TECHNICIAN TELEVISION & AUDIO SYSTEM

COMPETENCY BASED CURRICULUM

(Duration: 2 Yrs.)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL- 5

SECTOR – ELECTRONICS

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

TECHNICIAN TELEVISION & AUDIO SYSTEM

(Revised in 2018)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL - 5

Developed By

Ministry of Skill Development and Entrepreneurship
Directorate General of Training
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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.

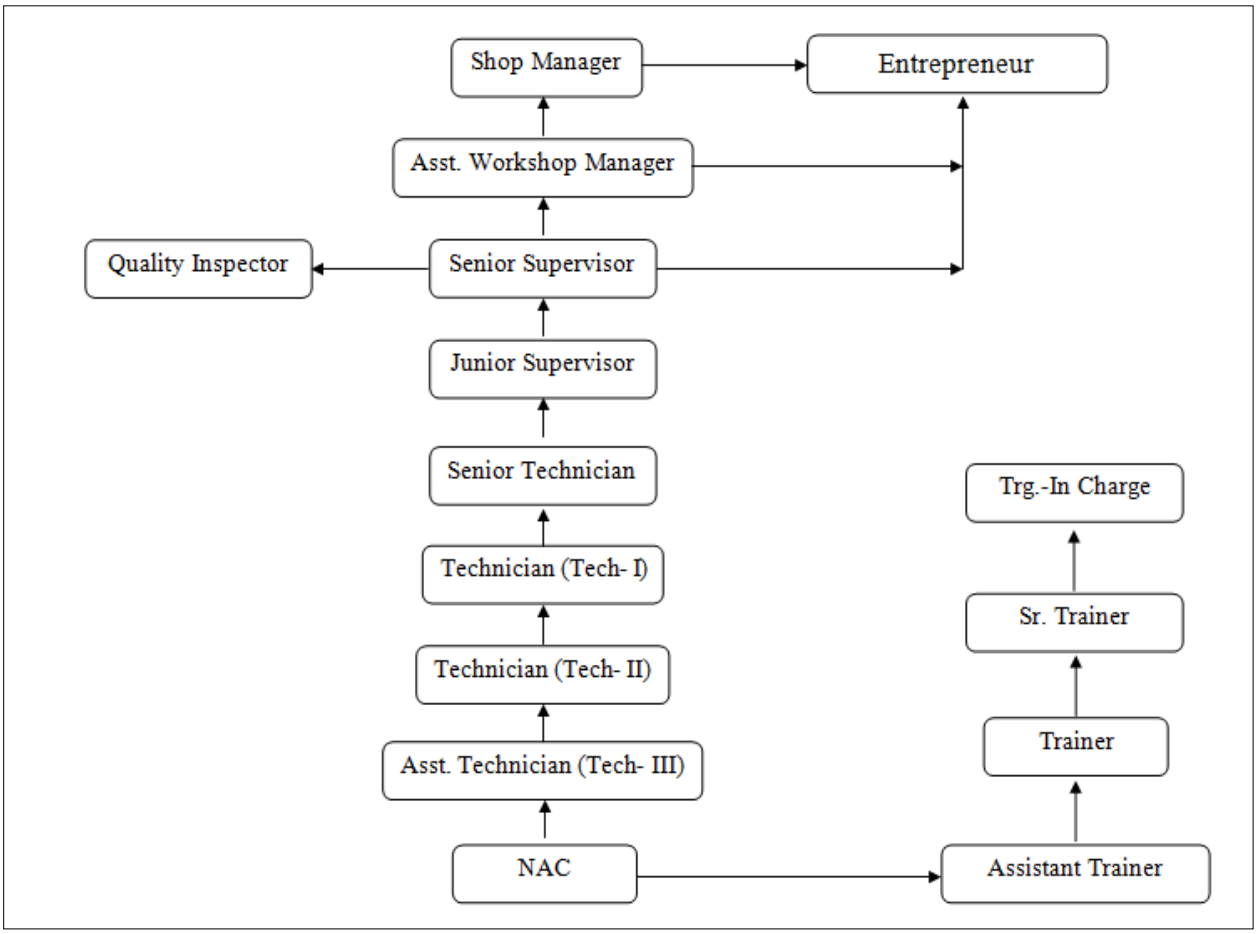
Technician Television & Audio System trade under ATS is one of the courses delivered nationwide through different industries. The course is of two years (02 Blocks) duration. It mainly consists of Domain area and Core area. In the Domain area Trade Theory & Practical impart professional - skills and 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 job/assembly as per drawing for functioning, identify and rectify errors in job/assembly.
- 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 two years (*Basic Training and On-Job Training*): -

Total training duration details: -

Time (in months)	1-3	4-12	13-15	16-24
Basic Training	**Block– II**	**-----**	**Block – II**	**------**
Practical Training (On - job training)	**----**	**Block – II**	**------**	**Block – II**

A. Basic Training

For 02 yrs. course (Engg.) :-(**Total 06 months:** 03 months in 1st yr. + 03 months in 2nd yr.)
For 01 yr. course (Engg.) :-(**Total 03 months:** 03 months in 1st yr.)

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 1st yr. + 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 (section-2.4.2). 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 (section-2.4.2) 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:

Performance Level	Evidence
(a) Weightage in the range of 60 -75% to be allotted during assessment	
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.	• 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	
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.	• 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	
For performance in this grade, the candidate, with minimal or no support in organization and execution and with due regard for safety procedures and practices, has produced work which demonstrates attainment of a high standard of craftsmanship.	• High skill levels in the use of hand tools, machine tools and workshop equipment • Above 80% tolerance dimension/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:

The Television & Audio technicians work in the electronics industry. They investigate problems customers have with their personal electronic devices and supply solutions.

The mechanic are also referred to as service technicians, are the troubleshooters of the TV and audio industry. They are asked to diagnose problems in electronics equipment such as televisions, video and audio disc players, radios, stereo components and video cameras. Often, TV and video repair technicians are specialists who are qualified to install and service devices like home security systems, satellite television dishes, intercom systems, and home entertainment systems.

Mechanic are responsible for setting up and operating audio and video systems, such as radio equipment, sound and video broadcast equipment and recording devices. They may install and configure specific systems for a manufacturing or sales company, install and maintain a wider variety of sound systems in an employer's facility, or set up and take down equipment in the field for concerts, weddings, speeches or other events.

The technicians' job duties may include connecting wires and cables and setting up and packing away sound boards, mixers, speakers, projectors, video screens and spotlights. After setup, technicians may also be responsible for running the machines they have set up. The technicians may be responsible for the permanent installation of items such as smart boards, large projectors, video feeds or computer networking systems.

Plan and organize assigned work and detect & resolve issues during execution. Demonstrate possible solutions and agree tasks within the team. Communicate with required clarity and understand technical English. Sensitive to environment, self-learning and productivity.

Reference NCO: 7421.0300, 7422.1100, 7422.1200, 7422.1300, 7422.1500

4. NSQF LEVEL COMPLIANCE

NSQF level for TECHNICIAN TELEVISION & AUDIO SYSTEM trade under ATS: **Level 5**

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 Technician Television & Audio System trade under ATS mostly matches with the Level descriptor at Level- 5.

The NSQF level-5 descriptor is given below:

Level	Process Required	Professional Knowledge	Professional Skill	Core Skill	Responsibility
Level 5	Job that requires well developed skill, with clear choice of procedures in familiar context.	Knowledge of facts, principles, processes and general concepts, in a field of work or study	A range of cognitive and practical skills required to accomplish tasks and solve problem by selecting and applying basic methods, tools, materials and information.	Desired mathematical skill, understanding of social, political and some skill of collecting and organizing information, communication.	Responsibility for own work and Learning and some responsibility for other's works and learning.

5. GENERAL INFORMATION

Name of the Trade	TECHNICIAN TELEVISION & AUDIO SYSTEM
NCO-2015	**7421.0300, 7422.1100, 7422.1200, 7422.1300, 7422.1500**
NSQF Level	Level – 5
Duration of Apprenticeship Training (Basic Training + On-Job Training)	Two years (02 Blocks each of one year duration).
Duration of Basic Training	a) Block –I : 3 months b) Block – II : 3 months **Total duration of Basic Training: 6 months**
Duration of On-Job Training	a) Block–I: 9 months b) Block–II : 9 months **Total duration of Practical Training: 18 months**
Entry Qualification	Passed 10th Class with Science and Mathematics under 10+2 system of Education or its equivalent
Selection of Apprentices	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.
Infrastructure for Basic Training	As per related trade of ITI
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	i) One year in the trade of Electronics Mechanic/Mechanic Consumer Electronic Appliances ii) One Year who Passed one year BBBT and any one advanced module in CoE of Electronics sector.
CTS trades eligible for TECHNICIAN TELEVISION & AUDIO SYSTEM Apprenticeship	Mechanic Consumer Electronic Appliances

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 Technician Television & Audio System course of 02 years duration under ATS.

Block I & II:-

1. Recognize & comply safe working practices, environment regulation and housekeeping.
2. Understand and explain different mathematical calculation & science in the field of study including basic electrical. *[Different mathematical calculation & science -Work, Power & Energy, Algebra, Geometry & Mensuration, Trigonometry, Heat & Temperature, Levers & Simple machine, graph, Statistics, Centre of gravity, Power transmission, Pressure]*
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. *[Different engineering drawing-Geometrical construction, Dimensioning, Layout, Method of representation, Symbol, scales, Different Projections, Machined components & different thread forms, Assembly drawing, Sectional views, Estimation of material, Electrical & electronic symbol]*
4. Select and ascertain measuring instrument and measure dimension of components and record data.
5. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.
6. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.
7. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.
8. Plan and organize the work related to the occupation.

6.2 SPECIFIC LEARNING OUTCOME

Block – I

1. Perform basic mechanical workshop operations using suitable tools for fitting riveting, drilling etc observing suitable care & safety.
2 Test various electrical/electronic components using proper measuring instruments.
3 Configure, install, troubleshoot, upgrade, interconnect given computer system(s) and demonstrate &utilize application packages for different application.

4 Simulate and analyze the analog and digital circuits using Electronic simulator software.
5 Assemble, test and repair the various analog circuits and apply this knowledge to troubleshoot AF amplifier of PA system, fan regulator, light dimmer circuit, display systems, digital clock, digital timer and event counter.
6 Assemble various electronic circuits using SMD components and test them using suitable test equipment and perform the repair work on the PCB tracks.
7 Prepare, crimp, terminate and test various cables used in different electronics industries.
8 Demonstrate the proficiency in the constructional features of AM/FM communication receiver circuits and devices and trouble shoot them.
9 Dismantle, trouble shoot and replace the modules of a cell phone/smart phone and assemble.

Block – II

10. Occupational Hazards and safety measures related to the trade.
11. Introduction about environment and environment management system.
12. Installation, Operation, Maintenance and Troubleshooting Blue ray players
13. Installation, Operation, Maintenance and Troubleshooting Fibre optics cable.
14. Installation, Operation, Maintenance and Troubleshooting DJ Equipment, Mixer, Amplifier, DJ Headphones, Motorised Lighting, Lazer Pattern Lighting.
15. Installation, Operation, Maintenance and Troubleshooting Satellite Radio System: System Design, Satellite Radio Vs. Other Radio Formats
16. Installation, Operation, Maintenance and Troubleshooting DTH System, Terminology, Technology, Installations, Free & Commercial DBS Services, DTH Service Providers. Satellite Dish principle of operation, size, Systems design & types
17. Installation, Operation, Maintenance and Troubleshooting of digital Video Camera. Major Components, Modern Recording media, Other devices with video capturing ability. Digital Camcorders.
18. Installation, Operation, Maintenance and Troubleshooting of digital studio with transmitting, receiving and video conferencing facility.
19. Installation, Operation, Maintenance and Troubleshooting Domestic Appliances Microwave Oven, Washing Machines, Water Purifiers. Functions & their usage. Block Diagram. Testing & troubleshooting
20. Security Systems: Various Types of Security Systems like Electronic Lock, Burglar Alarm, Biometrics, Closed Circuit Television, and Smart Cards etc. Features & Operation of Closed Circuit Television, Electronic Lock, Electronic Safe.

21. Installation, Operation, Maintenance and Troubleshooting Computer Peripherals: Monitors, Mono/Colour Printers, Modem, Hard Disc, RAM, SMPS, Routers, Ethernet, Graphic Cards, Speakers, Wireless Keyboard and Mouse,
22. Installation, Operation, Maintenance and Troubleshooting of LED/SMART with remote control.
23. Installation, operation, maintenance and troubleshooting of setup box and dish TV.
24. Installation, operation, maintenance and troubleshooting of setup box, camera setup and CCTV.

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 Explain concept of basic science related to the field such as Material science, Mass, weight, density, speed, velocity, heat & temperature, force, motion, pressure, heat treatment, centre of gravity, friction.

electrical and apply in day to day work.*[Different mathematical calculation & science -Work, Power & Energy, Algebra, Geometry & Mensuration, Trigonometry, Heat & Temperature, Levers & Simple machine, graph, Statistics, Centre of gravity, Power transmission, Pressure]*	2.2 Measure dimensions as per drawing
	2.3 Use scale/ tapes to measure for fitting to specification.
	2.4 Comply given tolerance.
	2.5 Prepare list of appropriate materials by interpreting detail drawings and determine quantities of such materials.
	2.6 Ensure dimensional accuracy of assembly by using different instruments/gauges.
	2.7 Explain basic electricity, insulation &earthing.
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. *[Different engineering drawing-Geometrical construction, Dimensioning, Layout, Method of representation, Symbol, scales, Different Projections, Machined components & different thread forms, Assembly drawing, Sectional views, Estimation of material, Electrical & electronic symbol]*	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. Select and ascertain measuring instrument and measure dimension of components and record data.	4.1 Select appropriate measuring instruments such as micrometers, venire callipers, dial gauge, bevel protector and height gauge (as per tool list).
	4.2 Ascertain the functionality & correctness of the instrument.
	4.3 Measure dimension of the components & record data to analyse the with given drawing/measurement.
5. 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

6. 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.
7. 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.
8. 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	
Block- I & II (Section:10)	
*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.*	

8. SYLLABUS

BASIC TRAINING (Block – I)
Duration: (03) Three Months

Week No.	Professional Skills	Professional Knowledge
1.	Importance of trade training, List of tools & Machinery used in the trade. Health & Safety: Introduction to safety equipments and their uses. Introduction of first aid, operation of Electrical mains. **Occupational Safety & Health** **Importance of housekeeping & good shop floor practices.** Basic safety introduction, Personal protective Equipments(PPE):- Use of Fire extinguishers.	Importance of safety and general precautions observed in the in the industry/shop floor. All necessary guidance to be provided to the new comers to become familiar with the working of Industrial Training Institute system including stores procedures. **Soft Skills: its importance and Job area after completion of training.** Introduction of First aid. Operation of electrical mains. Introduction of PPEs. Introduction to 5S concept & its application. Response to emergencies eg; power failure, fire, and system failure.
2.	**Hand Tools and their uses** • Demonstration and uses of hand tools- screw drivers, pliers, tweezers, tester, wire stripper, electrician knife, steel rule, scriber, punches, hacksaw, hammer, files, bench vice and drilling machine. • Simple mechanical fixtures • Identification of types of screws, bolts, nuts, washers, rivets, clamps, connectors • Fix screws of different sizes on wooden boards • Cutting of wooden blocks using hand/hack saw • Simple fitting practice and drilling practice	Identification, specifications, uses and maintenance of commonly used hand tools.

3.	**Basics of AC and Electrical Cables** Identify the Phase, Neutral and Earth on power Socket. Use a Tester to monitor AC power. Measure the voltage between phase and ground and rectify earthing. Identify and test different AC mains cables. Skin the electrical wires /cables using the wire stripper and cutter. Prepare the mains cable for termination.	Basic terms such as electric charges, Potential difference, Voltage, Current, Resistance. Basics of AC & DC. Terms such as +ve cycle, -ve cycle, Frequency, Time period, RMS, Peak, P-P, Instantaneous value. Single phase and Three phase supply. Terms like Line and Phase voltage/ currents. Insulators, conductors and semiconductor properties. Different type of electrical cables and their Specifications. Types of wires & cables, standard wire gauge (SWG). Classification of cables according to gauge (core size), number of conductors, material, insulation strength, flexibility etc.
4.	**<u>AC & DC measurements</u>** • Identify the meter for measuring AC & DC parameters. • Use the multi meter to measure the various functions (AC V, DC V, DC I, AC I, R) • Identify the different controls on the CRO front panel and observe the function of each controls. • Identify the different controls on the function generator front panel and observe the function of each controls. • Connect the function generator to CRO and observe the different wave forms.	Introduction to electrical measuring instruments, Importance of meter, classification of meters, forces necessary to work a meter. MC and MI meter, range extension, need of calibration, characteristics of meters and errors in meters. Multi meter, use of meters in different circuits. Care and maintenance of meters. Use of CRO, Function generator, LCR meter.
5.	**<u>Soldering & De-soldering and switches</u>** • Identify different types of soldering guns and practice soldering of different electronic active and passive components and IC bases on lug boards and	Different types of soldering guns, related to Temperature and wattages, types of tips. Solder materials and their grading. Use of flux and other materials. Selection of

	PCBs • Join the broken PCB track and test • Demonstrate soldering and de-soldering using soldering and de-soldering stations. • Identify and use SPST, SPDT, DPST, DPDT, tumbler, push button, toggle, piano switches used in electronic industries	a soldering gun for specific requirement. Soldering and De-soldering stations and their specifications. Different switches and their specification, uses.
6-7	**Passive Components** • Identify the different types of resistors • Measure the resistor values using colour code and verify the reading by measuring in multi meter • Verify ohms law • Measure the resistance, Voltage, Current through series and parallel connected networks using multi meter • Identify different inductors • Identify the different capacitors and measure capacitance of various capacitors using LCR meter • Dismantle and identify the different parts of a relay. • Connect a relay in a circuit and test for its working	Ohm's law and its variables. Resistor-definition, types of resistors, their construction & specific use, color-coding, power rating. Equivalent Resistance of series parallel circuits. Distribution of V & I in series parallel circuits. KVL& KCL with applications. Principles of induction, inductive reactance, Capacitance and Capacitive Reactance, Impedance. Types of capacitors, construction, specifications and applications. Dielectric constant. Significance of Series parallel connection of capacitors. Electromagnetic Relays, types, construction, specifications- coil voltage and contact current capacity.
8-10	**Passive Components** • Identify the different types of resistors • Measure the resistor values using colour code and verify the reading by measuring in multi meter • Verify ohms law • Measure the resistance, Voltage, Current through series and parallel connected networks using multi meter • Identify different inductors • Identify the different capacitors	Ohm's law and its variables. Resistor-definition, types of resistors, their construction & specific use, color-coding, power rating. Equivalent Resistance of series parallel circuits. Distribution of V & I in series parallel circuits. KVL& KCL with applications. Principles of induction, inductive reactance, Capacitance and Capacitive

	and measure capacitance of various capacitors using LCR meter • Dismantle and identify the different parts of a relay. • Connect a relay in a circuit and test for its working	Reactance, Impedance. Types of capacitors, construction, specifications and applications. Dielectric constant. Significance of Series parallel connection of capacitors. Electromagnetic Relays, types, construction, specifications- coil voltage and contact current capacity.
11-12	**Electronic circuit simulation software** • Prepare simple digital and electronic circuits using the software • Simulate and test the prepared digital and analog circuits • Convert the prepared circuit into a layout diagram. • Explore various troubleshooting and fault finding resources provided in the simulation software.	Study the library components available in the circuit simulation software. Various resources of the software.
13	**Revision & Assessment / Examination (03 days)**	

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.*

BASIC TRAINING (Block – II)
Duration: (03) Three Months

Week No.	Professional Skills	Professional Knowledge
1-2	**Basic Gates and combination circuits** • Identify different Logic Gates (AND, OR, NAND, NOR, X-OR, X-NOR, NOT ICs) by the number printed on them and draw I/O pin-out numbers. • Verify the truth tables of all Logic Gate ICs by connecting switches and LEDs. • Construct and verify the truth table of all the gates using NAND and NOR gates. • Use digital IC tester to test the various digital ICs (TTL and CMOS). • Construct Half Adder/Full adder circuit and verify the truth table. • Construct the Adder cum Subtractor and verify the result.	Introduction to Digital Electronics. Difference between analog and digital signals, Logic families and their comparison, Logic levels of TTL and CMOS. Number systems (Decimal, binary, octal, Hexadecimal) BCD code, ASCII code and code conversions. Logic Gates and their truth tables. Combinational logic circuits such as Half Adder, Full adder, Parallel Binary adders, 2-bit and four bit full adders. Magnitude comparators. Half adder, full adder ICs and their applications for implementing arithmetic operations.
3-4	**Flip Flops and Counters** • Identify different Flip-Flop (ICs) by the number printed on them. • Verify the truth tables of Flip-Flop ICs (RS, D, T, JK, MSJK) by connecting switches and LEDs. • Construct and test a four bit asynchronous binary counter using 7493. • Construct and test synchronous Decade counter. • Identify and test common anode and common cathode seven segment LED display using multi meter	Introduction to Flip-Flop. S-R Latch, Gated S-R Latch, D- Latch. Flip-Flop: Basic RS Flip Flop, edge triggered D Flip Flop, JK Flip Flop, T Flip Flop, Master-Slave flip flops and Timing diagrams, Basic flip flop applications like data storage , data transfer and frequency division. Basics of Counters, types of counters, two bit and three bit Asynchronous binary counters and decade counters with the timing diagrams. Types of seven segment display, BCD display, BCD to decimal decoder.

	• Display the two digit count value on seven segment display using decoder/driver ICs. • Construct a shift register using RS/D/JK flip flop and verify the result • Construct and test four bit SIPO register • Construct and test four bit PIPO register • Construct and test bidirectional shift registers	BCD to 7 segment display circuits.
5	**<u>Op – Amp & Timer 555 Applications:</u>** • Use analog IC tester to test the various analog ICs. • Construction and testing of various Op-Amp circuits Inverting, Non-inverting and Summing Amplifiers. • Construct and test Differentiator and Integrator. • Construct and test a zero crossing detector • Construct and test Instrumentation amplifier. • Construct and test a Binary weighted and R-2R Ladder type Digital-to-Analog Converters. • Construct and test Astable timer circuit using IC 555. • Construct and test mono stable timer circuit using IC 555. • Construct and test VCO (V to F Converter) using IC 555. • Construct and test 555 timers as pulse width modulator.	Block diagram and Working of Op-Amp, importance, Ideal characteristics, advantages and applications. Schematic diagram of 741, symbol, Non inverting voltage amplifier, inverting voltage amplifier, summing amplifier, Comparator, zero cross detector, differentiator, integrator and instrumentation amplifier, other popular Op-Amps. Block diagram of 555, functional description w.r.t. different configurations of 555 such as mono stable, as table and VCO operations for various application.

6	**Fiber optic communication:** • Identify the resources and their need on the given fiber optic trainer kit. • Make optical fiber setup to transmit and receive analog and digital data. • Demonstrate FM modulation and demodulation using OFC trainer kit using audio signal and voice link. • Demonstrate PWM modulation and demodulation using OFC trainer kit using audio signal and voice link. • Demonstrate PPM modulation and demodulation using OFC trainer kit using audio signal and voice link.	Introduction to optical fiber as a transmission media, its advantages over other media, properties of optic fiber, testing, losses, types of fiber optic Cables and specifications. Encoding of light. Fiber optic joints, splicing, testing and the related equipments/measuring tools, precautions to be taken laying of cables, safety aspects while handling optical cables.
7-8	**SMPS:** • Dismantle the given stabilizer and find major sections/ ICs components. • Measure voltages at vital points. • Identify various input and output sockets / connectors of the given SMPS. • Apply input and measure outputs using a multi meter. • Test capacity of the given SMPS. • Identify major sections/ ICs/components of SMPS. • Measure / Monitor major test points of computer SMPS. • Identify and replace the faulty components. • Use SMPS used in TVs and PCs for • Practice • Inverters, battery maintenance and UPS • Identification of front panel controls & indicators of inverter.	• Concept and block diagram of manual & automatic and servo voltage stabilizer, o/p voltage adjustment, voltage cutoff systems, study of different types of relays used in stabilizers, study of electronic circuit commonly used, buck and boost concept. Block Diagram of Switch mode power supplies and their working principles • Various types of chopper circuits step-up, step down, inverting types. • Introduction to DC-DC Converters • ICs used for converting DC- DC, block diagrams and their pin outs. Applications of DC-DC converters • The principle, operation, power rating and change over period of inverter. Block diagram of inverter. Installation of inverters, protection circuits used in inverters- battery level, over load, over charging etc.

	• Identification of back panel sockets & connections of inverter • Connect battery and load to inverter and test on battery load. • Measure battery current & load current when inverter is working in battery mode. • Open top cover of inverter, Identify isolator transformer & inverter transformer .	• Principle and working of three phase inverter circuits. • Installation of single phase & three phase inverters • Concept of UPS, Difference between inverters & UPS. Basic block diagram of UPS & operation principle of rectifier, battery, inverter, static transfer switch. • Types of UPS: OFF line UPS, ON line UPS, Line interactive UPS & their comparisons. UPS specification, load power factor & types of indications and protections.
9	**LCD and LED TV** • Identification and use of different Controls LCD/LED TV/SMART TV • Identify various connectors provided on a LCD TV and test the healthiness. • Dismantling the panel of LCD/LED TV • Identification of components and different sector of LCD / LED TV/SMART TV. • Dismantle, Identify the parts of the remote control • Trace and rectify the faults of a various remote controls • Identify various connectors and connect the cable operator's external decoder (set top box) to the TV. • LCD/ LED Projector. • Identify various front panel controls on the given LCD/LED Projector and operate the projector using them • Identify rear connectors and	• Difference between a conventional CTV with LCD/ LED and SMART TVs, • Principle of LCD/ LED & SMART TV and function of its different section. Basic principle and working of 3D TV. • IPS panels and their features • Different types of interfaces like HDMI, USB, RGB etc with latest TVs. • TV Remote Control –Types, parts and functions, IR Code transmitter and IR Code Receiver, Working principle, operation of remote control. Different adjustments, general faults in Remote Control. • Differentiate LCD and LED projectors. • Specifications of LED Projector. • Working principle of LED Projector. • Most frequently occurring faults in a LED projector and their remedies.

	terminate them using proper cables to the desktop computer. • Make necessary adjustments of the display using remote. • Dismantle the projector and identify all major functional modules • Test the healthiness of power supply, exhaust fan etc. • Identify the LCD/LED lamp stack and monitor the necessary voltages	
10	**DTH System** • Identification & use of DTH system assembly. • Identification & use of different tools and equipments used in DTH installation procedure & cabling procedure. • Identification of Various types of connectors and cables and • Connection procedure. • Install a DTH system & get a TV station. • Site selection, installation mounting tracking for azimuth and elevation angles using SAT meter. • Identify the faults in DTH system & rectify. • Identification & use of various I/O ports of STB. • STB connection and first installation • Identify the faults in STB & rectify.	• Basic satellite communication, Merits & Demerits of satellite communication, applications, types of satellite & its orbits, Satellite Frequency Bands. Basic components of DTH system: PDA, LNBC, Satellite receiver terminal, dish installation aspects, Azimuth & elevation settings of dish/ DTH receiver. Types of cables used in DZTH system, impedance and specification • Multi-dwelling unit design, headed amplifier, line amplifier, cascaded in/out multi-switch, tap, and splitter. Set top box features, block diagram of set top box, I/O ports, Cable modem termination system, software & customer premises equipment's.
11.	• Sensors, Transducers and Applications. • Identify sensors used in process industries such as RTDs, Temperature ICs, Thermocouples, proximity switches (inductive,	• Basics of passive and active transducers. • Role, selection and characteristics. • Working principles of RTD, PT-100 Thermocouple, Sensor voltage and current formats.

	capacitive and photo electric), load cells, strain gauge. LVDT by their appearance. • Measure temperature of a lit fire using a Thermocouple and record the readings referring to data chart. • Measure temperature of a lit fire using RTD and record the readings referring to data chart. • Measure the strain of a given material using strain gauge. • Measure the DC voltage of a LVDT. • Detect different objectives using capacitive, inductive and photoelectric proximity sensors.	• Thermistors – salient features – operating range, composition, advantages and disadvantages. • Thermocouples – basic principle – commonly used combinations, operating range, advantages and disadvantages. • Strain gauges – principle, gauge factor, types of strain gauges. • Load cell –definition, uses, working of strain gauge load cell. • Principle of operation of capacitive transducers,- advantages and disadvantages. • Principle of operation of inductive transducers,- advantages and disadvantages. • Principle of operation of LVDT-its advantages and disadvantages. • Proximity sensors – applications, working principles of eddy current , capacitive and inductive proximity sensors.
12.	• Sensors, Transducers and Applications. • Identify sensors used in process industries such as RTDs, Temperature ICs, Thermocouples, proximity switches (inductive, capacitive and photo electric), load cells, strain gauge. LVDT by their appearance • Measure temperature of a lit fire using a Thermocouple and record the readings referring to data chart. • Measure temperature of a lit fire using RTD and record the readings referring to data chart. • Measure the strain of a given material using strain gauge	• Basics of passive and active transducers. • Role, selection and characteristics. • Working principles of RTD, PT-100 Thermocouple, Sensor voltage and current formats. • Thermistors – salient features – operating range, composition, advantages and disadvantages. • Thermocouples – basic principle – commonly used combinations, operating range, advantages and disadvantages. • Strain gauges – principle, gauge factor, types of strain gauges. • Load cell –definition, uses, working

	• Measure the DC voltage of a LVDT • Detect different objectives using capacitive, inductive and photoelectric proximity sensors.	of strain gauge load cell • Principle of operation of capacitive transducers,- advantages and disadvantages • Principle of operation of inductive transducers,- advantages and disadvantages. • Principle of operation of LVDT-its advantages and disadvantages. • Proximity sensors – applications, working principles of eddy current, capacitive and inductive proximity sensors.
13.	**CCTV** • Identification of different CCTV components. • Draw, Trace or follow the CCTV setup of any commercial installation. • Identify the strategic locations for the installation of cameras. • Operate and learn the procedure for switching of cameras to have different views. • Identification of connectors and sockets used on DVRs. • Test the healthiness cables and connectors. • Connect CCTV Cameras to DVR, Record and Replay. • Dismantle DVR and identify major functional blocks and test for the healthiness. • Take the students to any nearby commercial CCTV installation to carry out the above tasks.	• Types of cameras and their specifications used in CCTV systems. • CCTV Setup and its components Working of Digital Video Recorders and types of DVRs.
14	**Assessment / Examination (03 days)**	

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.*

9.1 WORKSHOP CALCULATION SCIENCE & ENGINEERING DRAWING

Block- I

Sl. No.	Engineering Drawing (Duration : 30 hours)	Workshop Science & Calculation (Duration : 20 hours)
1	**Engineering Drawing:** Introduction and its importance -Viewing of engineering drawing sheets. Method of Folding of printed Drawing Sheet as per BIS SP:46-2003 Drawing Instruments : their Standard and 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.	**Unit**: Systems of unit- FPS, CGS, MKS/SI unit, unit of length, Mass and time, Conversion of units.
2	**Lines :** - Definition, types and applications in Drawing as per BIS SP:46-2003 - Classification of lines (Hidden, centre, construction, Extension, Dimension, Section) - Drawing lines of given length (Straight, curved) - Drawing of parallel lines, perpendicular line - Methods of Division of line segment	**Fractions & Simplification**: Fractions, Decimal fraction, Multiplication and Division of Fractions and Decimals, conversion of Fraction to Decimal and vice versa. Simple problems Simplification using BODMAS.
3	**Drawing of Geometrical Figures**: Definition, nomenclature and practice of - - Angle: Measurement and its types, method of bisecting. - Triangle -different types - Rectangle, Square, Rhombus, Parallelogram. - Circle and its elements.	**Square Root** : Square and Square Root, method of finding out square roots, Simple problem using calculator.

4	**Lettering and Numbering** as per BIS SP46-2003: - Single Stroke, Double Stroke, inclined, Upper case and Lower case.	**Ratio &Proportion:** Simple calculation on related problems.
5	**Free Hand sketch:** Hand tools and measuring instruments used in electronics mechanics Trades	**Percentage:** Introduction, Simple calculation. Changing percentage to decimal and fraction and vice-versa.
6	**Free hand drawing :** - Lines, polygons, ellipse, etc. - Geometrical figures and blocks with dimension. -Transferring measurement from the given object to the free hand sketches.	**Material Science** : Properties -Physical & Mechanical, Types –Ferrous & Non-Ferrous, difference between Ferrous and Non-Ferrous metals, introduction of Iron, Cast Iron, Wrought Iron, Steel, difference between Iron and Steel, Alloy steel, carbon steel, stainless steel, Non-Ferrous metals, Non-Ferrous Alloys.

Block - II

Sl. No.	Engineering Drawing (Duration : 30 hours)	Workshop Science & Calculation (Duration : 20 hours)
1	**Symbolic Representation** (as per BIS SP:46-2003) of : - Fastener (Rivets, Bolts and Nuts) - Bars and profile sections - Weld, brazed and soldered joints. - Electrical and electronics element - Piping joints and fittings	**Mass ,Weight and Density** : Mass, Unit of Mass, Weight, difference between mass and weight, Density, unit of density, specific gravity of metals
2	**Construction of Scales and diagonal scale**	**Work, Power and Energy**: work, unit of work, power, unit of power, Horse power of engines, mechanical efficiency, energy, use of energy, potential and kinetic energy, examples of potential energy and kinetic energy.
3	LED, IRLED, photo diode, photo transistor, opto-coupler symbols symbol of Logic gates	
4	Half adder, full adder, multiplexer and de-multiplexer	**Algebra:** Addition, Subtraction, Multiplication, Division, Algebraic formula, Linear equations (with two variables).

5	UJT, FET, MOSFET, DIAC, TRIC, SCR, IGBT symbols and circuits of FET Amplifier, SCR using UJT triggering, snubber circuit, light dimmer circuit using TRIAC, UJT based free running oscillator.	**Mensuration:** Area and perimeter of square, rectangle, parallelogram, triangle, circle, semi circle. Volume of solids – cube, cuboid, cylinder and Sphere. Surface area of solids – cube, cuboid, cylinder and Sphere.
		Trigonometry: Trigonometrical ratios, measurement of angles. Trigonometric tables. Finding height and distance by trigonometry.

9.2 EMPLOYABILITY SKILLS

(DURATION: - 110 HRS.)

Block – I (Duration – 55 hrs.)	
1. English Literacy Duration : 20 Hrs.	Marks : 09
Pronunciation	Accentuation (mode of pronunciation) on simple words, Diction (use of word and speech)
Functional Grammar	Transformation of sentences, Voice change, Change of tense, Spellings.
Reading	Reading and understanding simple sentences about self, work and environment
Writing	Construction of simple sentences Writing simple English
Speaking / Spoken English	Speaking with preparation on self, on family, on friends/ classmates, on know, picture reading gain confidence through role-playing and discussions on current happening job description, asking about someone's job habitual actions. Cardinal (fundamental) numbers ordinal numbers. Taking messages, passing messages on and filling in message forms Greeting and introductions office hospitality, Resumes or curriculum vita essential parts, letters of application reference to previous communication.
2. I.T. Literacy Duration : 20 Hrs.	Marks : 09
Basics of Computer	Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of computer.

Computer Operating System	Basics of Operating System, WINDOWS, The user interface of Windows OS, Create, Copy, Move and delete Files and Folders, Use of External memory like pen drive, CD, DVD etc, Use of Common applications.
Word processing and Worksheet	Basic operating of Word Processing, Creating, opening and closing Documents, use of shortcuts, Creating and Editing of Text, Formatting the Text, Insertion & creation of Tables. Printing document. Basics of Excel worksheet, understanding basic commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets.
Computer Networking and Internet	Basic of computer Networks (using real life examples), Definitions of Local Area Network (LAN), Wide Area Network (WAN), Internet, Concept of Internet (Network of Networks), Meaning of World Wide Web (WWW), Web Browser, Web Site, Web page and Search Engines. Accessing the Internet using Web Browser, Downloading and Printing Web Pages, Opening an email account and use of email. Social media sites and its implication. Information Security and antivirus tools, Do's and Don'ts in Information Security, Awareness of IT - ACT, types of cyber crimes.
3. Communication Skills Duration : 15 Hrs.	Marks : 07
Introduction to Communication Skills	Communication and its importance Principles of Effective communication Types of communication - verbal, non verbal, written, email, talking on phone. Non verbal communication -characteristics, components-Para-language Body language Barriers to communication and dealing with barriers. Handling nervousness/ discomfort.
Listening Skills	Listening-hearing and listening, effective listening, barriers to effective listening guidelines for effective listening. Triple- A Listening - Attitude, Attention & Adjustment. Active Listening Skills.
Motivational Training	Characteristics Essential to Achieving Success. The Power of Positive Attitude. Self awareness Importance of Commitment Ethics and Values Ways to Motivate Oneself Personal Goal setting and Employability Planning.
Facing Interviews	Manners, Etiquettes, Dress code for an interview

	Do's & Don'ts for an interview.
Behavioral Skills	Problem Solving Confidence Building Attitude
Block – II Duration – 55 hrs.	
4. Entrepreneurship Skills Duration : 15 Hrs. Marks : 06	
Concept of Entrepreneurship	Entrepreneur - Entrepreneurship - Enterprises:-Conceptual issue Entrepreneurship vs. Management, Entrepreneurial motivation. Performance & Record, Role & Function of entrepreneurs in relation to the enterprise & relation to the economy, Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.
Project Preparation & Marketing analysis	Qualities of a good Entrepreneur, SWOT and Risk Analysis. Concept & application of PLC, Sales & distribution Management. Different Between Small Scale & Large Scale Business, Market Survey, Method of marketing, Publicity and advertisement, Marketing Mix.
Institutions Support	Preparation of Project. Role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes & procedure & the available scheme.
Investment Procurement	Project formation, Feasibility, Legal formalities i.e., Shop Act, Estimation & Costing, Investment procedure - Loan procurement - Banking Processes.
5. Productivity Duration : 10 Hrs. Marks : 05	
Benefits	Personal / Workman - Incentive, Production linked Bonus, Improvement in living standard.
Affecting Factors	Skills, Working Aids, Automation, Environment, Motivation - How improves or slows down.
Comparison with developed countries	Comparative productivity in developed countries (viz. Germany, Japan and Australia) in selected industries e.g. Manufacturing, Steel, Mining, Construction etc. Living standards of those countries, wages.
Personal Finance Management	Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance.

6. Occupational Safety, Health and Environment Education Duration : 15 Hrs.	Marks : 06
Safety & Health	Introduction to Occupational Safety and Health importance of safety and health at workplace.
Occupational Hazards	Basic Hazards, Chemical Hazards, Vibroacoustic Hazards, Mechanical Hazards, Electrical Hazards, Thermal Hazards. Occupational health, Occupational hygienic, Occupational Diseases/ Disorders & its prevention.
Accident & safety	Basic principles for protective equipment. Accident Prevention techniques - control of accidents and safety measures.
First Aid	Care of injured & Sick at the workplaces, First-Aid & Transportation of sick person.
Basic Provisions	Idea of basic provision legislation of India. Safety, health, welfare under legislative of India.
Ecosystem	Introduction to Environment. Relationship between Society and Environment, Ecosystem and Factors causing imbalance.
Pollution	Pollution and pollutants including liquid, gaseous, solid and hazardous waste.
Energy Conservation	Conservation of Energy, re-use and recycle.
Global warming	Global warming, climate change and Ozone layer depletion.
Ground Water	Hydrological cycle, ground and surface water, Conservation and Harvesting of water.
Environment	Right attitude towards environment, Maintenance of in -house environment.
7. Labour Welfare Legislation Duration : 05 Hrs.	Marks : 03
Welfare Acts	Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Payment Wages Act, Employees Provident Fund Act, The Workmen's compensation Act.
8. Quality Tools Duration : 10 Hrs.	Marks : 05

Quality Consciousness	Meaning of quality, Quality characteristic.
Quality Circles	Definition, Advantage of small group activity, objectives of quality Circle, Roles and function of Quality Circles in Organization, Operation of Quality circle. Approaches to starting Quality Circles, Steps for continuation Quality Circles.
Quality Management System	Idea of ISO 9000 and BIS systems and its importance in maintaining qualities.
House Keeping	Purpose of House-keeping, Practice of good Housekeeping.
Quality Tools	Basic quality tools with a few examples.

10. DETAILS OF COMPETENCIES (ON-JOB TRAINING)

BROAD LEARNING TO BE COVERED IN INDUSTRY FOR TECHNICIAN TELEVISION & AUDIO SYSTEM TRADE:

1. Safety and best practices /Basic Industrial Culture (5S, KAIZEN, etc.)
2. Record keeping and documentation.
3. Identification and testing of electronic components/devices.
4. Repair & Maintenance work.

Note: Actual training will depend on the existing facilities available in the establishments.

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

Block – I

1 Perform basic mechanical workshop operations using suitable tools for fitting riveting, drilling etc observing suitable care & safety.

2 Test various electrical/electronic components using proper measuring instruments.
   1. Introduction to measuring instrument.
   2. Difference between MI Type and MC Type.
   3. Difference between analog & Digital Multimeter.
   4. Use of analog & Digital Multimeter.
   5. Introduction & use of front control of CRO.
   6. Measuring Voltage, current, resistance using Multimeter.
   7. Measurment of Voltage, current, Frequency and Phase angle using CRO
   8. Introduction and use of Wattmeter.

3 Configure, install, troubleshoot, upgrade, interconnect given computer system(s) and demonstrate &utilize application packages for different application.
   1. Safety precaution while handling pc internal component.
   2. Introduction & use of various component used in pc.
   3. Demo on assembling of PC.
   4. Motherboard connection.
   5. Symptom of beep.
   6. Formatting of HDD.
   7. Installation of OS.
   8. Installation of Application Software.
   9. Installation & Use of Antivirus.
   10. Troubleshooting & Maintenance.

4 Simulate and analyze the analog and digital circuits using Electronic simulator software.
   1. Introduction to simulation software.

2. Introduction & use of all menu.
3. Use of library.
4. Assemble circuit & test.
5. See the graphical result.

5 Assemble, test and repair the various analog circuits and apply this knowledge to troubleshoot AF amplifier of PA system, fan regulator, light dimmer circuit, display systems, digital clock, digital timer and event counter.

1. Identify the component given for assembly of above circuit.
2. Assemble the circuit with proper precaution.
3. Test the application circuit.
4. Repair, maintenance & troubleshooting the circuit.

6 Assemble various electronic circuits using SMD components and test them using suitable test equipment and perform the repair work on the PCB tracks.

1. Introduction to ESD belt.
2. Introduction to identify the SMD component.
3. Soldering concept of SMD, ie. Substrate, Solder paste Machine, component assembly (using pick & place machine), Reflow and Rework etc.
4. Testing of SMD assembled PCB using suitable test jig.

7 Prepare, crimp, terminate and test various cables used in different electronics industries.

1. Introduction to various connector/ Jack used in industry and their use.
2. Use of various crimping tools.
3. Crimping of RJ-11 and RJ 45 connector.
4. Crimping of straight and cross cable.

8 Demonstrate the proficiency in the constructional features of AM/FM communication receiver circuits and devices and trouble shoot them.

1. Introduction to AM/FM communication receiver.
2. Check the frequency response of AM/FM communication receiver.
3. Troubleshooting of AM/FM communication receiver.

9 Dismantle, trouble shoot and replace the modules of a cell phone/smart phone and assemble.

1. Introduction to cell phone/smart phone.
2. Identification of various parts used in cell phone/smart phone
3. Assembly of cell phone/smart phone.
4. Dismantle of cell phone/smart phone.
5. Software loading / Up gradation of software.
6. Configuration & Installation of various Application.

Block – II

1 Occupational Hazards and safety measures related to the trade.
Introduction about environment and environment management system.
3 Installation, Operation, Maintenance and Troubleshooting Blue ray players.
4 Installation, Operation, Maintenance and Troubleshooting Fibre optics cable.
5 Installation, Operation, Maintenance and Troubleshooting
DJ Equipment, Mixer, Amplifier, DJ Headphones, Motorised Lighting, Lazer Pattern Lighting.
6 Installation, Operation, Maintenance and Troubleshooting
Satellite Radio System: System Design, Satellite Radio Vs. Other Radio Formats
7 Installation, Operation, Maintenance and Troubleshooting
DTH System, Terminology, Technology, Installations, Free & Commercial DBS Services, DTH Service Providers. Satellite Dish principle of operation, size, Systems design & types
8 Installation, Operation, Maintenance and Troubleshooting of digital Video Camera.
Major Components, Modern Recording media, Other devices with video capturing ability. Digital Camcorders.
9 Installation, Operation, Maintenance and Troubleshooting of digital studio with transmitting, receiving and video conferencing facility.
10 Installation, Operation, Maintenance and Troubleshooting Domestic Appliances.
Microwave Oven, Washing Machines, Water Purifiers. Functions & their usage. Block Diagram. Testing & troubleshooting Security Systems:
Various Types of Security Systems like Electronic Lock, Burglar Alarm, Biometrics, Closed Circuit Television, and Smart Cards etc. Features & Operation of Closed Circuit Television, Electronic Lock, Electronic Safe
11 Installation, Operation, Maintenance and Troubleshooting.
Computer Peripherals: Monitors, Mono/Colour Printers, Modem, Hard Disc, RAM, SMPS, Routers, Ethernet, Graphic Cards, Speakers, Wireless Keyboard and Mouse,
12 Installation, Operation, Maintenance and Troubleshooting of LED/SMART with remote control.
13 Installation, operation, maintenance and troubleshooting of setup box and dish TV.
14 Installation, operation, maintenance and troubleshooting of setup box, camera setup and CCTV.

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.

ANNEXURE – I

INFRASTRUCTURE FOR PROFESSIONAL SKILL & PROFESSIONAL KNOWLEDGE

TECHNICIAN TELEVISION & AUDIO SYSTEM			
LIST OF TOOLS AND EQUIPMENT for Basic Training (For 20 Apprentices)			
Sl. No.	**Item**	**Specification**	**Qty**
1	Connecting screwdriver	100 mm	10 Nos.
2	Neon tester.	500 V	6 Nos.
3	Screw driver set	(set of 5)	10 Nos.
4	Insulated combination pliers	150 mm	6 Nos.
5	Insulated side cutting pliers	150 mm	8 Nos.
6	Long nose pliers	150 mm	6 Nos.
7	Soldering iron	25 W. 240 V.	10 Nos.
8	Electrician knife	15 cm	6 Nos.
9	Tweezers	100mm	10 Nos.
10	Digital Millimeter	(3 ½ digit)	10 Nos.
11	Soldering Iron Changeable bits	10 W	6 Nos.
12	De- soldering pump		10 Nos.

TOOLS INSTRUMENTS AND GENERAL SHOP OUTFITS.

Sl. No	Name of the items	Specification	Quantity (Indicative)
1.	Steel rule	300mm	4 Nos.
2.	Steel measuring tape-	3 m	4 Nos.
3.	Tools makers vice (clamp)	100mm	1 No.
4.	Tools maker vice (clamp)	50mm	1 No.
5.	Crimping tool (pliers)		2 Nos.
6.	Magneto spanner set	200mm	2 Nos.
7.	File flat bastard		2 Nos.
8.	File flat second cut	200mm	2 Nos.
9.	File flat smooth	200mm	2Nos.
10.	Flat pliers	100mm	4 Nos.
11.	Round Nose pliers	100mm	4 Nos.
12.	Scriber straight	150mm	2 Nos.
13.	Hammer ball peen	0.5Kg	1 No.
14.	Allen key set	(set of 9)	1 No.
15.	Tubular box spanner	(set of 6Nos)	1 set.

16.	Magnifying lenses	75mm	2 Nos.
17.	Continuity tester		6 Nos.
18.	Hacksaw frame adjustable		2 Nos.
19.	Cold chisel	20mm	1 No.
20.	Scissors	200mm	1 No.
21.	Handsaw	450mm	1 No.
22.	Hand Drill Machine		2 Nos.
23.	First aid kit		1 No.
24.	Fire Extinguisher		2 Nos.
25.	Bench Vice		1 No.
26.	Dual DC regulated power supply	30-0-30 V, 2 Amps	4 Nos.
27.	DC regulated variable power supply	0-24 V, 1Amp	2 Nos.
28.	LCR meter (Digital)		1 No.
29.	CRO Dual Trace 20 MHz (component testing facilities)		2 Nos.
30.	Signal Generator,	0-100 KHz	2 Nos.
31.	Analog multi meter		2 Nos.
32.	Function generator (Triangular, square and sine wave)		2 Nos.
33.	Dimmer start	3 Amps	2 Nos.
34.	Op Amp trainer		2 Nos.
35.	Digital IC Tester		1 No.
36.	Computers in the assembled form (including cabinet, motherboards, HDD, DVD, SMPS, Monitor, KB, Mouse, LAN card, Blu-Ray drive and player), MS Office education version.		2 Nos.
37.	Laptops latest configuration		1 No.
38.	Laser jet Printer		1 No.
39.	INTERNET BROADBAND CONNECTION		1 No.
40.	Different types of Analog electronic components, digital ICs, power electronic components, general purpose PCBs, bread board, MCB, ELCB		As required
41.	SMD Soldering & De soldering Station with necessary accessories		1 No.
42.	Sensor trainer kit (containing Various sensors like Thermocouple, RTD, Thermocouple, load cell, strain gauge, LVDT, smoke sensors, speed sensor)		2 Nos.
43.	Simulation software packages		2 Nos
44.	Smart phone of different make 3G/4G enable		4 Nos
45.	Regulated power supply variable for cell phone repair		4 Nos
46.	LCD, LED, SMART TV trainer kit		1 No each

47.	AM/FM Commercial radio receivers		2 Nos
48.	Fiber optic communication trainer		2 nos
49.	SMPS trainer		1 No
50.	SMPS of different make		4 Nos
51.	PA system with amplifier		1 No
52.	LCD and LED TV		1 each
53.	CCTV set up		1 system

The specifications of the items in the above list have been given in Metric Units. The items which are available in the market nearest of the specification as mentioned above, if not available as prescribed should be procured Measuring instruments such as steel rule which are graduated both English and Metric Units may be procured, if available.

Note: In case of basic training setup by the industry the tools, equipment and machinery available in the industry may also be used for imparting basic training.

INFRASTRUCTURE FOR WORKSHOP CALCULATION & SCIENCE AND ENGINEERING DRAWING

TRADE: TECHNICIAN TELEVISION & AUDIO SYSTEM

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^o (250 X 1.5 mm)		20+1 set
3.	Set square celluloid 30^o-60^o (250 X 1.5 mm)		20+1 set
4.	Mini drafter		20+1 set
5.	Drawing board (700mm x500 mm) IS: 1444		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.		

ANNEXURE-II

FORMAT FOR INTERNAL ASSESSMENT

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

Sl. No	**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	**Total internal assessment Marks**	**Result (Y/N)**
Maximum Marks (Total 100 Marks)			**15**	**5**	**10**	**5**	**10**	**10**	**5**	**10**	**15**	**15**		
1														
2														