INFORMATION & COMMUNICATION TECHNOLOGY SYSTEM MAINTENANCE

COMPETENCY BASED CURRICULUM

(Duration: 2 Yrs.)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL- 5

SECTOR – IT & ITeS

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

INFORMATION & COMMUNICATION TECHNOLOGY SYSTEM MAINTENANCE

(Designed in 2021)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL - 5

Developed By

Ministry of Skill Development and Entrepreneurship
Directorate General of Training
CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE
EN-81, Sector-V, Salt Lake City,
Kolkata – 700 091

CONTENTS

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 Directorate General of Training (DGT) 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 DGT 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.

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 Directorate General of Training (DGT). Craftsman Training Scheme (CTS) and Apprenticeship Training Scheme (ATS) are two pioneer programmes of DGT for propagating vocational training.

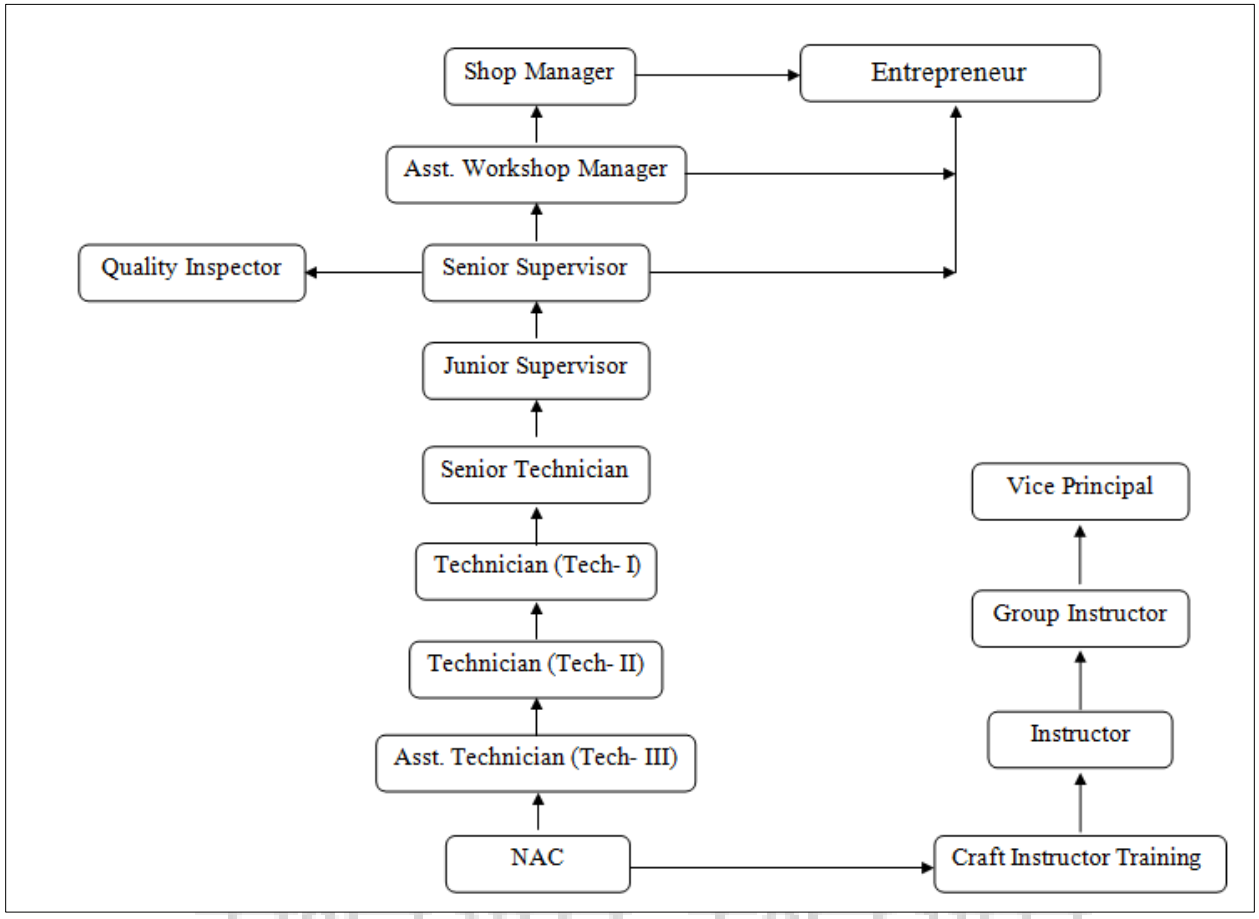
Information and Communication Technology System Maintenance trade under ATS is of two year duration. It mainly consists of Domain area and Core area. In the Domain area Trade Theory & Practical impart professional - skills and knowledge, while Core area - Workshop Calculation and science, Engineering 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 DGT 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:

- Can join Crafts Instructor Training Scheme (CITS) in the trade for becoming instructor in ITIs.
- 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 year (*Basic Training and On-Job Training*):-

Total training duration details: -

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

Basic Training: 06 Months (03 Months+03 Months)

SL. No.	Course Element	Total Notional Training Hours
1.	Professional Skill (Trade Practical)	550
2.	Professional Knowledge (Trade Theory)	240
3.	Workshop Calculation & Science	40
4.	Engineering Drawing	60
5.	Employability Skills	110
	Total (Including internal assessment)	**1000**

A. 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.

B. Total training hours: -

Duration	Basic Training	On-Job Training	Total
For 02 yrs. course (Engg.)	1000 hrs.	3120 hrs.	4120 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 DGT 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:

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	• High skill levels in the use of hand tools, machine tools and workshop equipment • Above 80% tolerance dimension/accuracy achieved while

which demonstrates attainment of a high standard of craftsmanship.	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:

ICT Technician; is responsible to maintain the ICT nodes/installations live on 24x7 basis, observe and repair Level-1 faults/issues in installed ICT equipment at site, carry out specified preventive and corrective maintenance procedures and report relevant network incidents to the supervisor in time for information as well as response. ICT or Information and Communication Technology refers to NodeB/e-NodeB, IP and TDM transmission equipment, IP and Packet Core switch, Cloud and Data Centre equipment.

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

Data Communication Analyst/Network Administrator; researches, tests, evaluates, and recommends data communications hardware and software: Identifies areas of operation which need upgraded equipment, such as modems, fibre optic cables and telephone wires. Conducts survey to determine user needs. Reads technical manuals and brochures to determine equipment which meets establishment requirements. Visits vendors to learn about available products or services. Tests and evaluates hardware and software to determine efficiency, reliability, and compatibility with existing system, using equipment such as computer terminal and modem. Analyses test data and recommends hardware or software for purchase. Develops and writes procedures for installation, use, and solving problems of communications hardware and software.

Monitors system performance. Trains users in use of equipment. Assists users to identify and solve data communication problems. May write technical specifications to send to vendors for bid. May oversee or assist in the installation of communications hardware. May perform minor equipment repairs.

Reference NCO-2015:

a) 3114.0802 – ICT Technician
b) 2523.0200 –Computer System Hardware Analyst/Hardware Engineer
c) 2523.0100 –Data Communication Analyst/Network Administrator

4. NSQF LEVEL COMPLIANCE

NSQF level for Information and Communication Technology System Maintenance 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 Information and Communication Technology System Maintenance 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	Information and Communication Technology System Maintenance
Course Code	DGT/ 3210
NCO - 2015	3114.0802, 2523.0200, 2523.0100
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
Space Norms	70 Sq. m
Power Norms	3.45 KW
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 Information and Communication Technology System Maintenance CTS trade.
Infrastructure of Basic Training	Annexure - I
Examination	The internal examination/ formative assessment will be held on completion of each 3 months duration, based on which sessional marks to be awarded. Final examination for all subjects will be held at the end of course and same will be conducted by DGT.
Rebate to Ex-ITI Trainees	01 year
CTS/CoE trades eligible for Information and Communication Technology System Maintenance Apprenticeship	1. Information and Communication Technology System Maintenance 2. Information technology and Electronics System maintenance 3. Broad Based Basic Training in ***Information Technology*** Sector under Centre of Excellence Scheme and Advanced

	module of Centre of Excellence Scheme in ***Repair and Maintenance of Hardware of Computer and Peripherals***.

Note:

- *Industry may impart training as per above time schedule for different blocks, 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 aspect is compromised.*
- *For imparting Basic Training the industry needs to have tie-up with ITIs having such specific trade and affiliated to DGT.*

6. LEARNING OUTCOME

6.1 GENERIC LEARNING OUTCOME

The following are minimum broad Common Occupational Skills/ Generic Learning Outcome after completion of the Information and Communication Technology System Maintenance 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. Use various electrical components i.e. fuses, resistors, inductors, transformers, capacitance and measure voltage, current, resistance, inductance using measuring devices and find resonance value of a circuit.
2. Perform Soldering& De-soldering of electrical & electronic components.
3. Use various electronic devices i.e. Diode, Zener Diode, transistors, JFET, MosFET and make rectifiers, amplifier using electronic devices.
4. Construct and test various Power Supply circuit.

5. Construct electronic circuits using logic gates and realise truth tables of various gates, encoder, decoder, multiplexer, de-multiplexer, flip flops.
6. Perform battery charging operations of acid battery and check connections.
7. Inspect internal parts of CRO and use it to measure voltage, frequency, modulation of modulator/ transmitter.
8. Work with some important Mechanical, Electrical & Electronics Accessories used in information communication system.
9. Use Word Processing and Spreadsheet Software and perform formatting operations in MS Word and perform various table related activities in MS Excel.
10. Identify various hardware components and Assemble and replace hardware components of Desktop Computer.
11. Install & customise Operating System and all other system &application software.
12. Assemble and replace hardware components of Laptop PC.
13. Replace/ install SMPS and troubleshoot its faults.
14. Familiarize with various components of Motherboard.
15. Identify different types of memory devices, chips and its structure.

Block – II

16. Install and customize Linux operating system.
17. Install Printer, Scanner and troubleshoot their faults.
18. Install/Replace Display Driver Card, perform servicing and configure various display unit.
19. Install/Replace Sound Card and set properties to adjust sound quality.
20. Perform maintenance and servicing of UPS.
21. Install and configure Modem, System Resources, Add on Cards, Cables & Connectors.
22. Upgrade, maintain and troubleshoot PC.
23. Assemble, replace and troubleshoot various parts of Tablet/ Smart Devices.
24. Browse internet and work with Cloud Computing.
25. Set up and configure Networking System using various network devices.
26. Share and control resource and Internet connection through network.
27. Implement Network Security to protect from various attacks on networking.
28. Perform installation and basic configuration of Windows Server.
29. Perform installation, configuration of DNS, Routing and user account customization.
30. Configure Server and manage Server Network security and Infrastructure.
31. Perform installation and basic configuration of Linux server.

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	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,

field of study including basic electrical andapply 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]*	heat treatment, centre of gravity, friction.
	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, vernier calipers, 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 given drawing/measurement.
5. Explain the concept in productivity, quality tools,	5.1 Explain the concept of productivity and quality tools and apply during execution of job.

and labour welfare legislation and apply such in day to day work to improve productivity & quality.	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	
<u>Block-I & II</u>	
*Assessment Criteria i.e. the standard of performance, for each specific learning outcome mentioned under **block – I & block – II** must ensure that the trainee achieves well developed skill with clear choice of procedure in familiar context. Assessment criteria should broadly cover the aspect of **Planning** (Identify, ascertain, estimate etc.); **Execution** (perform, illustration, demonstration etc. by applying 1) a range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information 2) Knowledge of facts, principles, processes, and general concepts, in a field of work or study 3)Desired Mathematical Skills and some skill of collecting and organizing information, communication) and **Checking/ Testing** to ensure functionality during the assessment of each outcome. The assessments parameters must also ascertain that the candidate is responsible for own work and learning and some responsibility for other's work and learning.*	

8. SYLLABUS

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

Week No.	Professional Skills (Trade Practical)	Professional Knowledge (Trade Theory)
1	Familiarise with workshops, labs, offices & demonstrate electrical safety precautions, First aid & artificial respiration.	Punctuality and Discipline expected of trainees. Course duration, methodology and structure of the training program. First aid. Artificial respiration. Electrical safety.
	Identify specification of types of fuses, type of switches, meter types and measuring range. Construct a simple circuit using AC/ DC supply, lamp, fuse and switch& measure voltage & current using ammeter & voltmeter. Measure DC and AC power using V-I method and using power meter.	Concept of current and voltage. AC, DC Supply indicating lamps. Different types of Fuses and their applications. Different types of connectors used in electrical and electronic applications. Different types of switches used in electrical and electronic applications. Circuit voltage and current. Measuring circuit voltage and current using voltmeters and ammeters. AC and DC meters. Measuring instruments, MC, MI type, Ammeter, Voltmeter, Multimeter for measuring voltage and current. Construction, characteristics/ features and specification. Digital Multimeter. Meaning of Circuit and basic electrical circuits. Meaning of resistance, continuity and continuity testers. Multimeter for checking continuity. Concept of Power and measurement using V&I meter and Power meter.
	Identify different types of resistors including resistor value and tolerance	Classification, characteristics and application of different types of resistors.-

	using colour code. Measure resistance using Multimeter. Soldering and de-soldering techniques, practice using hook-up wires. Soldering resistors on Tag board. Verification of Ohms Law and Kirchhoff's Laws. Soldering resistors on PCB. De-soldering practice. Experiment using P.T.C and NTC resistors.	carbon film, metal film, wire wound, cermets and surface mounted. Colour coding of resistors. Calculating resistance value and its tolerance value. Wattage of resistors, specific resistance and their importance. Resistors in series and parallel. Soft soldering and precautions tobe taken for making a good solder joint. Types of solder and need of soldering paste. Ohms law and Kirchhoff's Laws. Printed circuit boards and its application.
2	Identify different types of inductors and its specifications. Measure inductance using LCR meter. Calculate inductive reactance at different input signal frequencies. Finding losses and efficiency of given transformers. Identify of different types of capacitors from colour code and typographic code. Measure capacitance using RLC meter. Measure capacitance and capacitive reactance of, capacitors in series and capacitors in parallel.	Definition of inductance. Properties. Types of inductors and their application. Inductive reactance, measuring inductance and inductive reactance. Meaning of lead, lag. Effect of inductor on power factor. Frequency dependence of inductive reactance. Transformers. Turns ratio. Transformer winding. Winding machines. Transformer losses and efficiency. Working principle of capacitors. Electrostatic action, dielectric constant. Unit of capacitance and capacitive reactance. Types of Capacitors- electrolytic, ceramic, polyester, tantalum, mica, surface mounted. Colour coding, and tolerance. Meaning of Resonance. Application of resonance. Series and parallel resonance circuits.
3	Identify terminals of different types of diodes. Record its specifications referring to diode data sheet. Plot forward and reverse characteristics of diode Testing working condition of	Semiconductor, intrinsic and extrinsic semiconductors, P and N type semiconductor. Development of P.N. junction barrier potential. Different types of Diodes. Diode

	diodes. Construct and test a half wave and full wave diode rectifiers, Bridge rectifierwith and without filter. Construct and test a Bridge rectifier with and without filter. Draw Zener diode characteristics, Simple voltage regulator using zener diode.	terminals. Forward and reverse characteristics of diode. Testing diodes using Multimeter. Half wave and Full wave rectifiers using diodes. Transformer requirements. Calculating output DC, ripple factor. Bridge rectifier. Calculating output DC, ripple factor. Filters for rectifiers. Calculating output DC, ripple factor. Zener diode-Its characteristics and application for voltage regulation.
	Identify types of transistors based on their physical appearance. Identify the leads of the given assorted types of transistors. Quick test given transistors using Multimeter. Identify opens, shorted junctions. Wire and find the gain of amplifiers in - CB, CE, CC configurations.	Working principle of PNP, Bipolar transistors. Types of transistors and applications. Leads of transistors and their identification. Forward and reverse bias of transistor Junction. General values of junction resistances. Quick testing a transistor-using Multimeter. Transistor configuration - CB, CE, CC, alpha, beta. Types of Biasing of transistor amplifiers, comparison and applications. Thermal runaway.
	Construct and test a JFET amplifier, MosFET application circuit, relaxation oscillator using UJT, an application circuit using SCR, circuit using DIAC& an application circuit using TRIAC.	Field effect transistors, types, working principle, applications. Working principle and application of UJT. Working principle and application of SCR. Working principle and application of TRIAC. Working principle and application of DIAC.
4	Practice on identifying and using the controls on a regulated power supply. Assemble and test a series regulated power supply, a shunt regulated power supply, fixed voltage regulator using	Unregulated, regulated DC Power supply specifications. Application of different types of power supply for specific application types. Series regulator using transistor. Short

	3pin IC, variable voltage regulator using IC. Verify the truth table of two input OR, NOR, AND, NAND, NOT gates, multiple input logic gates. Verify the truth table of XOR and XNOR Gates. Realization of different gate type using NAND gates. Verification of Boolean laws. Realization of half adder & full adder using NAND gates. Realization half subtractor and full subtractor using NAND gates. Verification of truth table of 7483- 4bit adder. Verifying encoder/ decoder/ multiplexer/ demultplexer IC truth tables. Realization and verification of truth table of RS, JK and MS- JK flip-flop. Realization and verification of D-flip flop. Representation of logic function's truth table using K-Map.	circuit protection. Overload protection. Shunt regulators using transistors. Fixed Voltage regulators using IC's. Variable voltage regulators using IC's. Number systems and conversions. Classification of digital IC's. Use of data book for identification of digital IC's. Basic LOGIC GATES and truth table. Boolean algebra. Logic families, logic levels, propagation delay. Multiple input gates. XOR, XNOR gates and application. Simplification of Boolean equations. Combinational logic circuits. g) Half adder, full adder, parallel binary adder, half subtractor, fullsubtractor. Commercially available adders/ subtractors. Comparator, decoders, encoders, multiplexer, demultiplexer. Parity generators / checkers. RS Flip - Flop, JK flip-flop, Master- Slave flip-flops. Types of triggering and applications. D flip-flops. Counters, ripple, synchronous, up-down, scale-n counters. Commercially available shift registers and applications. Conversion of serial data into parallel and vice-versa. Concept of Karnaugh Map (K-Map).

5	Familiarize with the lead acid battery, Charging of batteries, Series parallel connection of batteries.	Lead acid cell, its construction and chemical changes during charging and discharging. Battery charging methods. Maintenance free batteries. Lithium cell, Ni-cad cells their construction and applications.
	Identify CRO front panel controls. Measure of DC/AC voltages and frequency using CRO. Identify the internal parts of a CRO and CRT. Calibrate a given CRO. Identifying AM signal. Measurement of percentage of modulation using CRO. Construct and test a simple Amplitude modulator.	Working principle and application of Oscilloscope. Precautions to be taken while measuring voltages using CRO. Internal parts of a CRO. Construction and function of CRT and its associated circuitry. Simple Calibration procedures care and maintenance. Modulation - types of modulation. AM, FM, PM. Amplitude modulation. Measurement of percentage of modulation. AM Transmitter block diagram. Amplitude modulator circuit and working. AM receiver block diagram. Principle of an AM demodulator/detector - analysis of crystal receiver. Frequency modulation- bandwidth requirement. FM transmitter block diagram. Comparison with AM- advantages of FM over AM.
6	Working with Gears, Belts, Stepper Motor, Drive. Identification and Testing of Sensors. Working with Relays. Identification of different advanced	Basics of gears, Belts, Stepper Motor, Drive. Sensors, its types and working principles. Relays, types and its working principles. Introduction to Microprocessor, Pentium

	Intel microprocessor chips. Identification of different advanced microprocessor chips other than from Intel.	processor architecture basics. Timing Circuits, Electronic Display segment, LED, LCD, Plasma, LED matrix.
7	Creating and saving document files using Word processing software. Formatting text and editing. Setting page and margins. Tabs and indents. Creating tables. Creating different types of documents. Saving word documents in other formats. Mail merge. Printing documents. Creating Worksheets using Spreadsheet Software. Formatting cells. Using formula in cells. Creating simple spreadsheet for an application. Graphs and tables. Printing spread sheets. Important Safety Basics and earthing requirements, danger of static electricity& protecting a PC from lightning strikes and power outages.	Introduction to Word processing and comparison of features. Creating and saving document files using Word processing software. Formatting test and editing. Setting page and margins. Tabs and indents. Creating multicolumn documents. Inserting pictures in documents. Creating tables. Creating different types of documents. Saving word documents in other formats. Mail merge. Printing documents. Introduction to spread sheet. Creating Worksheets using Spreadsheet Software. Formatting cells. Using formula in cells. Creating simple spreadsheet for an application. Creating relation between sheets. Graphs and tables. Advanced features. Printing spread sheet.
8	**Hardware Identification** Identify the front and rear panel controls and ports and all components on a PC. Remove and Install different components in PC.	Introduction to computers, classification, generations, applications. Basic blocks of a digital computer. Hand Tools Basics and Specifications. Types of cabinets, relation with motherboard form factor. Precautions to be taken whileopening and closing PC cabinet.

		Introduction to Main devices, components, cards, boards inside a PC (to card or device level only), specifications of the cables and connectors used for interconnecting the devices, boards, cards, components inside a PC. Precautions to betaken while removing and/ or re-connecting cables inside a PC. Types of I/O devices and ports on a standard PC for connecting I/O devices. Functions of keyboard, Mouse, monitor, Speakers and Mic., serial port, parallel port. Types of Processors and their specifications, Memory devices, Semi-conductor memories, RAM, ROM, PROM, EMPROM, EEPROM, Static and dynamic. Types &Functions of HDD/SSD and HDD interfaces. CMOS setting. Using Scan disk and defrag. Basic blocks of SMPS, description of sample circuit.
9	Installing Windows OS in a PC. Create a Windows system image. How to Backup/ Restore your Windows partition with the bootable image disk. Duplicating a partition (creating a multi-boot system). A dual/multi-boot system: the Windows boot manager vs. an alternative boot manager. Data backup from PC and restore automatically and manual. **Hardware Troubleshooting**	Types of software. System software-OS, Compiler. Application software like MS office. High Level, low level language, Computer application scientific industrial and business. Functions of an operating system. Disk operating system. Concept of GUI, Modes of starting on different occasions. Desktop, Icon, selecting, choosing, drag and drop. My computer, network neighborhood/ network places. Recycle bin, briefcase, task bar, start

	Learn how to test your RAM. Check your hard drive for errors. **PC Cleaning** How to clean your computer Partitioning& formatting hard disk (primary and extended partitions). **Virus Removal** Using a modern anti-virus utility. How to run a full system scan.	menu, tool bar, and menus. Windows Explorer. Properties of files and folders. Executing application programs. Properties of connected devices. Applications under windows accessories. Windows Help. Finding files, folders, computers. Control panel. Installed devices and properties. Introduction to removable storage devices, Bulk data storage devices. CD ROM/DVD ROM drives- Technology, Types of CD drives, working principle application. Working principle of Hard Disk & SSD. Learn how to prevent your PC from getting malware, virus, spyware etc.
10	Check bad sectors in HDD. Fix the master boot record. Using Task manager and Event Viewer. Using System Monitor and Performance Logs. Configure config.sys file. **User Account Customization** How to create and configure user accounts in Windows 7/8/10. View Hidden Files and Folders. Installing a service pack. How to perform a Windows Update. **Software Installation** Install software program in windows. Run a program file from MS-DOS. Compress or make files into one file. Extract or uncompress a compressed file. Update Drivers in Windows. Roll Back a Driver in Windows.	Bad Sectors in Hard disk, Master Boot Record, in-place installation, Registry fixing, performance level check, Shortcut fixing, Fixing Startup process, log, etc. Users and user account. Privileges, scope, permissions etc. Concept of Virtual Machine. Version of a software, Service pack, Updating of OS, Different configurations of Computer system and its peripherals, Compatible with different hardware/ software. Software Installation – Pre-installation –Prerequisites, Install procedure, Rollback or Un-install procedure, Tests. Post-installation – Backup procedure & specifications,

	Familiarize with Device manager. Interface with cell phone, tablet PC, synchronization of contacts. **Windows Utilities** Check &Repair Corrupted Files. Restore your machine back to normal. Optimize Hard Disk space .	Restore procedure, Periodical view check. Awareness of legal aspects of using computers such as copyright, patent etc. What is a Device Driver. Updating hardware device drivers. What is a Device manager. Backup, Scan and Clean. Windows boot process.
11	Remove Junk Files. Completely remove "deleted" files. Clear web browser cache from Firefox, Internet Explorer, Chrome etc. 5 steps to clean up your computer files. Personalize your Windows 10 based PC. **Linux OS** Use a Linux Live CD. Use Ubuntu Live CD to Backup Files from Your Dead Windows Computer. Configure outlook. Backup and Restore Outlook.	Junk files, deleted files, configuration of internetbrowser. Introduction to UNIX/LINUX and its structure. Files and Processes in Linux. Directory structure of Linux O.S. Overview of Outlook
12	Identification of various parts of laptop including different sections and connectors. Assembling and disassembling a Laptop. Replacing/upgrading different parts of laptops i.e. RAM, HDD and other parts. Troubleshooting techniques in Laptop. Laptop troubleshooting. Latest Tools & Gadgets For Desktop/ Laptop Repairs. Use of Debug Card Post Error & Code, SMPS Tester, PCI slot testing tool. Identification of different types of memory devices.	Introduction of laptop and comparison of various Laptops. Block diagram of laptop & description of all its sections. Introduction to Input system, Touchpad, Trackball, Track point, Docking station, Upgrade memory, hard disk, replacing batteryConfiguring wireless internet in a laptop. Latest Tools & Gadgets For Desktop/ Laptop Repairs. Organization of RAM, types of RAM's, Module types, pins, Type of processors, generation, features,

		speed, popular manufacturers. Memory devices, types & principle of storing. Data organization 4 bit, 8 bit, word. Introduction to RAM, ROM, PROM, EMPROM, EEPROM, Static and dynamic and examples.
13	**Assessment/Examination- 03days**	

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 (Trade Practical)	Professional Knowledge (Trade Theory)
1	Install & configure LINUX OS in a PC/Laptop. Managing users. Installing a printer and carrying self-test. Replacing ribbon in a DMP. Refilling ribbon tape of DMP. Removing and cleaning printer head. Replacing a new printer head. Testing and servicing Printer power supply. Changing rollers and othermechanical parts.	Basic Linux commands. Linux file system, The Shell, Users and file permissions, VI editor, X window system, Filter Commands, Processes, Shell Scripting. Types of printers and working principles of Dot Matrix printer, laser printer, Ink jet printer, line printer. Block diagram and function of each unit head assembly, carriage, and paper feed mechanism. Front panel controls and interfaces. Pin details of interface port. Installation of a printer driver and self-test. Ribbon types used. Troubleshooting different types of Printer. Printer control board, circuit, function, probable defects, servicing.
2	Replacement & refiling of toner cartridge of laser& desk jet/ inkjet printers. Drum cleaning and replacement in laser& desk jet/ inkjet printers. Testing and servicing different parts of laser & desk jet/ inkjet printers. Testing and servicing Printer power supply of laser &desk jet/inkjet printers. Changing mechanical parts of laser &desk jet/inkjet printers. Repair &Replacing spares of line printers. Self-test procedures in printers.	Working principle of Laser Inkjet/ Deskjet printers. Toner cartridge types and refilling process. Printer drum, function, cleaning and replacing procedure. Power supply in laser printers, circuit, defects, servicing. Mechanical parts &Control board(s) in laser printer, circuit diagram, defects and servicing procedure. Printer drum, function, cleaning and replacing procedure. Working principle of Plotter and its common faults.

	Use of diagnostics software for serving printers.	
3	Scanner - Installation, configuration, using Automatic Document Feeder (ADF), OCR. Barcode Scanner - Installation and configuration. Network Scanner - Installation and configuration. Troubleshooting of Scanner. Installation, Replacing supplies and spares, troubleshooting of MFP, Passbook, Network. Identify the type of monitor connected to PC. Remove the display driver card and identify the main components and connectorson the display driver card. Replace the display driver card and re-install. Change the exiting display card with a different card given and install. Servicing of monitors, changing fuses, adjusting colours, brightness and contrast. Setting resolution, Install, configure and operate LCD Projector. Install and Configure Touch Pad.	Working principles of Network Scanner. Working principles of Multifunction Printer,Passbook printer, High Speed Printer, Line Printer, Network Printer, Print Server. Types of monitor, LCD and TFT Monitors. Display cards, bus standards, types CGA, EGA VGA, SVGA, AGP, memory and drivers. Installing display drivers, setting features. Understanding the displays memory and its effect on quality and performance. Working principle of LCD Projector, its specification, configuration and common faults. Working Principle of Touch Pad.
4	Identify the specifications of the installed sound card in the PC. Replace/Remove the sound card from PC and identify the main components on the card. Connect the speaker and microphone, adjust the controls for better quality sound and testing. Interconnect laptop to a multimedia projector and carryout adjustments. Replace battery pack in laptops and	Specifications of sound card. Frequency response, sound files format, compression and decompression. Properties, specification & main components of sound cards. Type of speaker and microphone, frequency response, control adjustments, cable and connectors of speaker. Laptops, advantages, essential difference in construction, additional features, PCMCIA cards.

	carryout general maintenance.	General maintenance procedures and replacement of battery.
5	Identify the specifications of UPS. Switch-on and Switch-off procedure of UPS. Measurement of Input/ output voltage/ current levels, battery charge level. Identifying status of UPS from front panel indicators. Carryout routine maintenance of battery, battery terminals, loose contacts etc. Test UPS as per specification. Verification of back-up time. Circuit tracing and fault finding practice. Servicing of UPS by simulating more likely faults and systematic approach to identify and rectify them.	Study of typical working UPS circuit, explanation of each stage involved. Voltage, current, frequency and KVA specifications. Controls of different type of UPS: On-line, Off- line, Line interactive etc. Typical circuit blocks. Routine maintenance of battery and UPS. Back-up time, its dependence on battery, load and its calculations. Possible problems in UPS, fault finding procedures. Simulated faults and serving of UPS.
6	Installation and configuration of different types of Modem e.g. DSL, ADSL, Data Card, Dongle etc. Practice on setting IRQ, DMA, Memory Address, I/O address, Resource Conflict, Plug & Play. Practice on Add on Cards, Cables & Connectors, AGP, PCI Express, TV Tuner Card, DVR card, Video Capture, SCSI. USB, NIC, Fire wire, Card reader, network storage, Game video card, Camera etc. Mother board, Memory, CPU, Graphic Card, BIOS up-gradation, Additional features, Updating of System Software	Modem Fundamentals. Band width, baud rate, wireless communication, synchronous/ asynchronous transmission. IRQ, DMA, Memory Address, I/O address, Resource Conflict, Plug & Play Concept. Different latest Add on Cards - (Identification in terms of I/O slot and connectors). Recognize POST error message for different type of errors.

	& Application Software (Requirement & How to update). Practice on Backup Drives i.e. Pen Drive U3 format, Zip Drive, USB External Drive (HDD, CD/ DVD writer.	Introduction to removable storage devices, Bulk data storage devices magnetic, optical, magneto optical drives, WORM drives. Important parts and functions of DVD ROM drive. Latest trends in backup devices/ media.
7	Running diagnostics program to identify the health and defects of a PC using third party utilities.	Safety precautions in handling PC, sub-assemblies and components, Important points to be considered while purchasing and replacing components. Concept of Preventive and corrective maintenance. Tools required, Active & Passive Maintenance, Maintenance scheduling. Need of diagnostics program. Features, limitations. Examples of commonly used diagnostic programs.
8	Assembling & disassembling of different types of tablets/ Smart Devices. Testing of various parts with multimeter. Troubleshooting& Replacing of faulty parts. Upgrading operating systems. Formatting of virus affected devices. Unlocking of handsets through codes and software. Working with iOS, Android, Ice-cream sandwich, Jellybeans. Installation of Phone Gap framework. Practice web browsing using popular web browsing software, Configuring web browser. Using e-mail – Opening & configuring email client, mailbox: **Cloud Computing**	Circuit Board/ Motherboard Introduction. Study of parts of a tablet PC/ smart devices. Testing of various parts with multimeter. Steps of repairing various hardware problems. Concept of iOS, Android, Ice-cream sandwich, jellybeans. Concept of Phone Gap World wide web and website. Web Browsing and popular web browsing software. Introduction to Search Engines, Popular Search engines. Concept of Favorites Folder. Email Addressing, BCC and CC, Inbox, Outbox, Address book, SPAM. Cloud Computing Introduction to Cloud Computing, how to access Cloud service providers & to create

	Work with Cloud services.	an account. IT Act & Law Introduction to Cyber Security. Introduction to Cyber Laws & IT Act. Importance of privacy and techniques to manage it.
9	Familiarization with various Network devices, Connectors and Cables. Understanding the Layout of network. Crimping practice with straight and cross CAT 5 cables. Punching practice in IO Box and patch panel. Crimping and making cables Create cabling in a lab with HUB/ Switch and IO Boxes and patch panel. Fitting Switch Rack Installing & Configuring a Peer-to-Peer Network using Windows Software. Connect computers using Bluetooth. IP addressing technique (IP4/ IP6) and Subnetting and Supernetting the network. Installation and Configuration of TCP/ IP Protocol. Practice TCP/ IP Utilities: PING, IPCONFIG, HOSTNAME, ROUTE, TRACERT etc. Working with SMTP, TELNET, FTP, HTTP, SNMP, LDAP etc. Practice on configuring DHCP.	Introduction to Computer Networks – Advantages of Networking, Peer-to-Peer and Client/Server Network. Network Topologies – Star, Ring, Bus, Tree, Mesh, Hybrid. Type of Networks – Local Area Networks (LAN), Metropolitan Area Networks (MAN), Wide Area Networks (WAN). Internet, Ethernet, Wi-Fi, Bluetooth, Mobile Networking, Wire and wireless Networking. Difference between Intranet and Internet. Communication Media & Connectors – Unshielded twisted-pair (UTP), shielded twisted-pair (STP), Fiber Optics and coaxial cable: RJ-45, RJ-11, BNC. Understanding color codes of CAT5 cable. 568A and 568B convention. Introduction to Data Communication – Analog and Digital Signals, Simplex, Half-Duplex and Full-Duplex transmission mode. Network Components – Modems, Firewall, Hubs, Bridges, Routers, Gateways, Repeaters, Transceivers, Switches, Access point, etc. – their types, functions, advantages and applications. IP Routing in Network RIP IGRP Protocols, TCP/IP, FTP, Telnet, SMTP, FTP, HTTP, SNMP,LDAP, DHCP etc.

		Theory on Setting IP Address(IP4/ IP6) & Subnet Mask, Classes of IP Addressing. Overview of Virtual LAN. VLAN Memberships. Identifying VLAN. Trunking - VLAN Trunk ProtocoL Concept of Translator Gateways.
10	Sharing Resource and Advance Sharing Setting. Installing Proxy Server. Video Conferencing. Installing and Configuring Internet. Connection on a PC using Broadband or Wi Fi Dongle. Integrate wired with wireless network. Power over Ethernet (PoE). Troubleshooting wired and wireless network. Setting up of basic collaboration tool like NetMeeting for activities like chat, application sharing, remote desktop access and control, VoIP. Setup IP camera for basic surveillance scenario, logging and monitoring of devices/ locations. Practice on firewall technologies to secure the network perimeter. Practice LAN security considerations and implement endpoint and Layer 2 security features. Wi-Fi configuration to implement security considerations. Install and configure Windows Server. Install and Configure Active Directory.	Concept of Internet. Architecture of Internet. DNS Server. Internet Access Techniques, ISPs and examples (Broadband/ Dialup/ WiFi). Concept of Social Networking Sites, Video Calling & Conferencing. Concept of Virus and its Protection using Anti-Virus, UTM and Firewall. Collaborating using wired and wireless networks, Protecting a Network, Network performance study and enhancement Surveillance using network devices, collaboration on network for team optimization and support activities. Remote management of devices. Modern Network Security Threats and the basics of securing a network. Secure Administrative Access, LAN security considerations. Network Security Devices. Cryptography. Wi-Fi security considerations. Server concepts, Server Hardware, Installation steps, configuration of server. Concept of Active Directory. ADS Overview, ADS Database, Active Directory Namespace, Logical & Physical Elements of AD.
11	Installing and Configuring DNS Services Setup Name resolution – Host names,	Concept of DNS. Name resolution – Host names, NetBIOS

	NetBIOS names. Installing DNS Server. Configuring DNS Zones, DNS Clients, Delegating Zones. Testing DNS with nslookup, dnscmd and dnslint. Configuring RRAS. VPN implementation. Configuring Remote Access Authentication Protocol. Configuring RRAS Policies. Configuring IAS. Managing TCP/ IP Routing	names. DNS Overview. DHCP Overview. DHCP Clients and Leases. (09 hrs.) Remote Access Overview. VPN Concepts. Remote Access Authentication Protocol. RRAS Policies. IAS. TCP/ IP Routing
12	**Planning and Implementing User and Group Strategies** Adding Account. Implement AGDLP Process. Implement User Authentication Strategy. (Planning and Implementing OU Structure. Planning and Maintaining Group Policies - Configuring User Environment. Configuring Computer Security. Configure a server as web server. Configuring Mailbox Servers. Implementing Backup and Recovery. Security Baseline Settings and Templates. Configuring Audit Policy. Monitoring and Troubleshoot Network protocol. Configuring Protocol Security. Planning security for Wireless Network.	Concept of User and Group. Planning Security Group Strategy. AGDLP Process. Planning User Authentication Strategy. Planning OU Structure. Planning a Group Policy Strategy. Deploying Software Through GPO. (Introduction to Web Server Introduction to Messaging Services. Concept of Backup and Recovery of Server. Security Baseline and Templates. Audit Policy. Understanding IPSec. Protocol Security. Planning security for Wireless Network. Managing Network Traffic Types of Problems of Internet Connectivity. Types and working of Server Services.

	Monitor Network Traffic. Troubleshoot Internet Connectivity. Troubleshoot Server Services. Use Linux Network Tools to check/ maintain/ Manage Network. Install Linux Server. Create new user and group. Create public and data directory. Create anlmlhosts file. Check host file. Secure and run SWAT. Filter ports. Telnet installation and configuration.	Configuration Plan. Public and data directory. Host file. SWAT. Password Authentication. Telnet.
13	**Assessment/Examination 03days**	

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.	**Unit, Fractions** Classification of Unit System Fundamental and Derived Units F.P.S, C.G.S, M.K.S and SI Units Measurement Units and Conversion Factors, HCF, LCM and Problems Fractions – Addition, Subtraction, Multiplication and Division Decimal Fractions - – Addition, Subtraction, Multiplication and Division Solving Problems by using calculator	**Engineering Drawing: Introduction and its importance** - Viewing of engineering drawing sheets. - Method of Folding of printed Drawing Sheet as per BIS SP:46-2003
2.	**Square Root: Ratio and Proportions, Percentage :** Square and Square Root Simple problems using calculator Application of Pythagoras Theorem and related problems Ratio and Proportions Direct and Indirect proportion Percentage Changing percentage to decimal	**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.
3.	**Material Science** Types of metals Physical and Mechanical Properties of metals Types of ferrous and non-ferrous metals Introduction of iron and cast iron Difference between iron and steel, alloy steel and carbon steel Properties and uses of rubber, timber	**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

	and insulating materials	line Methods of Division of line segment
4.	**Mass, Weight, Volume, and Density** Mass, volume, density, weight & specific gravity Related problems for mass, volume, density, weight & specific gravity	**Drawing of Geometrical Figures:** Drawing practice on: - Angle: Measurement and its types, method of bisecting. - Triangle -different types - Rectangle, Square, Rhombus, Parallelogram. - Circle and its elements.
5.	**Speed and Velocity, Work Power and Energy** Rest, motion, speed, velocity, difference between speed and velocity, acceleration and retardation Related problems on speed and velocity Potential energy, Kinetic Energy and related problems with related problems Work, power, energy, HP, IHP, BHP and efficiency	**Dimensioning:** - Definition, types and methods of dimensioning (functional, non-functional and auxiliary) - Types of arrowhead - Leader Line with text
6.	**Heat &Temperature and Pressure** Concept of heat and temperature, effects of heat, difference between heat and temperature Scales of temperature, Celsius, Fahrenheit, Kelvin and Conversion between scales of temperature Temperature measuring instruments, types of thermometer, pyrometer and transmission of heat - Conduction, convection and radiation Co-efficient of linear expansion and related problems with assignments Problem of Heat loss and heat gain with assignments Thermal conductivity and insulators Boiling point and melting point of	**Free hand drawing of** - Lines, polygons, ellipse, etc. - geometrical figures and blocks with dimension - Transferring measurement from the given object to the free hand sketches.

	different metals and Nonmetals Concept of pressure and its units in different system	
7.	**Basic Electricity** Introduction and uses of electricity, molecule, atom, how electricity is produced, electric current AC, DC and their comparison, voltage , resistance and their units Conductor, Insulator, types of connections- Series and Parallel, Ohm's Law, relation between VIR &related problems Electrical power, energy and their units, calculation with assignments Magnetic induction, self and mutual inductance and EMF generation Electrical Power, HP, Energy and units of electrical energy	**Method of presentation of Engineering Drawing** - Pictorial View - Orthogonal View - Isometric view
8.	**Mensuration** Area and perimeter of square, rectangle and parallelogram Area an Perimeter of Triangle Area and Perimeter of Circle, Semi-circle , circular ring, sector of circle, hexagon and ellipse Surface area and Volume of solids- cube, cuboids, cylinder, sphere and hollow cylinder Finding lateral surface area , total surface area and capacity in liters of hexagonal, conical and cylindrical shaped vessels	**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
9.	**Levers and Simple Machines**	**Dimensioning practice:**

	Simple machines, Effort and load, mechanical advantage, velocity ratio, efficiency of machine, relation between efficiency, velocity ratio and mechanical advantage Lever and its types	- Position of dimensioning (unidirectional, aligned, oblique as per BIS SP:46-2003) - Symbols preceding the value of dimension and dimensional tolerance.
10.	**Trigonometry** Measurement of Angle, Trigonometrical Ratios, Trigonometric Table Trigonometry-Application in calculating height and distance (Simple Applications)	**<u>Construction of Geometrical Drawing Figures:</u>** - Polygons and their values of included angles. Conic Sections (Ellipse)
11.		**<u>Projections:</u>** - Concept of axes plane and quadrant. - Orthographic projections - Method of first angle and third angle projections (definition and difference) - Symbol of 1st angle and 3rd angle projection as per IS specification. Drawing of Orthographic projection from isometric/3D view of blocks

Block – II		
Sl. No.	**Workshop Calculation and Science (Duration: - 20 hrs.)**	**Engineering Drawing (Duration : - 30 hrs.)**
1.	**Friction** Advantages and disadvantages, Laws of friction, co- efficient of friction, angle of friction, simple problems related to friction Friction – Lubrication Co- efficient of friction, application and effects of friction in workshop practice	Machined components; concept of fillet & chamfer; surface finish symbols.
2.	**Centre of Gravity** Centre of gravity and its practical application	Screw thread, their standard forms as per BIS, external and internal thread, conventions on the features for drawing as per BIS.
3.	**Area of cut – out regular surfaces and area of irregular surfaces** Area of cut – out regular surfaces – circle, segment and sector of circle Related problems of area of cut – out regular surfaces – circle, segment and sector of circle Area of irregular surfaces and application related to shop problems	Reading & interpretation of assembly drawing and detailing.
4.	**Algebra** Addition, Subtraction, Multiplication & Divisions Algebra – Theory of indices, Algebraic formula, related problems	Reading of drawing. Simple exercises related to missing lines, dimensions and views. How to make queries.
5.	**Elasticity** Elastic, plastic materials, stress, strains and their units and young modulus Ultimate stress and working stress	Simple exercises related to trade related symbols.
6.	**Heat Treatment** Heat treatment and advantages Different heat treatment process – Hardening, Tempering, Annealing, Normalising, Case Hardening	Sign and Symbols of Electrical, Electronics and related trades

	Profit and Loss Simple problems on profit & loss Simple and compound interest	
7.	**Estimation and Costing** Simple estimation of the requirement of material etc., as applicable to the trade Problems on estimation and costing	Sketch of Electrical and Electronics/ trade related components
8.		Electrical and Electronics wiring diagram/ trade related Layout diagram Electrical earthing diagram - Drawing the schematic diagram of plate and pipe earthing. Electrical, Electronics/ trade related circuit diagram Block diagram of Instruments/ equipment of related trades

9.2 EMPLOYABILITY SKILLS

(DURATION: - 110 HRS(55Hrs+55Hrs)

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	Basic of computer Networks (using real life examples), Definitions of

and Internet	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.
Preparation to the world of work	
Career Plan	Identify the difference between job and career
Basic Professional Skills	Job roles available in respective trades

Career Pathways	Awareness of industries, and the respective professional pathways
Search and apply for a job	Awareness of higher education / up skilling (short-term) options Steps involved in online application for Instructor course, Apprenticeship and different jobs in popular site like theindiajobs.com, naukri.com, monsterindia.com, Govt. website.
Customer Interaction / service	
Greeting customers	Forms of greeting
Probing-understanding customer requirements	Use of positive body language
Handling grievances	Handling grievances (Use of ask-listen-repeat technique)
Relationship building with customers	Relationship building with customers, importance of probing.
To identify the importance of probing	Use of open-ended/ close-ended questions to gauge requirement

10. DETAILS OF COMPETENCIES (ON-JOB TRAINING)

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

Block-I

1. Use various electrical components i.e. fuses, resistors, inductors, transformers, capacitance and measure voltage, current, resistance, inductance using measuring devices and find resonance value of a circuit.
2. Perform Soldering& De-soldering of electrical & electronic components.
3. Use various electronic devices i.e. Diode, Zener Diode, transistors, JFET, MosFET and make rectifiers, amplifier using electronic devices.
4. Construct and test various Power Supply circuit.
5. Construct electronic circuits using logic gates and realise truth tables of various gates, encoder, decoder, multiplexer, de-multiplexer, flip flops.
6. Perform battery charging operations of acid battery and check connections.
7. Inspect internal parts of CRO and use it to measure voltage, frequency, modulation of modulator/ transmitter.
8. Work with some important Mechanical, Electrical & Electronics Accessories used in information communication system.
9. Use Word Processing and Spreadsheet Software and perform formatting operations in MS Word and perform various table related activities in MS Excel.
10. Identify various hardware components and Assemble and replace hardware components of Desktop Computer.
11. Install & customise Operating System and all other system &application software.
12. Assemble and replace hardware components of Laptop PC.
13. Replace/ install SMPS and troubleshoot its faults.
14. Familiarize with various components of Motherboard.
15. Identify different types of memory devices, chips and its structure.

Block – II

1. Install and customize Linux operating system.
2. Install Printer, Scanner and troubleshoot their faults.
3. Install/Replace Display Driver Card, perform servicing and configure various display unit.
4. Install/Replace Sound Card and set properties to adjust sound quality.
5. Perform maintenance and servicing of UPS.
6. Install and configure Modem, System Resources, Add on Cards, Cables & Connectors.
7. Upgrade, maintain and troubleshoot PC.

8. Assemble, replace and troubleshoot various parts of Tablet/ Smart Devices.
9. Browse internet and work with Cloud Computing.
10. Set up and configure Networking System using various network devices.
11. Share and control resource and Internet connection through network.
12. Implement Network Security to protect from various attacks on networking.
13. Perform installation and basic configuration of Windows Server.
14. Perform installation, configuration of DNS, Routing and user account customization.
15. Configure Server and manage Server Network security and Infrastructure.
16. Perform installation and basic configuration of Linux server.

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

List of Tools & Equipment			
INFORMATION & COMMUNICATION TECHNOLOGY SYSTEM MAINTENANCE (For batch of 24 candidates)			
S No.	**Name of the Tool & Equipment**	**Specification**	**Quantity**
A. TRAINEES TOOL KIT			
1.	Connecting screwdriver	100 mm	25 Nos.
2.	Neon tester	500 V	25 Nos.
3.	Screw driver set	set of 5	25 Nos.
4.	Insulated combination pliers	150 mm	25 Nos.
5.	Insulated side cutting pliers	150 mm	25 Nos.
6.	Long nose pliers	150 mm	25 Nos.
7.	Soldering iron	25 W. 240 V	06 Nos.
8.	Electrician knife		25 Nos.
9.	Tweezers	100mm	25 Nos.
10.	Digital Multimeter		06 Nos.
11.	Soldering Iron Changeable bits	15 W	25 Nos.
12.	De- soldering pump		25 Nos.
B. LIST OF TOOLS REQUIRED			
13.	Magneto spanner set		2 Nos.
14.	Steel rule	150mm	2 Nos.
15.	Scriber straight	150mm	2 Nos.
16.	Soldering Iron	240W	1 Nos.
17.	Allen key set	set of 9	2 Nos.
18.	Tubular box spanner	set of 6	1 No.
19.	Magnifying lenses	75mm	3 Nos.
20.	Continuity tester		6 Nos.
21.	Soldering iron	10W	6 Nos.
22.	Cold chisel	20mm	1 No.
23.	Scissors	200mm	1 No.
24.	Handsaw	450mm	1 No.
C. TOOLS & EQUIPMENTS (Computer Hardware: Installation and Maintenance)			
28.	Server Computer	CPU: 32/64 Bit i3/i5/i7 or latest	01 No.

		processor, Speed: 3 GHz or Higher. Cache Memory: - Minimum 3 MB or better. RAM:-8 GB DDR-III or Higher. Hard Disk Drive: 500GB or Higher, 7200 rpm (minimum) or Higher, Wi-Fi Enabled. Network Card: Integrated Gigabit Ethernet (10/100/1000) - Wi-Fi, USB Mouse, USB Keyboard and Monitor (Min. 17 Inch), Standard Ports and connectors. DVD Writer, Speakers And Mic. Licensed Windows Operating System / OEM Pack (Preloaded), Antivirus / Total Security	
29.	Desktop Computer	CPU: 32/64 Bit i3/i5/i7 or latest processor, Speed: 3 GHz or Higher. RAM:-4 GB DDR-III or Higher, Wi-Fi Enabled. Network Card: Integrated Gigabit Ethernet, with USB Mouse, USB Keyboard and Monitor (Min. 17 Inch. Licensed Operating System and Antivirus compatible with trade related software.	12 Nos.
30.	Laptop, Notebook		01 each
31.	Intel Mobile Desktop based PC with LCD monitor	CPU: 32/64 Bit i3/i5/i7 or latest processor, Speed: 3 GHz or Higher. RAM:-4 GB DDR-III or Higher, Wi-Fi Enabled. Network Card: Integrated Gigabit Ethernet, with USB Mouse, USB Keyboard and Monitor (Min. 17 Inch. Licensed Operating System and Antivirus compatible with trade related software.	01 No.
32.	Tablet		02 Nos.
33.	Printers: LaserJet, DeskJet, passbook, mfd		01 each
34.	Network Printer		01 No.
35.	Online UPS		As require
36.	LAN Cards, Wi-fi LAN Cards		06 Nos. each

37.	LCD/DLP Projector		01 no
38.	Power Meter		02 nos.
39.	Computer Toolkits		06 Nos.
40.	Computer Spares:		As required
41.	Motherboards (of different make)		4 Nos.
42.	Cabinets		4 Nos.
43.	Processors (of different make)		4 Nos.
44.	Hard Disk different types	1 TB or higher	4 Nos.
45.	Optical Drives		4 Nos.
46.	LCD/LED/TFT Monitors		2 Nos.
47.	Pen Drives		4 Nos.
48.	External DVD Writer		2 Nos.
49.	Keyboards		4 Nos.
50.	Mouse		4 Nos.
51.	Anti static pads		4 Nos.
52.	Anti static wrist wraps		4 Nos.
53.	SMPS		4 Nos.
54.	Blu-Ray drive and player		2 Nos.
55.	Digital Camera		2 Nos.
56.	HD Display		2 Nos.
57.	Network storage		2 Nos.
58.	Card Reader		2 Nos.
59.	Game video card		2 Nos.
60.	Web Cam		2 Nos.
61.	Surround sound speakers		2 Nos.
62.	Different types of memory cards		2 Nos. each
63.	Laptop kits		12 Nos.
64.	Laptop spares: Cabinet with display, memory, hard disk, battery pack, keyboard membrane, chargers		As required
65.	SMPS Trainer kit		2 Nos.
66.	UPS Trainer kit		As require
67.	Power electronics Trainer kit		2 Nos.
68.	Post error debugging card		4 Nos.
69.	SMPS Tester		4 Nos.
70.	PCI slot Testing tool		4 Nos.
71.	Scanner		1 No.
72.	Modem		1 No.
D. SOFTWARE			
75.	Windows Server Operating System		1 license

76.	Windows Operating System		2 licenses
77.	Linux Operating System		2 Nos.
78.	Network Management Software		1 No.
79.	MS Office		2 Nos.
80.	Anti-virus software		2 Nos.
81.	Data recovery software		2 Nos.
82.	LINUX Server Operating System (Samba / Su-se)		1 No.
83.	Open source Pc Utility / Tweak Software		As available
E. FURNITURE and Other Equipments			
84.	Computer Tables		12 Nos.
85.	Computer Chairs		24 Nos.
86.	Printer Table		1 No.
87.	Class Room Chairs		24 Nos.
88.	Air Conditioners		As required
89.	Broadband Internet Connection		1 No.
90.	Fire Fighting Equipments		As required
91.	Hardware and Network Trainer Kit		6 Nos.
F. TOOLS & EQUIPMENTS (Computer Networking)			
95.	Wireless Network Adapter		6 Nos.
96.	Wireless Access Point		4 Nos.
97.	Router		4 Nos.
98.	Managed Layer 2 Ethernet Switch	8/16/24 port	2 Nos.
99.	Managed Layer 3 Ethernet Switch	8/16/24 port	2 Nos.
100.	Network Training System		2 Nos.
101.	LAN Protocol Simulation and Analyser Software		2 Nos.
102.	Network and Internet security trainer		2 Nos.
103.	LAN cable tester		2 Nos.
104.	Network cables – UTP		As required
105.	Network Cables – coaxial, flat, ribbon		As required
106.	LAN Cards, wi-fi LAN Card		05 Nos. each
107.	Connectors for cables		As required
108.	Media Convertor		4 each
109.	UTP jack panel	8/16/24 port	2 Nos.
110.	SC Couplers		12 Nos.
111.	SC Pigtails		12 Nos.
112.	RJ-45 connector		As required
113.	Fluke Meter		2 Nos.

114.	Crimping Tools		6 Nos.
115.	Switch with POE ports		2 Nos.
116.	POE adapters		2 Nos.
117.	Network Camera (Outdoor/ Indoor)		2 No. each
118.	Fibre Optics cable with LC connector		As required
119.	LC connector module		As required

INFRASTRUCTURE FOR WORKSHOP CALCULATION & SCIENCE AND ENGINEERING DRAWING

TRADE: Information and Communication Technology System Maintenance

LIST OF TOOLS & EQUIPMENTS FOR -24 APPRENTICES

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		24+1 set
2.	Set square celluloid 45^o (250 X 1.5 mm)		24+1 set
3.	Set square celluloid 30^o-60^o (250 X 1.5 mm)		24+1 set
4.	Mini drafter		24+1 set
5.	Drawing board (700mm x500 mm) IS: 1444		24+1 set
B : Furniture Required			
Sl. No.	**Name of the items**	**Specification**	**Quantity**
1	Drawing Board		24
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	8ft. x 4ft	01
7	Trainer's Table		01
8	Trainer's Chair		01

Tools & Equipment 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 & Equipment not required, if Computer LAB is available in the institute.		

ACKNOWLEDGEMENT

The DGT sincerely expresses appreciation for the contribution of the Industry, State Directorate, Trade Experts and all others who contributed in revising the curriculum. Special acknowledgement to the following industries/organizations who have contributed valuable inputs in revising the curricula through their expert members:

1. Cognizant Technology Solutions India Pvt. Ltd, Mumbai
2. Infosys, Bangalore
3. WIPRO, Bangalore
4. TCS, Mumbai
5. Accenture Services Pvt. Ltd., Bangalore
6. Mindtree Ltd, Bangalore
7. National Institute of Electronics and Information Technology, New Delhi
8. National Institute of Open Schooling, Noida
9. XLRI Jamshedpur
10. HCL Services Ltd, Hyderabad
11. CDAC, Pune
12. VI Micro Systems Pvt. Ltd, Chennai

Special acknowledgement is extended by DGT to the following expert members who had contributed immensely in this curriculum.

Sl. No.	Name & Designation Shri/Mr./Ms.	Organization	Mentor Council Designation
Expert group on restructuring of Apprenticeship Training Modules			
1.	Dr. Sanjeev Kumar Gupta, Head, Technical Wing	National Institute of Electronics and Information Technology, Electronics Niketan, 6, CGO Complex, New Delhi 110 003	Chairman
2.	C S Murthy, JD	CSTARI Kolkata	Member
3.	R Chandrasekaran, Chief Executive, Technology & Operations	Cognizant Technology Solutions India Pvt. Ltd., 12th & 13th Floor, "A" wing, Kensington Building Hiranandani Business Park, Powai, Mumbai - 400 076	Member
4.	Srikantan Moorthy, SVP & Head, Education & Research	Infosys Electronics City, Hosur Road, Bangalore 560 100	Member
5.	Deepak Jain, Senior VP & Global	WIPRO, Doddakannelli, Sarjapur	Member

	Head-Work Force Planning	Road, Bangalore - 560 035	
6.	K. Ganesan Vice President -Global Head Talent Acquisition Group TCS House, Raveline street Fort, Mumbai - 400 001	TCS, TCS House, Raveline street, Fort, Mumbai - 400 001	Member
7.	Avinsh Vashishta, Chairman & GU Managing Director	Accenture Services Pvt. Ltd., 71, Cunningham Road, Bangalore – 560052	Member
8.	Ravi Shankar B.	Mindtree Ltd, Global Village, RCVE Post, Mysore Road, Bangalore 59	Member
9.	Mr. Umesh Gupta, Network of ICT Entrepreneurs and Enterprises	USO House, USO Road, 6 Special Institutional Area, New Delhi-110067	Member
10.	Ms. Koushalya Barik, AD (VE)	National Institute of Open Schooling, Noida	Member
11.	Prof. Ashis.K. Pani, Professor, XLRI Jamshedpur	XLRI Jamshedpur	Member
12.	Shri S.K. Prasad	National Institute of Open Schooling, Noida	Member
13.	P N Nayak, Head - Organizational Training	HCL Services Ltd., (A subsidiary of HCL INFOSYSTEMS LTD.), Hyderabad Campus, Road No 2, Hardware Technology Park, Kancha Imarat, Pahadi Shareef, Hyderabad – 500005	Member
14.	Hemant Darbadi, Ex. Director	CDAC, Pune University Campus, Pune-411007	Member
15.	Ms. Sheetal Chopra, Dy. Director	NIELIT,Delhi, 2nd Floor Parshwanath Mero Mall, Indralok Metro Station, New Delhi	Member
16.	Dr Vijayarajeswaran, Managing Director	VI Micro Systems Pvt. Ltd, Chennai	Member
17.	Pramod Tripathi, SEO	National Institute of Open Schooling, Noida	Member
18.	Shri Naresh Chandra, Director	RDSDE Chattisgarh	Mentor
19.	B.K. Singha, JDT	RDSDE Assam	Member

20.	Shri Sundar Rajan, DPA Gr. B	NIMI, Chennai	Member
21.	Dr. M. Jayprakasan, JDT	DGT, New Delhi	Member
22.	V. Babu, DDT	NSTI(W), Indore	Member
23.	K. Singh, DDT	ATI, Ludhiana	Member
24.	Akhilesh Pandey, TO	CSTARI Kolkata	Member
25.	Snehasish Bandopadhyay, TO	CSTARI Kolkata	Member
26.	Annapurna, TO	ATI Hyderabad	Member
27.	S.K. Acharya, TO	DGT, NEW DELHI	Member
28.	B.Biswas, TO	CSTARI Kolkata	Member
29.	B K Nigam, TO	CSTARI Kolkata	Member
30.	Sanjay Kr. Gupta, VI –COPA	RVTI Vadodara	Member
31.	Kunal Shanti Priya, VI	ITI, Daltonganj, Jharkhand	Member
32.	Anwar Muhammed, TO	RDSDE J&K	Member
33.	Sunil. M.K. TO	CTI, Chennai	Member
34.	Narmada, TO	NSTI, Bangalore	Member
35.	Rohit Sama, ATO	ITI Shantinagar, Hyderabad	Member
36.	J. Herman, Assistant Training Officer	Govt. ITI (W), Nagarkoil, TN	Member
37.	P. Parthiban, Assistant Training Officer (ITESM)	Govt ITI(W),Salem, TN	Member
38.	S. Raja, ADT	DET, Telangana	Member
39.	Mohd. Akram,	ITI, Shanthi Nagar, Hyderabad	Member
40.	Geeta Sikhen , VI	RVTI, Panipat	Member

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 (15)	Workplace hygiene (5)	Attendance/ Punctuality (10)	Ability to follow Manuals/ Written instructions (5)	Application of Knowledge (10)	Skills to handle tools & equipment (10)	Economical use of materials (5)	Speed in doing work (10)	Quality in workmanship (15)	VIVA (15)	**Total internal assessment Marks**	**Result (Y/N)**
1														
2														