

COMPUTER AND PERIPHERALS HARDWARE REPAIR AND MAINTENANCE MECHANIC

COMPETENCY BASED CURRICULUM

(Duration: 1 Year 3 Months)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL- 4



SECTOR – IT AND ITES



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

COMPUTER AND PERIPHERALS HARDWARE REPAIR AND MAINTENANCE MECHANIC

(Revised in 2018)

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NSQF LEVEL - 4

Developed By

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Directorate General of Training
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CONTENTS

Sl. No.	Topics	Page No.
1.	Background	1-2
2.	Training System	3-7
3.	Job Role	8
4.	NSQF Level Compliance	9
5.	General Information	10
6.	Learning Outcome	11-13
7.	Learning Outcome with Assessment Criteria	14-16
8.	Syllabus	17-19
9.	Syllabus - Core Skill	20-24
	9.1 Core Skill – Workshop Calculation & Science and Engineering Drawing	
	9.2 Core Skill – Employability Skill	
10.	Details of Competencies (On-Job Training)	25-27
11.	List of Trade Tools & Equipment Basic Training - Annexure I	28-31
12.	Format for Internal Assessment -Annexure II	32

1. BACKGROUND

1.1 Apprenticeship Training Scheme under Apprentice Act 1961

The Apprentices Act, 1961 was enacted with the objective of regulating the programme of training of apprentices in the industry by utilizing the facilities available therein for imparting on-the-job training. The Act makes it obligatory for employers in specified industries to engage apprentices in designated trades to impart Apprenticeship Training on the job in industry to school leavers and person having National Trade Certificate(ITI pass-outs) issued by National Council for Vocational Training (NCVT) to develop skilled manpower for the industry. There are four categories of apprentices namely; **trade apprentice, graduate, technician and technician (vocational) apprentices.**

Qualifications and period of apprenticeship training of **trade apprentices** vary from trade to trade. The apprenticeship training for trade apprentices consists of basic training followed by practical training. At the end of the training, the apprentices are required to appear in a trade test conducted by NCVT and those successful in the trade tests are awarded the National Apprenticeship Certificate.

The period of apprenticeship training for graduate (engineers), technician (diploma holders and technician (vocational) apprentices is one year. Certificates are awarded on completion of training by the Department of Education, Ministry of Human Resource Development.

1.2 Changes in Industrial Scenario

Recently we have seen huge changes in the Indian industry. The Indian Industry registered an impressive growth during the last decade and half. The number of industries in India have increased manifold in the last fifteen years especially in services and manufacturing sectors. It has been realized that India would become a prosperous and a modern state by raising skill levels, including by engaging a larger proportion of apprentices, will be critical to success; as will stronger collaboration between industry and the trainees to ensure the supply of skilled workforce and drive development through employment. Various initiatives to build up an adequate infrastructure for rapid industrialization and improve the industrial scenario in India have been taken.

1.3 Reformation

The Apprentices Act, 1961 has been amended and brought into effect from 22nd December, 2014 to make it more responsive to industry and youth. Key amendments are as given below:

- Prescription of number of apprentices to be engaged at establishment level instead of trade-wise.
- Establishment can also engage apprentices in optional trades which are not designated, with the discretion of entry level qualification and syllabus.
- Scope has been extended also to non-engineering occupations.
- Establishments have been permitted to outsource basic training in an institute of their choice.
- The burden of compliance on industry has been reduced significantly.

2. TRAINING SYSTEM

2.1 GENERAL

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

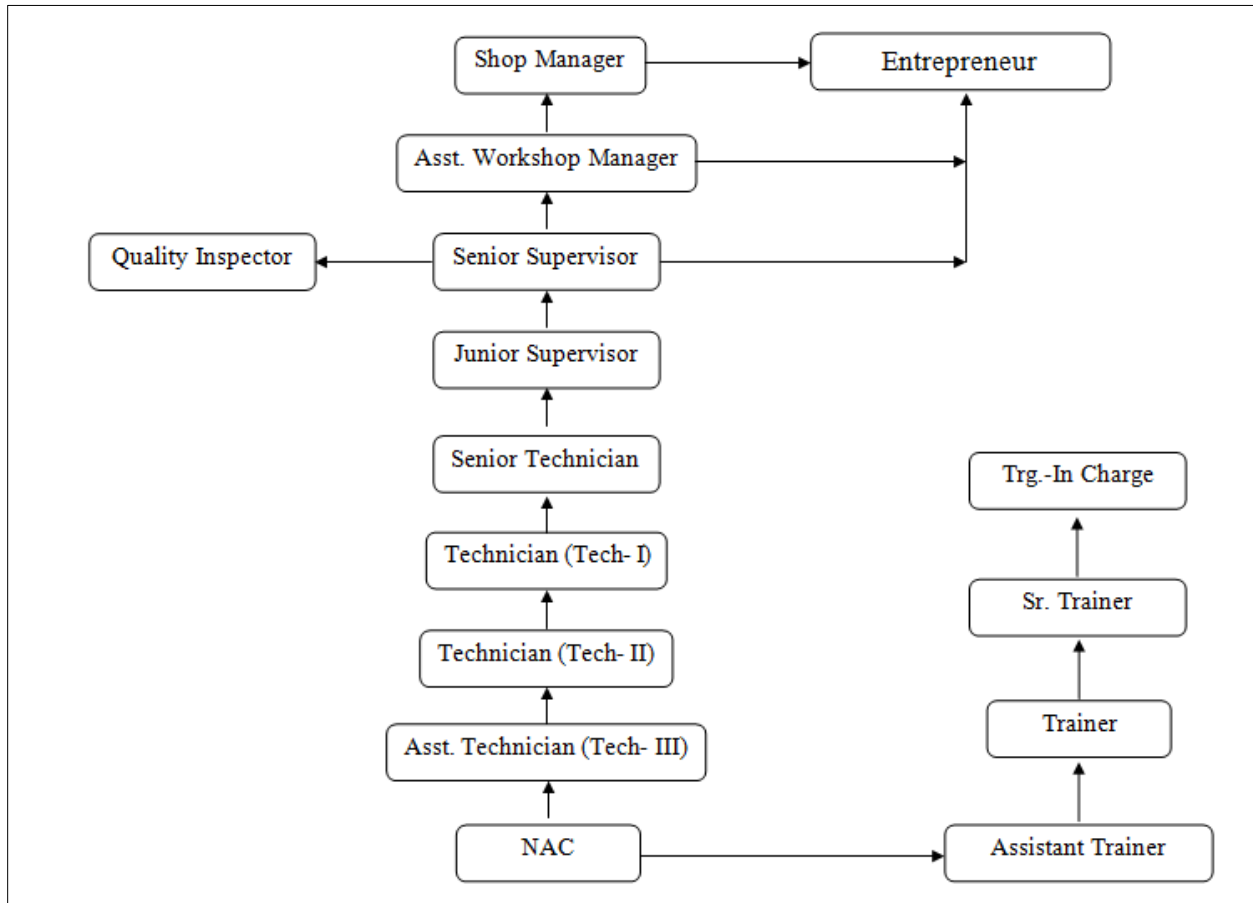
Computer and Peripherals Hardware Repair and Maintenance Mechanic trade under ATS is one of the most popular courses delivered nationwide through different industries. The course is of one year three months (01 Block of 15months including basic training) duration. It mainly consists of Domain area and Core area. In the Domain area Trade Theory & Practical impart professional - skills and knowledge, while Core area - Workshop Calculation and science, Engineering Drawing and Employability Skills imparts requisite core skills & knowledge and life skills. After passing out the training programme, the trainee is being awarded National Apprenticeship Certificate (NAC) by NCVT having worldwide recognition.

Broadly candidates need to demonstrate that they are able to:

- Read & interpret technical parameters/document, 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 skill, knowledge, core skills & employability skills while performing jobs and solve problem during execution.
- Check the product as per specifications for functioning, identify and rectify errors in the system.
- Document the technical parameters related to the task undertaken.

2.2 CAREER PROGRESSION PATHWAYS:

- Indicative pathways for vertical mobility.



2.3 COURSE STRUCTURE:

Table below depicts the distribution of training hours across various course elements during a period of one year (*Basic Training and On-Job Training*) :-

Total training duration details: -

Time (in months)	1-3	4 - 15
Basic Training	Block- I	-----
Practical Training (On - job training)	----	Block - I

Computer and Peripherals Hardware Repair and Maintenance Mechanic

A. Basic Training

For 02 yrs. course (Engg.) :-(**Total 06 months:** 03 months in 1styr. + 03 months in 2nd yr.)

For 01 yr. course (Engg.) :-(**Total 03 months:** 03 months in 1styr.)

S No.	Course Element	Total Notional Training Hours	
		For 02 Yrs. course	For 01 Yr. course
1.	Professional Skill (Trade Practical)	550	275
2.	Professional Knowledge (Trade Theory)	240	120
3.	Workshop Calculation & Science	40	20
4.	Engineering Drawing	60	30
5.	Employability Skills	110	55
	Total (Including internal assessment)	1000	500

B. On-Job Training:-

For 02 yrs. Course (Engg.) :-(**Total 18 months:** 09 months in 1styr. + 09 months in 2nd yr.)

Notional Training Hours for On-Job Training: 3120 Hrs.

For 01 yr. course (Engg.) :-(**Total 12 months**)

Notional Training Hours for On-Job Training: 2080 Hrs.

C. Total training hours:-

Duration	Basic Training	On-Job Training	Total
For 02 yrs. course (Engg.)	1000 hrs.	3120 hrs.	4120 hrs.
For 01 yr. course (Engg.)	500 hrs.	2080 hrs.	2580 hrs.

2.4 ASSESSMENT & CERTIFICATION:

The trainee will be tested for his skill, knowledge and attitude during the period of course and at the end of the training programme as notified by Govt of India from time to time. The Employability skills will be tested in first two semesters only.

a) The **Internal assessment** during the period of training will be done by **Formative assessment method** by testing for assessment criteria listed against learning outcomes. The training

institute have to maintain individual *trainee portfolio* as detailed in assessment guideline. The marks of internal assessment will be as per the template (Annexure – II).

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

2.4.1 PASS REGULATION

The minimum pass percent for Practical is 60% & minimum pass percent for Theory subjects 40%. The candidate pass in each subject conducted under all India trade test.

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 assessment. Due consideration should be given while assessing for team work, avoidance/reduction of scrap/wastage and disposal of scarp/wastage as per procedure, behavioral attitude, sensitivity to environment and regularity in training. The sensitivity towards OSHE and self-learning attitude are to be considered while assessing competency.

Assessment will be evidence based comprising the following:

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

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

Computer and Peripherals Hardware Repair and Maintenance Mechanic

Performance Level	Evidence
(a) Weightage in the range of 60 -75% to be allotted during assessment	
<p>For performance in this grade, the candidate with occasional guidance and showing due regard for safety procedures and practices, has produced work which demonstrates attainment of an acceptable standard of craftsmanship.</p>	<ul style="list-style-type: none"> • Demonstration of good skill in the use of hand tools, machine tools and workshop equipment • Below 70% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A fairly good level of neatness and consistency in the finish • Occasional support in completing the project/job.
(b)Weightage in the range of above75% - 90% to be allotted during assessment	
<p>For this grade, the candidate, with little guidance and showing due regard for safety procedures and practices, has produced work which demonstrates attainment of a reasonable standard of craftsmanship.</p>	<ul style="list-style-type: none"> • Good skill levels in the use of hand tools, machine tools and workshop equipment • 70-80% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A good level of neatness and consistency in the finish • Little support in completing the project/job
(c) Weightage in the range of above 90% to be allotted during assessment	
<p>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.</p>	<ul style="list-style-type: none"> • High skill levels in the use of hand tools, machine tools and workshop equipment • Above 80% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A high level of neatness and consistency in the finish. • Minimal or no support in completing the project.

3. JOB ROLE

Brief description of Job roles of Computer and Peripherals Hardware Repair and Maintenance Mechanic

- Install, maintain and repair computer peripheral or hardware components
- Troubleshoot different computer issues
- Maintain system configuration and operating system
- Determine and installing appropriate security measures
- Install & Configure basic computer networks
- Provide technical support on-site or via phone or email
- Install, configure and maintain common end user application software. Assist to train end users.
- Troubleshoot software and hardware problems related to Internet applications.

NCO Code 2015:

- i. 7422.2001 Field technician (computing and peripherals)
- ii. 2523.0200 Computer system hardware analyst/hardware engineer
- iii. 2523.0501 Hardware Engineer

4. NSQF LEVEL COMPLIANCE

NSQF level for Computer and Peripherals Hardware Repair and Maintenance Mechanic trade under ATS: **Level 4**

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

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

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

- a. Process
- b. professional knowledge,
- c. professional skill,
- d. core skill and
- e. Responsibility.

The Broad Learning outcome of Computer and Peripherals Hardware Repair and Maintenance Mechanic trade under ATS mostly matches with the Level descriptor at Level- 4.

The NSQF level-4 descriptor is given below:

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

5. GENERAL INFORMATION

Name of the Trade	Computer and Peripherals Hardware Repair and Maintenance Mechanic
NCO - 2015	7422.2001, 2523.0200, 2523.0501
NSQF Level	Level – 4
Duration of Apprenticeship Training (Basic Training + On-Job Training)	3 months + One year (01 Block of 15 months duration including basic training).
Duration of Basic Training	a) Block –I : 3 months Total duration of Basic Training: 3 months
Duration of On-Job Training	a) Block–I: 12 months Total duration of Practical Training: 12 months
Entry Qualification	Passed 10th class examination under 10+2 system of education or its equivalent
Selection of Apprenticeship	The apprentices will be selected as per Apprenticeship Act amended time to time.
Instructors Qualification for Basic Training	As per ITI instructors qualifications as amended time to time for the specific trade.
Examination	The internal examination/ assessment will be held on completion of each block. Final examination for all subjects will be held at the end of course and same will be conducted by NCVT.
Rebate to Ex-ITI Trainees	03 months
CTS trades eligible for Computer and Peripherals Hardware Repair and Maintenance Mechanic Apprenticeship	Advanced module Repair and Maintenance of Hardware of Computer and Peripherals in Information Technology sector

Note:

- *Industry may impart training as per above time schedule for different block, however this is not fixed. The industry may adjust the duration of training considering the fact that all the components under the syllabus must be covered. However the flexibility should be given keeping in view that no safety aspects is compromised.*
- *For imparting Basic Training the industry to tie-up with ITIs having such specific trade and affiliated to NCVT.*

6. LEARNING OUTCOME

6.1 GENERIC LEARNING OUTCOME

The following are minimum broad Common Occupational Skills/ Generic Learning Outcome after completion of the Computer and Peripherals Hardware Repair and Maintenance Mechanic course of 01 year and 3 months duration under ATS.

Block I:-

1. Recognize & comply safe working practices, environment regulation and housekeeping.
2. Understand, explain different mathematical calculation & science in the field of study including basic electrical and apply in day to day work. *[Different mathematical calculation & science-, Algebra, Power transmission, Pressure]*
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. *[Different engineering drawing- Assembly drawing, Sectional views, Estimation of material, Electrical & electronic symbol]*
4. Explain the concept in productivity, quality tools and labour welfare legislation and apply such in day to day work to improve productivity & quality.
5. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.
6. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.
7. Plan and organize the work related to the occupation.

6.2 SPECIFIC LEARNING OUTCOME

Block – I

DURATION: 12 MONTHS (52 WEEKS)	
SL. NO.	LIST OF OPERATIONS/SKILLS TO BE COVERED DURING INDUSTRIAL TRAINING
1	Practice the shop floor processing of the concerned industry including safety precautions regarding operation of different tools and equipments, occupational hazards and safety measures related to the trade. Practice the environment management system to prevent environment pollution.
2	Prepare history Sheet of different tools and equipments
3	Identify Processor chips and handling procedure. Identify I/O and memory chips on Microprocessor kit. Read and load memory locations. Practice assembly language programming.

Computer and Peripherals Hardware Repair and Maintenance Mechanic

	<p>Carry out interfacing to microprocessors. Work on microcontroller, architecture, types and applications.</p>
4	<p>Identify the PC and its various vital components. List out various components of ROM and DOS software. Explain Embedded systems. Describe the AVR (Advantages, philosophy, architecture).</p>
5	<p>Identify ports of a PC. Practice to Connect and Disconnect the I/O devices to PC. Check system configuration and specifications. Check connectivity of devices. Identify IRQ and DMA settings. Modify IRQ settings. Identify device drivers and location. Disable/Uninstall and enable/install devices. Practice to Solder and De-Solder Measure voltage Different Circuits</p>
6	<p>Install Keyboard. Set keyboard features. Clean keyboard. Identify defect in keyboards. Replace parts of keyboards. Troubleshoot defects. Install Mouse. Set properties of mouse. Clean Mouse. Identify defective Mouse. Replace parts of mouse and troubleshoot defects.</p>
7	<p>Install Printer. Set printer properties. Repair printer cable. Remove and replace ribbon/toner cartridge. Run Printer tools/utility. Practice maintenance of printers. Refill tape/toner.</p>
8	<p>Install CD Players and CD writers. Burn different types of CD using writer. Install DVD players and DVD writers. Install Combo drive and using writers. Troubleshoot and Repair CD and DVD.</p>
9	<p>Identify different types of motherboard form factors and specifications. Identify components on a motherboard. Identify different types of buses and raisers. Identify Processor, form factor and specifications. Identify jumpers on the motherboard and functions. Identify RAM slot, type, size, expandability. Identify CMOS capacity. Lithium battery.</p>
10	<p>Identify the type of HDD.</p>

Computer and Peripherals Hardware Repair and Maintenance Mechanic

	<p>Identify specification of HDD. Practice maintenance of HDD. Partition IDE/ATA Drives, SCSI drives. Format IDE/ATA drives, SCSI drives. Practice Jumper settings. Install and test Pen drives/Thumb drives. Test SMPS, Half wave, Full wave & Bridge rectifiers</p>
11	Repair and Maintain different makes and types of monitors.
12	<p>Repair and Maintain different types of printers. Repair and Maintain different types of Scanner (Photo & Bar Code Scanner)</p>
13	<p>Work with Laptop/notebook computers. Practice the disassembling and reassembling procedures. Replace processor. Replace memory. Replace add-in cards. Troubleshoot and repair/replace battery/mains adaptor.</p>
14	<p>List the features of micro controller boards. Configure ports and control their status, interrupts and timers. Compare Polling vs. Interrupt driven approaches</p>
15	Practice Supported communication protocols UART (RS-232) I2C SPI
16	<p>Explain Real time system concepts (OS vs. RTOS). Describe the need for an RTOS/scheduler. Identify RTOS components, Target RTOS (uC/OS-II) kernel architecture.</p>
17	Troubleshoot and rectify the faults of finished product. Work with the latest technology adapted in the industry at the time of training
18	<p>Install different device drivers Install different Application Software Practice to Run All Dos Command (Internal and External Dos Command) Practice taking Data Backup Install application Software : Photoshop 7.0, Page Maker 6.5, CorelDraw Install CD-DVD Burning Software like: Nero 7.0 & Power ISO 4.0 Install Tally 7.2 and Tally ERP 9.0 and Tack Data Backup Install and Troubleshoot Different types of Antivirus Software Install Dual Operating System like: Windows XP and Linux Install Dual Operating System using VM Ware Run All Types of Network Troubleshooting Command</p>

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

7. LEARNING OUTCOME WITH ASSESSMENT CRITERIA

GENERIC LEARNING OUTCOME	
LEARNING OUTCOMES	ASSESSMENT CRITERIA
1. Recognize & comply safe working practices, environment regulation and housekeeping.	1. 1. Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements.
	1. 2. Recognize and report all unsafe situations according to site policy.
	1. 3. Identify and take necessary precautions on fire and safety hazards and report according to site policy and procedures.
	1. 4. Identify, handle and store / dispose off dangerous/unsalvageable goods and substances according to site policy and procedures following safety regulations and requirements.
	1. 5. Identify and observe site policies and procedures in regard to illness or accident.
	1. 6. Identify safety alarms accurately.
	1. 7. Report supervisor/ Competent of authority in the event of accident or sickness of any staff and record accident details correctly according to site accident/injury procedures.
	1. 8. Identify and observe site evacuation procedures according to site policy.
	1. 9. Identify Personal Productive Equipment (PPE) and use the same as per related working environment.
	1. 10. Identify basic first aid and use them under different circumstances.
	1. 11. Identify different fire extinguisher and use the same as per requirement.
	1. 12. Identify environmental pollution & contribute to avoidance of same.
	1. 13. Take opportunities to use energy and materials in an environmentally friendly manner
	1. 14. Avoid waste and dispose waste as per procedure
	1. 15. Recognize different components of 5S and apply the same in the working environment.
2. Understand, explain different mathematical calculation & science in the field of study including basic	2.1 Comply given tolerance.
	2.2 Prepare list of appropriate materials by interpreting detail drawings and determine quantities of such materials.

Computer and Peripherals Hardware Repair and Maintenance Mechanic

electrical and apply in day to day work. <i>[Different mathematical calculation & science-, Algebra, Power transmission, Pressure]</i>	2.3 Ensure dimensional accuracy of assembly by using different instruments/gauges.
	2.4 Explain basic electricity, insulation & earthing.
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. <i>[Different engineering drawing- Assembly drawing, Sectional views, Estimation of material, Electrical & electronic symbol]</i>	3. 1. Read & interpret the information on drawings and apply in executing practical work.
	3. 2. Read & analyse the specification to ascertain the material requirement, tools, and machining /assembly /maintenance parameters.
	3. 3. Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work.
4. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.	5.1 Explain the concept of productivity and quality tools and apply during execution of job.
	5.2 Understand the basic concept of labour welfare legislation and adhere to responsibilities and remain sensitive towards such laws.
	5.3 Knows benefits guaranteed under various acts
5. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.	6.1 Explain the concept of energy conservation, global warming, pollution and utilize the available recourses optimally & remain sensitive to avoid environment pollution.
	6.2 Dispose waste following standard procedure.
6. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.	7. 1. Explain personnel finance and entrepreneurship.
	7. 2. Explain role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes & procedure & the available scheme.
	7. 3. Prepare Project report to become an entrepreneur for submission to financial institutions.
7. Plan and organize the work related to the occupation.	8. 1. Use documents, drawings and recognize hazards in the work site.
	8. 2. Plan workplace/ assembly location with due

	consideration to operational stipulation
	8. 3. Communicate effectively with others and plan project tasks
	8. 4. Assign roles and responsibilities of the co-trainees for execution of the task effectively and monitor the same.
SPECIFIC OUTCOME	
<u>Block-I</u>	
<p><i>Assessment Criteria i.e. the standard of performance, for each specific learning outcome mentioned under Block – I(section: 10) must ensure that the trainee works in familiar, predictable, routine, situation of clear choice. Assessment criteria should broadly cover the aspect of Planning (Identify, ascertain, etc.); Execution apply factual knowledge of field of knowledge, recall and demonstrate practical skill during performing the work in routine and repetitive in narrow range of application, using appropriate rule and tool, complying with basic arithmetic and algebraic principles and language to communicate in written or oral with required clarity; Checking/ Testing to ensure functionality during the assessment of each outcome. The assessments parameters must also ascertain that the candidate is responsible for his/her own work and learning.</i></p>	

BASIC TRAINING (Block – I)

Duration: (03) Three Months

Week no.	Professional Skills	Professional Knowledge
1	<p>Safety precautions related to trade. Awareness for electrical shock. Handling parts of PC with safety</p> <p>Introduction to PC. Handling and working with internal parts of CPU.</p>	<p>Safety Precautions related to the trade/ First Aid</p> <p>Occupational Safety Hazards related to the module.</p> <p>Basic blocks of a digital computer. Function of each block. Personal computer organization. Introduction to various generations of PC's</p> <p>Introduction to different parts of Computer.</p>
2	<p>Identify given IC's using digital IC handbook.</p>	<p>Comparing Analogue and Digital signal. Introduction to Binary Number system. Application of Digital electronics. Boolean algebra, D'Morgans theorem. Simplification of logic circuit.</p>
3-4	<p>Convert Decimal to Binary and reverse.</p> <p>Convert of Binary to octal and reverse.</p> <p>Convert of Binary to Hexadecimal and reverse.</p> <p>Identify the external I/O and memory devices connected to the PC. Identify the controls of each of these devices including the system (CPU) unit.</p> <p>Disconnect the external I/O and memory devices connected to the PC. Re-connect external I/O and memory devices connected to the PC.</p> <p>Verify the truth table of NOT, AND, OR, NAND and NOR gates. Construct a logic circuit using basic gates for a given output logic.</p> <p>Construct a 1's compliment & 2's compliment circuit and verify</p>	<p>Introduction to octal and hexadecimal number system. 1's & 2's compliment</p> <p>Brief working and usage of I/O and memory devices used in a PC.</p> <p>Identification of Digital IC's, Types of packages, applications. Basic digital gates and truth tables.</p> <p>Flip-flop, register & counter</p> <p>Making a logic circuit for any custom requirement</p>

Computer and Peripherals Hardware Repair and Maintenance Mechanic

	<p>Construct and verify the truth table of flip-flop</p> <p>Construct and test a serial and parallel shift register</p> <p>Construct and test a 4-bit binary counter</p>	
5	Practice windows operating system.	Introduction to Windows Operating system
6	Identify system specifications. Use device manager to check status of installed devices.	Obtaining system information. Ports on a PC and its specifications.
7	<p>Identify and record IRQ.</p> <p>Uninstall, Reinstall and make settings for the following devices using Device manager:</p> <p>Keyboard, Mouse, Display, Multimedia,</p> <p>Printer, Modem, Web camera and other such external devices.</p>	<p>Hardware interface and driver. IRQ and DMA.</p> <p>Installing and setting keyboard and mouse.</p> <p>Installing and setting Display.</p> <p>Installing and setting Printer.</p> <p>Installing and setting multimedia.</p> <p>Installing and setting Modem.</p> <p>Installing and setting web camera and other devices.</p>
8	<p>Identify the internal parts of a PC.</p> <p>Identify cable connections inside a PC.</p> <p>Identify the specifications of motherboard.</p> <p>Identify the components of a motherboard.</p> <p>Remove, identify and refit add-in cards Remove, identify and refit RAM, Processor.</p> <p>Practice CMOS setting.</p>	<p>Memory Types and uses. Computer main memory, specifications, compatibility, expandability, types, manufacturers.</p> <p>Mother board, types, specifications, components on the motherboard and its functions.</p> <p>BIOS, CMOS setup.</p>
9-10	<p>Remove and refit HDD. Remove and refit CD ROM drive.</p> <p>Partition HDD, Format HDD, Load operating system.</p> <p>Load multiple Operating systems (Windows & Linux). Test working.</p> <p>Assemble PC given all components. Check for working.</p> <p>Identify defect (Hardware/software).</p> <p>Rectify defect.</p> <p>Identify possibility of upgrading a given PC to given specification.</p>	<p>Hard disk, types, specifications, manufacturers. Connecting to the motherboard. Jumper setting. Partitioning, formatting.</p> <p>Non DOS partitions. Loading operating system.</p> <p>Loading multiple OS. Loading application packages.</p> <p>CDROM drive, principle of working, types, specifications, manufacturers, connecting, jumper setting. COMBO drives.</p> <p>Identifying and Troubleshooting</p>

Computer and Peripherals Hardware Repair and Maintenance Mechanic

	Collect and upgrade PC. Check working of upgraded PC	software related problems. Create bootable CD Introduction to booting process, BIOS setting and their modification.
11-12	Test and report system performance.	Identifying and Troubleshooting hardware related problems. Disassembling precautions and procedure. Assembling of PC for a given requirement. Upgrading of PC in respect of main memory, HDD, ZIP, DAT and other special devices. Usage of Multimeter for voltage testing.
13.	Revision & Internal Assessments	

Note: - More emphasis to be given on video/real-life pictures during theoretical classes. Some real-life pictures/videos of related industry operations may be shown to the trainees to give a feel of Industry and their future assignment.

9. SYLLABUS - CORE SKILLS

9.1 WORKSHOP CALCULATION SCIENCE & ENGINEERING DRAWING

Block – I		
Sl. No.	Workshop Calculation and Science (Duration: - 20 hrs.)	Engineering Drawing (Duration: - 30 hrs.)
1.	Addition, Subtraction, Multiplication, Division, Algebraic formula, Linear equations (with two variables). Quadratic equation, Simultaneous linear equation in two variables. Arithmetic and geometric progression, sum of n terms, simple calculations.	Engineering Drawing: Introduction and its importance. Different types of standards used in engineering drawing. Drawing Instruments: their uses Drawing board, T-Square, Drafter (Drafting M/c), Set Squares, Protractor, Drawing Instrument Box (Compass, Dividers, Scale, Diagonal Scales etc.), Pencils of different Grades, Drawing pins / Clips.
2.	Concept of storage units(bit, byte etc.), decimal to binary, binary to decimal, decimal to hexadecimal, hexadecimal to decimal. Binary addition and subtraction.	Free hand sketching of straight lines, dotted lines, chain lines, rectangles, square, circles, polygons etc. Free hand sketching of tools, simple solids with dimensions. Free hand sketch of solids viewed perpendicularly to their surface and axes.
3.	Calculations of Hard disk capacity, Read/write time, latency time, seek time. Definition of Scalar and Vector, notations. Addition and subtraction of vectors.	Flow charts showing steps in sample programs. Block diagram of personal computer, drawings of keyboard, monitor, mouse, FDD, HDD, CD ROM. Front and Rear view of a PC.
4.	Specifications and Rating of SMPS. Power Good. Interpersonal relationship and group behaviors.	Diagram of a Hard disk, diagram of internal components and structure. Pin diagram and block diagram of RAM, ROM, EPROM and Dynamic ROM Chips. Diagram of servo motor and stepper motor with external connections.
5.	Dynamic and Static RAM. Quality control standard and	Top view of a motherboard showing chip set and slots etc.

Computer and Peripherals Hardware Repair and Maintenance Mechanic

	institutions. Calculation of the capacity of RAM.	Diagram of different connectors, CPU sockets. Front and Rear view of a Laptop PC.
6.	Use of Electricity, Types of current_ AC, DC, their comparison, voltage, resistance, types of connections - series, parallel, electric power, unit of electrical energy. Concept of earthling.	Block diagram of SMPS and diagram of various power connectors. 3 d view of SMPS Top view of a mother board showing chip set and slots etc Diagram of different connectors, CPU sockets.

9.2 EMPLOYABILITY SKILLS

Duration- 55 Hrs.

Topic No.	Topic	Duration (in hours)
	English Literacy	7
1.	Reading Reading and understanding simple sentences about self, work and environment	
2.	Writing Construction of simple sentences Writing simple English	
3.	Speaking / Spoken English Speaking with preparation on self, on family, on friends/ classmates, on know, picture reading gain confidence through role-playing and discussions on current happening job description, asking about someone's job habitual actions. Taking messages, passing messages on and filling in message forms, greeting and introductions office hospitality, resumes or curriculum vitae essential parts, letters of application reference to previous communication.	
	I.T. Literacy	10
1.	Basics of Computer Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of computer.	
2.	Word processing and Worksheet Basic operating of Word Processing, Creating, opening and closing Documents, use of shortcuts, Creating and Editing of Text, Formatting the Text, Insertion & creation of Tables. Printing document. Basics of Excel worksheet, understanding basic commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets. Use of External memory like pen drive, CD, DVD etc,	
3.	Computer Networking and INTERNET Accessing the Internet using Web Browser, Downloading and Printing Web Pages, Opening an email account and use of email. Social media sites and its implication.	
	Communication Skill	18
1	Introduction to Communication Skills Communication and its importance Principles of Effective communication Types of communication - verbal, nonverbal, written, email, talking on phone. Nonverbal communication - components-Para-language Body - language	

	Barriers to communication and dealing with barriers.	
2	Listening Skills Listening-hearing and listening, effective listening, barriers to effective listening guidelines for effective listening.	
3	Motivational Training Characteristics Essential to Achieving Success The Power of Positive Attitude Self awareness Importance of Commitment Ethics and Values Ways to Motivate Oneself Personal Goal setting and Employability Planning.	
4	Facing Interviews Manners, Etiquettes, Dress code for an interview Do's & Don'ts for an interview	
	Entrepreneurship skill	8
1.	Concept of Entrepreneurship Entrepreneurship- Entrepreneurship - Enterprises:-Conceptual issue. Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.	
2.	Institutions Support Role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes& procedure & the available scheme.	
	Productivity	
1.	Productivity Definition, Necessity.	
2.	Affecting Factors Skills, Working Aids, Automation, Environment, Motivation How improves or slows down.	
3.	Personal Finance Management Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance.	
	Occupational Safety, Health & Environment Education	6
1	Safety & Health Introduction to Occupational Safety and Health importance of safety and health at workplace.	
2	Occupational Hazards Basic Hazards, Chemical Hazards, Vibro-acoustic Hazards, Mechanical Hazards, Electrical Hazards, Thermal Hazards. Occupational health,	

Computer and Peripherals Hardware Repair and Maintenance Mechanic

	Occupational hygienic, Occupational Diseases/ Disorders & its prevention.	
3	Accident & safety Basic principles for protective equipment. Accident Prevention techniques - control of accidents and safety measures.	
4	First Aid Care of injured & Sick at the workplaces, First-Aid & Transportation of sick person	
Labour Welfare Legislation		
1	Welfare Acts Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Employees Provident Fund Act.	
Quality Tools		
1.	Quality Consciousness : Meaning of quality, Quality Characteristic	6
2.	Quality Circles : Definition, Advantage of small group activity, objectives of quality Circle, Roles and function of Quality Circles in Organization, Operation of Quality circle. Approaches to starting Quality Circles, Steps for continuation Quality Circles.	
3.	House Keeping : Purpose of Housekeeping, Practice of good Housekeeping.	
4.	Quality Tools Basic quality tools with a few examples	

10. DETAILS OF COMPETENCIES (ON-JOB TRAINING)

The **competencies/ specific outcomes** on completion of On-Job Training are detailed below: -

Block – I

DURATION: 12 MONTHS (52 WEEKS)	
SL. NO.	LIST OF OPERATIONS/SKILLS TO BE COVERED DURING INDUSTRIAL TRAINING
1	Practice the shop floor processing of the concerned industry including safety precautions regarding operation of different tools and equipments, occupational hazards and safety measures related to the trade. Practice the environment management system to prevent environment pollution.
2	Prepare history Sheet of different tools and equipments
3	Identify Processor chips and handling procedure. Identify I/O and memory chips on Microprocessor kit. Read and load memory locations. Practice assembly language programming. Carry out interfacing to microprocessors. Work on microcontroller, architecture, types and applications.
4	Identify the PC and its various vital components. List out various components of ROM and DOS software. Explain Embedded systems. Describe the AVR (Advantages, philosophy, architecture).
5	Identify ports of a PC. Practice to Connect and Disconnect the I/O devices to PC. Check system configuration and specifications. Check connectivity of devices. Identify IRQ and DMA settings. Modify IRQ settings. Identify device drivers and location. Disable/Uninstall and enable/install devices. Practice to Solder and De-Solder Measure voltage Different Circuits
6	Install Keyboard. Set keyboard features. Clean keyboard. Identify defect in keyboards. Replace parts of keyboards. Troubleshoot defects. Install Mouse.

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	<p>Set properties of mouse. Clean Mouse.</p> <p>Identify defective Mouse.</p> <p>Replace parts of mouse and troubleshoot defects.</p>
7	<p>Install Printer.</p> <p>Set printer properties.</p> <p>Repair printer cable.</p> <p>Remove and replace ribbon/toner cartridge.</p> <p>Run Printer tools/utility.</p> <p>Practice maintenance of printers.</p> <p>Refill tape/toner.</p>
8	<p>Install CD Players and CD writers.</p> <p>Burn different types of CD using Writer.</p> <p>Install DVD players and DVD writers.</p> <p>Install Combo drive and using.</p> <p>Troubleshoot and Repair CD and DVD.</p>
9	<p>Identify different types of motherboard form factors and specifications.</p> <p>Identify components on a motherboard.</p> <p>Identify different types of buses and raisers.</p> <p>Identify Processor, form factor and specifications.</p> <p>Identify jumpers on the motherboard and functions.</p> <p>Identify RAM slot, type, size, expandability.</p> <p>Identify CMOS capacity. Lithium battery.</p>
10	<p>Identify the type of HDD.</p> <p>Identify specification of HDD.</p> <p>Practice maintenance of HDD.</p> <p>Partition IDE/ATA Drives, SCSI drives.</p> <p>Format IDE/ATA drives, SCSI drives.</p> <p>Practice Jumper settings.</p> <p>Install and test Pen drives/Thumb drives.</p> <p>Test SMPS, Half wave, Full wave & Bridge rectifiers</p>
11	<p>Repair and Maintain different makes and types of monitors.</p>
12	<p>Repair and Maintain different types of printers.</p> <p>Repair and Maintain different types of Scanner (Photo & Bar Code Scanner)</p>
13	<p>Work with Laptop/notebook computers.</p> <p>Practice the disassembling and reassembling procedures.</p> <p>Replace processor.</p> <p>Replace memory.</p> <p>Replace add-in cards.</p>

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	Troubleshoot and repair/replace battery/mains adaptor.
14	List the features of micro controller boards. Configure ports and control their status, interrupts and timers. Compare Polling vs. Interrupt driven approaches
15	Practice Supported communication protocols UART (RS-232) I2C SPI
16	Explain Real time system concepts (OS vs. RTOS). Describe the need for an RTOS/scheduler. Identify RTOS components, Target RTOS (uC/OS-II) kernel architecture.
17	Troubleshoot and rectify the faults of finished product. Work with the latest technology adapted in the industry at the time of training
18	Install different device drivers Install different Application Software Practice to Run All Dos Command (Internal and External Dos Command) Practice taking Data Backup Install application Software : Photoshop 7.0, Page Maker 6.5, CorelDraw Install CD-DVD Burning Software like: Nero 7.0 & PowerISO 4.0 Install Tally 7.2 and Tally ERP 9.0 and Tack Data Backup Install and Troubleshoot Different types of Antivirus Software Install Dual Operating System like: Windows XP and Linux Install Dual Operating System using VMWare Run All Types of Network Troubleshooting Command

Note:

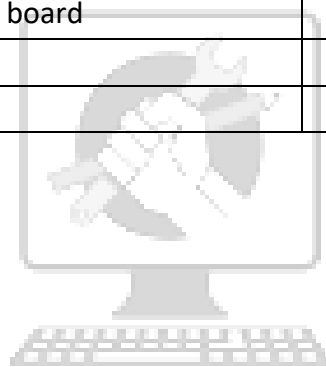
1. Industry must ensure that above mentioned competencies are achieved by the trainees during their on job training.
2. In addition to above competencies/ outcomes industry may impart additional training relevant to the specific industry.

INFRASTRUCTURE FOR PROFESSIONAL SKILL & PROFESSIONAL KNOWLEDGE

COMPUTER AND PERIPHERALS HARDWARE REPAIR AND MAINTENANCE MECHANIC			
LIST OF TOOLS AND EQUIPMENT for Basic Training (For 20 Apprentices)			
A. TRAINEES TOOL KIT (For each additional unit trainees tool kit Sl. 1-18 is required additionally)			
Sl. no.	Name of the Tool &Equipments	Specification	Quantity
1.	Pentium system with multimedia and Combo drives, Zip drives and DAT drives /or Latest Configuration		15 nos.
2.	Operating system /latest version		For each computer
3.	Dot matrix printer		4 nos.
4.	Inkjet printer		3 nos.
5.	Laser printer		3 nos.
6.	Antivirus software /latest version		As required
7.	Tool kit		5 nos.
8.	Spare cards and components		Five spare sets
9.	Consumable		As required
10.	System maintenance software /latest version		As required
11.	DMM		5 nos.
12.	Soldering iron		2 nos.
13.	Desoldering gun		2 nos.
14.	Temperature controlled soldering/ desoldering station		2 nos.
15.	Computer maintenance table		15 nos.
16.	Lab stools/chair		20 nos.
17.	Student locker		4 nos.
18.	Teacher table		01 no
19.	Teacher chair		01 no
20.	Office Almirah		02 nos.
21.	Book case		01 no

Computer and Peripherals Hardware Repair and Maintenance Mechanic

22.	Vacuum cleaner		01 no
23.	Air blower		01 no
24.	Cables connectors etc		As required
25.	Crimping tools		2 nos.
26.	CD Writers		5 nos.
27.	DVD writer		5 nos.
28.	External HDD		5nNos.
29.	Microprocessor Trainer kit / Latest Configuration		5 nos.
30.	Micro controller Trainer kit / Latest Configuration		5 nos.
31.	Digital Circuit Experiment board		5 nos.
32.	Multimedia Projector		1 no
33.	UPS 5 KVA		2 nos.



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**INFRASTRUCTURE FOR WORKSHOP CALCULATION & SCIENCE AND ENGINEERING
DRAWING**

**TRADE: COMPUTER AND PERIPHERALS HARDWARE REPAIR AND
MAINTENANCE MECHANIC**

LIST OF TOOLS& EQUIPMENTS FOR -20APPRENTICES

1) **Space Norms** : 45 Sq. m.(For Engineering Drawing)

2) **Infrastructure:**

A : TRAINEES TOOL KIT:-			
Sl. No.	Name of the items	Specification	Quantity
1.	Draughtsman drawing instrument box		20+1 set
2.	Set square celluloid 45°	(250 X 1.5 mm)	20+1 set
3.	Set square celluloid 30°-60°	(250 X 1.5 mm)	20+1 set
4.	Mini drafter		20+1 set
5.	Drawing board IS: 1444	(700mm x500 mm)	20+1 set
B : Furniture Required			
Sl. No.	Name of the items	Specification	Quantity
1	Drawing Board		20
2	Models : Solid & cut section		as required
3	Drawing Table for trainees		as required
4	Stool for trainees		as required
5	Cupboard (big)		01
6	White Board (size: 8ft. x 4ft.)		01
7	Trainer's Table		01
8	Trainer's Chair		01

TOOLS & EQUIPMENTS FOR EMPLOYABILITY SKILLS		
Sl. No.	Name of the Equipment	Quantity
1.	Computer (PC) with latest configurations and Internet connection with standard operating system and standard word processor and worksheet software	10 Nos.
2.	UPS - 500VA	10 Nos.
3.	Scanner cum Printer	1 No.
4.	Computer Tables	10 Nos.
5.	Computer Chairs	20 Nos.
6.	LCD Projector	1 No.
7.	White Board 1200mm x 900mm	1 No.

Note: - Above Tools & Equipments not required, if Computer LAB is available in the institute.

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FORMAT FOR INTERNAL ASSESSMENT

Name & Address of the Assessor :				Year of Enrollment :										
Name & Address of ITI (Govt./Pvt.) :				Date of Assessment :										
Name & Address of the Industry :				Assessment location: Industry / ITI										
Trade Name :			Semester:	Duration of the Trade/course:										
Learning Outcome:														
Sl. No	Maximum Marks (Total 100 Marks)		15	5	10	5	10	10	5	10	15	15	Total internal assessment Marks	Result (Y/N)
	Candidate Name	Father's/Mother's Name	Safety consciousness	Workplace hygiene	Attendance/ Punctuality	Ability to follow Manuals/ Written instructions	Application of Knowledge	Skills to handle tools & equipment	Economical use of materials	Speed in doing work	Quality in workmanship	VIVA		
1														
2														