common Problems and	<u>Explain the following</u>: • Benefits of preventive maintenance • Preventive Maintenance – dust • Preventive maintenance – internal components • Preventive Maintenance – Environmental Concerns • Preventive Maintenance – Software • Introduction to Troubleshooting • Personal Reference Tools • Internet Reference Tools • Advanced Problems and Solutions for Hardware

		Solutions for Displays (5 hrs) • Project : Troubleshoot and Repair a non working PC (5 hrs)	
Professional Skill 46 Hrs; Professional Knowledge 18 Hrs	Install different Operating System and all other application software. (Mapped NOS: SSC/N0305,SSC/N0901,and SSC/NOS0922)	77. Boot the PC through a BOOTABLE DVD of OS. Partition the disk, Format the drive. Install Windows 7 and Windows 10 from DVD Disk. (08 hrs) 78. Make bootable USB DRIVE (use any open source software) and install both OS again. (04 hrs) 79. Make Win-7 AND Win-10 dual boot properly. Practice on recovery partition. (04 hrs) 80. 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. (02 hrs) 80. Understand the difference between UEFI firmware and tradition BIOS. Check various motherboard if it is UEFI supported or not. (04 hrs) 81. Install and boot Win-10 in UEFI mode. (04 hrs) 82. Use third party hard disk partitioning applications. (02 hrs) 83. Imaging: create a Windows	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)

		system image. (02 hrs) 84. How to Backup/Restore your Windows partition with the bootable image. (04 hrs) 85. Practise Windows 7 and 10 registry tweaks. (04 hrs)	
Professional Skill 26 Hrs; Professional Knowledge 06 Hrs	Customize Operating System and maintenance of system application software. (Mapped NOS: SSC/N0305, SSC/N0901, and SSC/NOS0922)	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 familiar with different options and their appropriate use (taskbar and start menu, Programs and features, Display, System, Sound, Devices and Printers etc). (08 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. (12 hrs)	**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 menu, tool bar, and menus. • Windows Explorer. Properties of files and folders. • Executing application programs. (06 hrs)
Professional Skill 30 Hrs; Professional Knowledge	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	**Device Driver, OS Update and Firewall Security** • Properties of connected devices. • Applications under windows

06 Hrs	(Mapped NOS: SSC/N0305, SSC/N0901, and SSC/NOS0922)	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. (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	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)

		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 26 Hrs; Professional Knowledge 06 Hrs	Customize Operating System and maintenance of system application software. (Mapped NOS: SSC/N0305, SSC/N0901, and SSC/NOS0922)	**User Account Customization** 105. Create and configure user accounts in Windows 7/8/10. Create Administrator and Limited user account. (04 hrs) 106. Make Changes to an Account. Reset Limited user account password through Administrative account. (08 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. (06 hrs)
Professional Skill 26 Hrs; Professional Knowledge 06 Hrs	Install different Operating System and all other application software. (Mapped NOS: SSC/N0305, SSC/N0901, and SSC/NOS0922)	113. Install any popular antivirus software. Online and offline updating of antivirus. View its various options. On and off Firewall option inside antivirus software. (02 hrs) 114. Run a full system scan and booting in Safe Mode. (02 hrs) 115. Set up Parental Controls	**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

		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. (04 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)	of using computers and software such as copyright, patent licencing etc. • Reliable sources of downloading software, antivirus etc. (06 hrs)
Professional Skill 28 Hrs; Professional Knowledge 06 Hrs	Customize Operating System and maintenance of system application software. (Mapped NOS: SSC/N0305, SSC/N0901, and SSC/NOS0922)	**Junk File Removal** 123. Use various free and paid Disk clean up utility to remove junk files from hard disk. (02 hrs) 124. Try to find out the folder in root directory where junk files are stored and	**Junk File** • Junk files, deleted files, un deleting files, configuration of internet browser. **Data backup and data recovery software** • Maintenance of Temp folder,

		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) 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. (02 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	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 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)

		from an Outlook PST-file. (02 hrs)	
Professional Skill 32 Hrs; Professional Knowledge 12 Hrs	Assemble and repair Laptop and its hardware components. (Mapped NOS: SSC/N0101 and SSC/N0202)	135. Identify and use of tools and gadgets required for repair & servicing laptop. Safety precaution and handling components of laptops. (02 hrs) 136. Identify of laptop sections, components and connector. (02 hrs) 137. Assemble and disassembling a Laptop. (04 hrs) 138. Check of various parts of a laptop. (02 hrs) 139. Check of batteries and adaptors. Configuration of energy saving mode. (02 hrs) 140. Replace different parts of laptops. (02 hrs) 141. Upgrade RAM, HDD and other parts. (02 hrs) 142. Test fault finding and troubleshooting techniques. (04 hrs) 143. POST codes and their meaning, fixing of problems based on codes. Check and configure CMOS BIOS set up. (02 hrs) 144. Enabling support for SATA technology. Installation of OS using SATA technology drivers. (04 hrs) 145. Configuration of camera, mic, WLAN and Bluetooth, touchpad, finger print	**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. (12 hrs)

		scanner. (02 hrs) 146. Latest Tools & Gadgets For Desktop/Laptop Repairs. (02 hrs) 147. Connecting external peripherals and their configuration. Use of KVM switch. (02 hrs)	
Professional Skill 30 Hrs; Professional Knowledge 06 Hrs	Perform the operations of office package (word, excel, power point). (Mapped NOS: SSC/N0305, SSC/N0901, and SSC/NOS0922)	**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. Practice filtering and data sorting in excel. (02 hrs) 158. Print spread sheets. (02 hrs) 159. Create power point presentation and familiarise with basic	**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. **Power Point Presentation** • Introduction to Power Point and its advantages. • Creating Slide Shows. • Fine tuning the presentation and good presentation technique. (06 hrs)

		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)	
Professional Skill 24 Hrs; Professional Knowledge 04 Hrs	Install Operating and all different System other application software. (Mapped NOS: SSC/N0305, SSC/N0901, and SSC/NOS0922)	**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. (02 hrs) 164. Adding new users, software, material components. (02 hrs) 165. Making back-up copies of the index and files. (02 hrs) 166. Dealing with the files permissions and indexes. (02 hrs) 167. Practice important Linux commands. (04 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. (04 hrs)
Professional Skill 62 Hrs; Professional Knowledge 18 Hrs	Install Printer, Scanner and troubleshoot their faults. (Mapped NOS: SSC/N0101 and SSC/N0202)	**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. (01 hrs) 170. Replacing ribbon in a DMP. (01 hr)	**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

		171. Testing and rectifying defective cable. (01 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. (02 hrs) 175. Tracing the control board and identifying defective components. Servicing of control board. (02 hrs) 176. Replacement of toner cartridge of laser printers. (01 hr) 177. Refilling toner cartridge of laser printers. (01 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. (02 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/	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. • 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)

		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. (02 hrs) 187. Tracing the control board and identifying defective components. Servicing of control board of DeskJet/ inkjet printers. (02 hrs) 188. Use of diagnostics software for serving printers. (02 hrs) 189. Replacement of mechanical parts and sensors of printer. (02 hrs) 190. Installing plotter and rectify its common faults. (02 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. (02 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)	**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)

		197. Install Multifunction Printer and configure it. (01hrs) 198. Find Multifunction Printer related problems and troubleshoot. (02 hrs) 199. Connecting and using high speed line printers. (01 hrs) 200. Replacing spares offline printers. (02 hrs) 201. Install Passbook Printer calibrate, configure. (01 hrs) 202. Find Passbook Printer related problems and troubleshoot. (02 hrs) 203. Install Network Printer and configure it. (01 hrs) 204. Find Network Printer related problems and troubleshoot. (02 hrs)	
Professional Skill 132 Hrs; Professional Knowledge 42 Hrs	Set up and configuring Networking System using various network devices. (Mapped NOS: SSC/N0305, SSC/N0901, and SSC/NOS0922)	**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. Punching Tools (08 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. (08 hrs) 207. Understand the Layout of network on your lab and	**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.

		campus. (08 hrs)	• 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. (08hrs)	**Crimping & Punching** • Communication Media and Connectors – Unshielded
		209. Punching practice in IO Box and patch panel. (04hrs) 210. Create cabling using Fibre Optic cable and connectors. (08hrs) 211. Create cabling in a lab with HUB/Switch and IO Boxes and patch panel. (12hrs) 212. Fit Switch Rack. (04hrs) 213. Install &Configure a Peer-to-Peer Network using Windows and Linux Software. (04hrs) 214. Connect computers using Bluetooth, WI-FI, hotspot. (04hrs)	twisted-pair (UTP), shielded twisted-pair (STP), Fibre Optic and coaxial cable: RJ-45, RJ-11, BNC. • Understanding colour codes of CAT6 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. (04 hrs) 216. Configure Basic Programmable switch (layer two) and practice to set up Spanning Tree Protocol (STP) from Command Line Interface (CLI). (08 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

		217. Configure Layer 3 Switch. Verify IP Routing Process. Configure it from CLI in layer three switches. (08 hrs) 218. Create simple VLAN and understand the concepts. (04 hrs)	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. (04 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. (12 hrs) 221. Install and Configure TCP/IP Protocol. Practice FTP, Telnet and NS lookup. (04 hrs) 222. Use popular TCP/IP (windows and Linux) Utilities like PING, IPCONFIG, HOSTNAME, ROUTE, TRACERT etc. (04 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,HTTP, SNMP, LDAP, SSH, NTP, IPP, HTTPS etc. (08 hrs) 224. Configure a wireless router in the lab and practice port forwarding with security features. (04 hrs) 225. Practice on configuring DHCP. (04 hrs)	**Other Network Protocols** • Simple Mail Transfer Protocol (SMTP) • 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 42 Hrs; Professional Knowledge 12 Hrs	Share and controlling resource And Internet connection through network. (Mapped NOS: SSC/N0305, SSC/N0901, and SSC/NOS0922)	226. Configure internet connection to the pc through wire. Check its process. Find the fault and troubleshoot the problems. (08 hrs) 227. Configure internet connection to the PC using wireless technology and troubleshoot various connection related problems. (08 hrs) 228. Share the internet connection (wire and wireless) in the local network and access it from other machine in LAN. (02 hrs) 229. Configure Access Point. Configure both cloud based and frame based access point. Practice LAN controller of access point. (04 hrs) 230. Configure internet connection using L2 and L3 switch. (04 hrs) 231. Setup and Configure security features in wired and wireless LAN with internet connection. (04 hrs) 232. Sharing Resource and Advance Sharing Setting. (04 hrs) 233. Demonstrate MPLS network. (02 hrs)	**Sharing Resource & Internet connection** • 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)

		234. Install Proxy Server and configure it. (04 hrs) 235. Use free VPN software. (02 hrs)	
Professional Skill 18 Hrs; Professional Knowledge 06 Hrs	Implement Network Security to protect from various attacks on networking. (Mapped NOS: SSC/N0305, SSC/N0901, and SSC/NOS0922)	236. Set up basic protection using public keys and MAC address filters. (04 hrs) 237. Integrate wired/ wireless network. (02 hrs) 238. Understand and use Power over Ethernet (PoE). (02 hr) 239. Troubleshoot wired and wireless network. (08 hrs) 240. Preventing various attacks on networking. (02 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 24 Hrs; Professional Knowledge 06 Hrs	Collaboration, surveillance and maintenance through network. (Mapped NOS: SSC/N0305, SSC/N0901, and SSC/NOS0922)	241. Setup of basic collaboration tool for activities like chat, application sharing, remote desktop access and control, VoIP. (08 hrs) 242. Setup IP camera for basic surveillance scenario, logging and monitoring of devices / locations. (08 hrs) 243. Use Linux Network Tools to check / maintain / Manage Network. (08 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 49 Hrs; Professional Knowledge 12 Hrs	Install and configure of Windows and Linux server. (Mapped NOS: SSC/N0305, SSC/N0901, and	**Install and configure Windows Server** 244. Configure services like Active Directory, DNS and DHCP. (12 hrs) 245. Configure IIS Web server	**Introduction to Windows Server** • Server concepts, installation step, configuration of server. • Concept of Active Directory

	SSC/NOS0922)	(latest version). (08 hrs) 246. Configure of broadband modem and sharing internet connection. (04 hrs)	and DNS. • Setting up of DHCP, Routing and remote access. (06 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. (12 hrs) 248. Find package installed on your system (DPKG, YUM, DNF) using system control command for configuration and monitoring daemon and services. (12 hrs) 249. Use of grep command for search. (01 hr)	**Linux Server** • Basic configurations. • Editing /etc/hosts file. • Concept of DHCP, DNS, WEB SERVER(Apache), SAMBA • Linux package and package installer. • Concept of virtual server and containers, cloud computing (06 hrs)
Professional Skill 24 Hrs; Professional Knowledge 06 Hrs	Implement Network Security to protect from various attacks on networking. (Mapped NOS: SSC/N0305, SSC/N0901, and SSC/NOS0922)	250. Practice on firewall technologies to secure the network perimeter. (12 hrs) 251. Practice LAN security considerations and implement endpoint and Layer 2 security features. (08 hrs) 252. Configure Wi-Fi to implement security considerations. (04 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 24 Hrs; Professional Knowledge 06 Hrs	Browse internet and able to communicate through email. (Mapped NOS: SSC/N0305, SSC/N0901, and SSC/NOS0922)	253. Practice web browsing using popular web browsing software, Configuring web browser. (04 hrs) 254. Search for content using popular search engines. (04 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.

		255. Use favourite folder for browsing quickly. (04 hrs) 256. Download & Printing Web pages. (04 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. (08 hrs)	• Concept of Electronic 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. (06 hrs)
Professional Skill 20 Hrs; Professional Knowledge 06 Hrs	Explain Virtualization and Cloud Computing (Mapped NOS: SSC/N0305, SSC/N0901, and SSC/NOS0922)	258. Install Linux in a Virtual Machine and Explore the GUI. (08 Hrs) **Working with Cloud Services (12hrs)** 259. Practice with IaaS using free cloud services. (4 hrs) 260. Practice with PaaS using free cloud services. (4 hrs) 261. Practice with SaaS using free cloud services. (4 hrs)	Explain the following: • What is the cloud • Cloud Computing and Virtualization • Traditional Server Deployment • Server Virtualization • Advantages of Server Virtualization • Client-Side Virtualization • Type 1 and Type 2 Hypervisors • Virtual Machine Requirements • Cloud Computing Characteristics (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 another machine in the network.			

SYLLABUS FOR CORE SKILLS

1. Employability Skills (Common for all CTS trades) (120 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/ dgt.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
37.	LCD/DLP Projector/Interactive Smart Board		01No.
38.	Power Meter		02Nos.
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.
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.
85.	Class room chairs		24 Nos.
86.	Air conditioners (optional)		As required
87.	Scanner		1 No.
88.	Modem		1 No.
90.	Broadband Internet connection		1 No.
91.	Fire fighting equipments	Arrange all proper NOCs and equipments from Municipal/Competent authorities.	
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.
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			
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
144.	Pen Drives	8 GB	4Nos.
145.	CDs		24 Nos.
146.	DVDs		12Nos.
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
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
165	Punching Tool		01 No.

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