CURRICULUM

FOR THE TRADE OF

INFORMATION & COMMUNICATION TECHNOLOGY SYSTEM MAINTENANCE

UNDER

APPRENTICESHIP TRAINING SCHEME

2017

सत्यमेव जयते
Government of India

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

CONTENTS

1. ACKNOWLEDGEMENT

The DGT sincerely express 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. Sami infotech , Nerul ,Navimumbai
2. ChristioniSharpline Tech Pvt. Ltd, Navi Mumbai.
3. Abvolt India Pvt Ltd, Vikroli Mumbai
4. Global Technogies, Vashi, Navi Mumbai
5. Festo India Pvt. Ltd, Santcruz Mumbai

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

Co-ordinator for the course: Sh. NirmalyaNath, ADT- CSTARI Kolkata

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2. BACKGROUND

2.1 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.

2.2 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.

2.3 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.

3. RATIONALE

(Need for Apprenticeship inINFORMATION & COMMUNICATION TECHNOLOGY SYSTEM MAINTENANCE trade)

Information & Communication Technology System Maintenance is an information and electronics communication system maintaining vocational trade. Students are introduced to so many latest technology during training such as install, troubleshoot, repair and maintain electronic systems and equipment used in industrial manufacturing; checking for loose connections and defective components on electronic control systems and mechanical equipment; maintain and setup network with computers, printers and other peripheral equipment as well as configure broadband equipmentfixing a problem and evaluate computer diagnostic tests. The greater degree of relevance of the training with latest advancements of the industry will enhance the employability opportunities.

4. JOB ROLES: REFERENCE NCO

Brief description of Job roles:

The role of a**Information & Communication Technology System Maintenance** personnel is to support and maintain computer systems, desktops, and peripherals. This includes installing, diagnosing, repairing, maintaining, and upgrading all hardware and equipment while ensuring optimal workstation performance. The person will also troubleshoot problem areas in a timely and accurate fashion, and provide end user training and assistance where required. Install, maintain and setup network with computers, printers and other peripheral equipment as well as configure broadband equipment.

In a Nutshell :

- Installing software or hardware
- Maintaining and repairing equipment / peripherals.
- Troubleshooting different computer issues
- Determining and installing appropriate security measures
- Installing & Configuring advanced computer networks
- Providing technical support on-site or via phone or email
- Install, configure, and maintain common end user application software. May train and provide assistance to end users.
- Troubleshoots software and hardware problems related to Internet applications.
- Assist the information technology administrators with configuration, maintenance and monitoring of access servers, routers, Microsoft and Linux servers and Internet servers including DNS, radius, web, LDAP, e-mail, network monitoring and print servers.
- Assist in preparing, maintaining, and upholding procedures for logging, reporting, and statistically monitoring PC performance.
- Accurately document instances of hardware failure, repair, installation, and removal.
- Assist in developing long-term strategies and capacity planning for meeting future computer hardware needs.
- Support development and implementation of new computer projects and new hardware installations.

Reference NCO-2015: 3114.9900

5. GENERAL INFORMATION

1. **Name of the Trade : INFORMATION & COMMUNICATION TECHNOLOGY SYSTEM MAINTENANCE**

2. **N.C.O.-2015 Code No**.: **3114.9900**

3. **Duration of Apprenticeship Training (Basic Training + Practical Training):**2years

4. **Duration of Basic Training**: -

a) Block –I : 3 months

b) Block – II : 3 months

Total duration of Basic Training: 6 months

5. **Duration of Practical Training (On -job Training): -**

a) Block–I: 9 months

b) Block–II : 9 months

Total duration of Practical Training: 18 months

6. **Entry Qualification** : Passed 10th with Science and Mathematics as subjects.

7. **Selection of Apprentices**: The apprentices will be selected as per Apprentices Act amended time to time.

8. **Rebate for ITI passed trainees** :i)**One year** in the trade of Information&Communication TechnologySystem Maintenance
ii)**One year** in the trade of InformationTechnology & Electronic System Maintenance
iii) One year - Passed one year BBBT and Advanced moduleRepair and Maintenance of Hardware of Computer and Peripherals in COE of Information Technology sector

Note: Industry may impart training as per above time schedule for different block, however this is not fixed. The industry may adjust the duration of training considering the fact that all the components under the syllabus must be covered. However the flexibility should be given keeping in view that no safety aspects is compromised.

6. COURSE STRUCTURE

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**

Components of Training	Duration of Training in Months →																							
↓	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Basic Training Block - I																								
Practical Training Block - I																								
Basic Training Block - II																								
Practical Training Block - II																								

7. SYLLABUS

7.1 BASIC TRAINING
(BLOCK – I &II)
DURATION: 06 MONTHS

GENERAL INFORMATION

1) **Name of the Trade** :INFORMATION & COMMUNICATION TECHNOLOGY SYSTEM MAINTENANCE
2) **Hours of Instruction** : 1000 Hrs. (500 hrs. in each block)
3) **Batch size** : 20 TRAINEES
4) **Power Norms** : 3.45 KW for Workshop
5) **Space Norms** : 70 Sq.m.,
6) **Examination** : The internal assessment will beheld on completion of each Block.
7) **Instructor Qualification** :

Technical **–**

(i)B.E./B. Tech in Computer Science / IT/Electronics & Communication from RecognizedUniversity with one year expreience in the relevant field.***OR***

(ii) Post Graduate in Computer Science /Computer Application / IT /Electronics with one year expreience in the relevant field.***OR***

(iii)Bachelor in Computer Science / ComputerApplication / IT *OR* NIELIT A Level with two year expreience in the relevant field.***OR***

(iv)Three year Diploma from recognized Board/ Institution in Computer Science / IT/ Electronics & Communication with two year expreience in the relevant field.***OR***

(v) National Apprenticeship Certificate orNational Trade certificate in Information &Communication Technology SystemMaintenance /ITESM trade withthree year expreience in the relevant field.

Desirable: CITS passed in the relevant field

8) **Tools, Equipments& Machinery required** : - As per Annexure – I

7.1.1 DETAILSYLLABUS OF CORE SKILL

A. Block– I
Basic Training

Topic No.	a) Engineering Drawing	Duration (in hours)	b) Workshop Science & Calculation	Duration (in hours)
1.	Engineering Drawing: Introduction and its importance. Different types of standards used in engineering drawing. Drawing Instruments: their uses Drawing board, T-Square, Drafter (Drafting M/c), Set Squares, Protractor, Drawing Instrument Box (Compass, Dividers, Scale, DiagonalScales etc.), Pencils of different Grades, Drawing pins / Clips.	**30**	Quadratic equation, Simultaneous linear equation in two variables. Electricity: Negative & positive polarities, structure of Atoms,Electrons & protons, coulomb, unit of charge, volt, unit of potential difference and charge in motion is current. Fundamentals and derived units, Supplementary units, of electrical parameters.	**20**
2.	Free hand sketching of straight lines, dotted lines, chain lines, rectangles, square, circles, polygons etc. Free hand sketching of tools, simple solids with dimensions. Freehandsketchof solidsviewedperpendicularly totheir surface andaxes.		Ohms law: Current, voltage, resistance, and related problems, multiple and submultiples units, electric power, power dissipation in resistance, power formulas. Seriescircuits: Total resistance, same current inseries circuits,IR voltagedrops, Sum ofIR drops equalto the appliedvoltage. PolarityofIRvoltagedrops,Total powerinseriescircuits, Relatedexercise	
3.	Electronic Component symbols, Series circuit, Representation of IR voltage drops. Free hand sketchofcircuits and wiring diagrams. Drawing of UJT triggered circuit with ISI symbols, power amplifier circuit, models asSCR,DIAC,TRIAC, voltage regulator ckt. Motor controlckt.		Transistor amplifiers, Voltage Gain Direct-current meters: Moving coil meter, design of voltmeter, ammeter, loading effect of voltmeters, related problems. Parallel circuits: Applied voltage is the same across parallel branches, Each branch current, Total current equal to the sum of the branch currents.	
4.	Parallel circuits, Branch currents, representation. Logic gates, Combinational gates, other circuits.		Calculation related with Series, parallel connection of batteries. Functions of x-shift, y-shiftcontrols,time/divcontrols,Internal triggering and externaltriggering.	
5.	Diagram of series, parallel connection of batteries. Block diagram of a CRO. Introduction to different types of		Fundamentals and derived units, Supplementary units of electrical parameters, Standards -definition, types - primary and secondary,	

	wave shape and drawing practice.		working standards, Standards of length, mass, time, current, voltage.	
6.	Types of resistors, colour coding, tolerance representation Capacitor structure, symbol, types, colour code, Variable capacitors.		Temperature, pressure. Newton's law of motion, applications , momentum. Simple problems.	

B. Block- II
Basic Training

Topic No.	a) Engineering Drawing	Duration (in hours)	b) Workshop Science & Calculation	Duration (in hours)
1.	Flow charts showing steps in sampleprograms. Block diagram of personal computer, drawings of keyboard, monitor, mouse, FDD, HDD, CD ROM. Front and Rearview of aPC.	**30**	Voltageregulators,Voltagedoublers , multipliers, Clipper circuits, related exercise. Logarithm definition ,properties,simpleproblems. Alternatingvoltageandcurrent:ACf undamentals,RMS,Averagevalues.	**20**
2.	Explanation of simple orthographic projection 3rd angle. Block Diagram, Front and Rear view of a monitor. Connections of a Computer.		Arithmetic andgeometricprogression, sum of n terms, simple calculations. Problems of binary addition, decimal to binary, binary to decimal, decimal to hexadecimal, hexadecimal to decimal. Binary addition andsubtraction.	
3.	Diagram of aHard disk,diagram ofinternalcomponents andstructure. Pin diagram and block diagram of RAM, ROM, EPROM, DynamicROM Chips. Diagram of servo motor and stepper motor with external connections.		Calculation ofHard diskcapacity, Read/write time,latency time,seek time. Definition of Scalar and Vector, notations. Addition and subtraction of vectors.	
4.	Top view of a motherboard showing chip set and slots etc. Diagram of different connectors, CPU sockets. Front and Rear view of a Laptop PC.		Scalarcross product, SimpleProblems. AC circuits: Power, VA, KVA, Watts,KW, relatedexercise, power factor.	
5.	Block diagramof SMPS and diagram of various power connectors. 3 d view of SMPS Top view of a mother board showing chip set and slots etc Diagram of different connectors, CPU sockets.		Diodes: Rectifier, peak voltage, PIV, Rectifier efficiency. Specifications and Rating of SMPS. Power Good. Interpersonal relationship and group behaviours.	
6.	Pin diagram ofRAM,DPROM etc. Diagram related with Project.		Dynamic and Static RAM. Quality control standard and institutions. Calculation of the capacity of RAM.	
7.	Simple exercises related to trade related Test Papers. Solution of NCVT test papers.			

7.1.2DETAIL SYLLABUS OF PROFESSIONAL SKILLS &PROFESSIONAL KNOWLEDGE

A. Block –I

Basic Training

Week No.	Professional Skills	Professional Knowledge
1	**Basic concepts ofElectricity:** a) Identify specification of types of fuses. Identification and specification of type of switches. b) Identification of meter types and measuring range. c) Construct a simple circuit using AC/DC supply, lamp, fuse and switch. d) Measure circuit voltage and current using voltmeters and ammeters. e) Measure voltage and current using Multi-meter(analog-digital). f) Use Multimeter to check uses, lamps and switches. g) Measure DC and AC power using V-I method and using power meter.	a) Concept of current and voltage. AC, DC Supplyindicating lamps. Different types of Fuses and their applications. Different types of switches used in electrical and electronic applications. b) Circuit voltage and current. Measuring circuit voltage and current using voltmeters and ammeters. AC and DC meters. c) Measuring instruments, MC, MI type, Ammeter, Voltmeter, Multimeterfor measuring voltage and current. Construction, characteristics/ features and specification. d) Meaning of Circuit and basic electrical circuits. e) Meaning of resistance, continuity and continuity testers. Multimeter for checking continuity.
2	**Resistors. Soldering and De-soldering:** a) Identify different types of resistors from physical appearance. b) Identify resistor value and tolerance using colour code. c) Measuring resistance using Multimeter. d) Soldering and de-soldering techniques, practice using hook-up wires. Soldering resistors on Tag board. e) Verification of Ohms Law and Kirchhoff's Laws. f) Soldering resistors on PCB.De-soldering practice. g) Experiment using P.T.C and NTC resistors. h) Experiment to check VDR's, LDR's.Test Pots, Presets.	a) Classification, characteristics and application of different types of resistors. Carbon film, metal film, wire wound, cermets and surface mounted. b) Colour coding of resistors. Calculating measuring resistance value and its tolerance value. Wattage of resistors, specific resistance and their importance. c) Soft soldering and precautionsto be taken for making a goodsolder joint. Types of solder and need of soldering paste. d) Ohms law and KirchhoffsLaws. e) Printed circuit boards and its application. f) Temperature dependent resistors and their applications.(PTC and NTC). g) Voltage dependent resistors(VDR). h) Photoelectric effect,LightDependent resistors. i) Variable resistors, pots, presets, types and application. Log and Linear resistors.
3	**Inductance:** a) Identification of different types of inductors and its specifications. b) Measure inductance using LCR meter. Calculate inductive reactance at different input signal frequencies. c) Demo on self andmutual induction. d) Check step down transformers. e) Rewind a transformer to given specification	a) Definition of inductance. Types of inductors and their application. b) Inductive reactance, measuring inductance and inductive reactance. Meaning of lead, lag. Effect of inductor on power factor. Frequency dependence of inductive reactance. c) Self and Mutual inductance.Coefficient of coupling. d) Transformers. Turns ratio.Transformer

	using winging machine. f) Finding losses and efficiency of given transformers. g) Identifying and testing high frequency transformers used in electronic circuits.	winding. Winding machines. e) Transformer losses and efficiency. f) Uses, losses, efficiency type of cores and uses for LF, HF, VHFtransformer. g) Transformers used in high frequency applications.
4	**Capacitance and Resonance circuits:** a) Identify of differenttypes of capacitors from colour code and typographic code. b) Test working condition of capacitor. Measure capacitance using RLC meter. c) Measure capacitive reactance at different frequencies. d) Measure capacitance and capacitive reactance of, capacitors in series and capacitors in parallel. e) Find the resonance frequency of a given Series and parallel resonance circuit.	a) Working principle of capacitors. Electrostatic action, dielectric constant. Unit of capacitance and capacitive reactance. b) Measuring capacitance and capacitive reactance. c) Behaviour of capacitance at different frequencies. d) Capacitors in series and parallel. e) Meaning of Resonance. Application of resonance. Series and parallel resonance circuits.
5	**Electronic Components:** a) Identify terminals of different types of diodes. Record its specifications referring to diode data sheet. b) Plot forward and reverse characteristics of diode Testing workingcondition of diodes. c) Construct and test a half wave and full wave diode rectifiers. d) Construct and test a Bridge rectifier with and withoutfilter. e) Construct a bridge rectifier with capacitance input filter. f) Draw Zener diode characteristics, Simple voltage regulator using zener diode.	a) Semiconductor, intrinsic and extrinsicsemi conductors, P and N type semiconductor. Development of P.N. junction barrier potential. Effect of temperature. Breakdown voltage. b) Different types of Diodes. Diode terminals. Diode specifications using data book. c) Forward and reverse characteristics of diode. Testing diodes using Multimeter. d) Half wave and Full wave rectifiers using diodes. Transformer requirements. Calculating output DC, ripple factor. e) Bridge rectifier. Calculating output DC, ripple factor. f) Filters for rectifiers. Calculating output DC, ripple factor. g) Zener diode-Its characteristics andElectronic Componentsymbols,Series circuit,Representation of IR voltagedrops.Polarity of IR voltage drops, Total power in series circuits, related exerciseapplication for voltage regulation. Calculating the series resistor for required current rating. h) Specifications of a regulated power supply and testing a power supply for its specifications.
6	**Transistor and Amplifiers:** a) Identify types of transistors based on their physical appearance. Identify the leads of the given assorted types of transistors. b) Quick test given transistors using Multimeter. Identify opens, shorted junctions. c) Wire and find the gain of amplifiers in - CB, CE, CCconfigurations.	a) Working principle of PNP,Bipolartransistors. Types of transistors and applications. Leads of transistors and theiridentification. b) Forward and reverse bias of transistor Junction. General values of junction resistances. Quick testing a transistor- using Multimeter. c) Transistor configuration - CB, CE, CC, alpha, beta. Types of Biasing of transistor amplifiers, comparison and applications. Thermal runaway. Steady and Dynamic characteristics. Testing- get frequency response, gain bandwidth product, signal to noise ratio.
7	**SpecialSemiconductors-FET:**	a) Field effect transistors, types, working

	a) Construct and testa JFETamplifier. b) Construct and test a MosFET application circuit. c) Construct and test a relaxation oscillator using UJT. d) Construct and test an application circuit using SCR. e) Construct and test an application circuit using DIAC. f) Construct and test an application circuit using TRIAC.	principle, applications. b) Working principle andapplication of UJT. c) Working principle and application of SCR. d) Working principle and application of TRIAC. e) Working principleand application ofDIAC.
8	**Power supply:** a) Practice on identifying and using the controls on a regulated power supply. b) Assemble and test a series regulated power supply. c) Assemble and test a shunt regulated power supply. d) Assemble and test a fixed voltage regulator using 3pin IC. e) Assemble and test a variable voltage regulator using IC. f) Assemble a simple inverter and converter for use with emergency lamp. g) Identify the parts and controls of a UPS. Practice switch-on and switch-off procedures.	a) Unregulated, regulated DCPower supply specifications. Application of different types of power supply for specific application types. b) Series regulator using transistor.Short circuit protection. Overload protection. c) Shunt regulators using transistors. d) Fixed Voltage regulators using IC's. e) Variable voltage regulators using IC's. f) Mains voltage stabilizers. g) Inverters and converters. h) Un-interrupted power supply, types and applications.
9	**Digital Electronics** a) Identify the specifications of given digital IC's referring to data books. b) Verify the truth table of two input OR, NOR, AND, NAND, NOT gates. c) Verify the truth tableof XOR and XNORGates. d) Realization of different gate type using NAND gates. e) Realization of half adder & full adder usingNAND gates.Realization half subtractor and full subtractor using NAND gates. f) Verifying encoder/decoder/multiplexer/ demultplexer IC truth tables. g) Realization and verification of truth table of RS, JK and MS- JK flip-flop. h) Realization and verification of D-flip flop. i) Realization and verification of up & down (sync/async) counter. j) Verification of A/D & D/A converter. k) Realization of shift registers using FF. l) Verification ofRight-shift, Left- shift registers. p) Verification of Serial-in-parallel out and parallel in serial out of data. q) Representation of logic function's truth table using K-Map.	a) Number systems and conversions. Classification of digital IC's. Use of data book for identification of digital IC's. b) Basic LOGIC GATES and truth table. Boolean algebra. c) Logic families, logic levels, propagation delay. Multiple input gates. d) XOR, XNORgates and application. e) Simplification of Boolean equations. f) Combinational logic circuits. g) Half adder, full adder, parallel binary adder, half subtractor, fullsubtractor. h) Commercially available adders/subtractors. i) Comparator, decoders, encoders, multiplexer, demultiplexer. j) Parity generators / checkers. RS Flip -Flop, JK flip-flop, Master- Slave flip-flops. k) Types of triggering and applications. D flip-flops. l) Counters, ripple, synchronous, up-down, scale-n counters. m)Principles of A/D & D/A converter. Commerciallyavailable A/D & D/Aconverters. n) Shift registers. Types, applications. o) Commercially available shift registers and applications. p) Conversion of serialdata into parallel andvice-versa. q) Concept of KarnaughMap (K-Map).

10	**Battery:** Familiarize with the lead acid battery, Charging of batteries, Series parallel connection of batteries.	Lead acid cell, its construction andchemicalchanges during charging and discharging. Battery charging methods. Maintenance free batteries. Lithium cell, Ni-cad cells their construction and applications.
11	**Oscilloscope:** a) Identify CRO front panel controls. b) Measure ofDC/AC voltagesand frequency using CRO. c) Identify the internal parts of aCRO and CRT. d) Calibrate A given CRO.	a) Working principle and application. b) Precautions to be taken while measuring voltages using CRO. c) Internal parts of a CRO. Construction and function of CRT and its associated circuitry. d) Simple Calibration procedures care and maintenance.
12	**Modulation, Demodulation and Transmitters:** a) Identifying AM signal.Measurement of percentage of modulation usingCRO. b) Construct and test a simple Amplitude modulator. c) Construct and test a crystal receiver. d) Construct and simple Frequency modulator /transmitter. Test transmitter using FM radio.	a) Modulation – types of modulation. AM, FM, PM. Amplitude modulation.Measurement of percentage of modulation. b) AM Transmitter block diagram. Amplitude modulator circuit and working. c) AM receiver block diagram.Principle of an AM demodulator/detector - analysis of crystal receiver. d) Frequency modulation-bandwidth requirement. FM transmitter block diagram.Comparison with AM- advantages of FM over AM. e) FM receiver block diagram.Principle of Demodulation ofFM signals. f) Pulse modulation -PAM, PWM and PCM. Demodulators. Advantages and applications.
13.	**Revision & Internal Assessment**	

B. Block –II
Basic Training

Week No.	Professional Skills	Professional Knowledge
1.	**Word Processing:** a) Creating and savingdocument files using Word processingsoftware. b) Formatting text andediting. e) Inserting pictures indocuments. f) Creating tables. h) Saving worddocuments in otherformats. i) Setting page and margins; Printing documents. **Spreadsheet Processing:** j) Creating Worksheets using Spreadsheet Software. k) Formatting cells. l) Using formula in cells. m) Graphs and tables. n) Printing spreadsheets.	a) Introduction toword processing and comparison offeatures. Creating andsaving document filesusing Wordproces software. b) Formatting testand editing. c) Setting page andmargins. Tabs and indents. e) Inserting pictures in documents. f) Creating tables. h) Saving word documents in other formats. i) Printingdocuments. j) Introduction to spread sheet.Creating Worksheets using Spreadsheet Softv k) Formatting cells. l) Using formula in cells. m) Graphs and tables. n) Printing spread
2.	**Hardware Identification:** • Identify thefrontandrear panel controlsandports on a PC • Cases • Cooling • Cables & Connectors • Power SupplyConnections • MotherboardComponentsand Connections • MotherboardCPU (Processor) • RAM (Memory) • Hard Drive Connections • ROM Drives • Graphics Cards	a) TypesofI/OdevicesandportsonastandardPCforconnectingI/Odevices. b) Functionofkeyboard,briefprinciple,types,interfaces,connectors, cable. c) Function of Mouse,brief principle, types,interfaces,connectors, cable. d) Functionofmonitor,briefprinciple,resolution,size,types,interfaces,conne cable. e) Function of Speakers and Mic, brief principle, types, interfaces, connec cable. f) Function of serial port, parallel port, brief principle of communication through these ports, types of devices that can be connected, interface standards, connectors, cable.
3.	**HardwareRemove-Test-Replace/Install:** • Removing and installingRAM • Removing and installing ROM • Removing and installing a Hard Drive • Removing and installinga Power Supply • Removing and installinga Graphics Card • Install Expansion Cards • Removing and installing Fans	a) Types of Processors and their specifications (Intel: Celeron, Pentiur family, Xeon, dual core, quad core, core 2 duo, i3,i5,i7 and AMD). b) Principle of storing. Bitwise data organization. c) Semiconductor memories, RAM,ROM, PROM, EMPROM, EEPRO Static anddynamic. d) Concept of track, sector, cylinder. Read write head, headactuator, spindle motor, sensors, PCB. e) HDD, Principle of working of Hard disk drive, cylinder and clusture,types, capacity, standards, interface, jumper setting. Drive components- hard disk platens, and recording media, air filter, read v head, head actuator, spindle motor, circuit board, sensor, features lik head parking, head positioning, reliability,performances, shock mou

	• Removing and installing Motherboard • Removing and installingthe Processor • Installing a CPU Cooler • Troubleshooting • Checking the Power Switch • Removing the CMOS Battery • Seating Expansion Cards	capacity. f) CMOSsetting(restrict to drive settings only). g) Basic blocks of SMPS, description of sample circuit.
4.	**Windows Installation:** A walkthrough of installing Windows 7 /10/ latest version. Imaging: create a Windowssystem image How to Backup/Restoreyour Windows partition with the bootable imagedisk Duplicating a partition (creating a multiboot system) A multiboot system: the Windows bootmanager vs. an alternative bootmanager Setting up a multiboot / dualboot system	a)Types of software. System software-OS, Compiler. b) Application softwarelike MS office. High level, low level language, functions of an operating system. Disk operating system. c) Concept of GUI, Modes of starting on different occasions. d) Desktop, Icon, selecting, choosing, drag and drop. e) My computer, network neighbor hood/ network places. f) Recycle bin, briefcase, task bar, start menu, tool bar, and menus. g) Properties of files and folders. h) Properties of connected devices. i) Applications under Windows accessories. j) Windows Help. k) Finding files, folders, computers. l) Control panel. Installed devices and properties.
5.	**Data Backup:** • 3 types of media to use when backing up your data, and when each method is appropriate • How to create automated backups to ensure you always have a recent backup • Learn how to manuallybackup data • How to make an exactcopy (clone) of a harddrive **HardwareTroubleshooting:** • The danger in notdiagnosing problems First • Learn how to test yourRAM • Check your hard drivefor errors **PC Cleaning:** • The best cleaningsupplies to use • How to increaseairflow and increaseyour	a) Utilities for recovering data from defective/bad hard disks. b) Introduction to removablestorage devices, Bulk data storage devices-magnetic, optical, magneto opticaldrives, WORMdrives. c) CD ROM drives-Technology,TypesofCD drives,workingprincipleapplication. d)Technology,workingprinciple,capacity, media of DATDriveand back-upprocedures. e)Technology,workingprinciple,capacity, mediaofDVD ROM drive . f)Technology,workingprinciple, capacity, media of CDWRITERandusedifferentmodes ofwritingonaCD.Using of utility for CD writing.

	computer'slifespan • How to clean yourcomputer	
6.	**Hard Drives:** • Partitioning hard disk (primary and extended partitions) • Hard Drive Failures • How To Troubleshoot a Noisy Hard Drive • How to Format a Hard Drive • How to Completely Erase a Hard Disk Drive • Installation and configuration of storage devices. Integration of PATA and SATA drivers. • Recover emails, files, and data from a crashed hard drive or computer **Virus Removal:** • Installing a modern anti-virus utility • Run a full system scan, Hard Drive scan, selective folder scan. • How to fix your browser from redirecting to other websites (browser hijack) • When utilities don't fix everything, how to manually remove a virus • 2 specific things to disable when trying to get rid of a nasty virus	• What's Inside a HardDrive? • How Hard DisksWork • Inside: Hard DriveMotherboard • Desktop Hard DriveBuyer's Guide • What is RAID? UsingMultiple Hard Drives for Performance and Reliabi • Partitioning hard disk (primary and extended partitions) • Learn how to prevent your PC from getting malware • All the different types of malware and how they attack your PC • Diagram of a Hard disk, diagram of internal components andstructure. • Calculation of Hard disk capacity, Read /write time, latency time time. • The difference between Anti-Virus and Anti-Spyware software
7.	**System Utilities:** • How to check to see if your hard drive has bad sectors • Fix the master boot record • How to run an in-place installation • 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 XP,Vista,7/8/10 • Make Changes to an Account • Changing the storage location of the personal folders • Changing the storage location of installed software • Setting up Parental Controls in Windows XP,Vista,7, 8, 10 • How to Use Fast User Switching	Bad Sectors in Hard disk, Master Boot Record, in-place installation, Re fixing, performance level check, Shortcut fixing, Fixing Startup process, log Users and user account. Privileges, scope, permissions etc. Concept of Virtual Machine.

	in Windows • View Hidden Files and Folders • Lock Down Windows 7 / 8 / 10 With User Account Control • How to Delete User Accounts in Windows	
8.	**Windows Update & Device Driver:** • How to find your system version in Windows, Linux • Installing a service pack • How to perform a Windows Update **Software Installation:** • Installing a software program in windows • How to run a file from MS-DOS • Extracting or uncompressing a compressed file • How to compress or make files into one file • Extracting files from the Windows cabinets • Uninstalling Windows software • Unable to remove a program from Windows Add/Remove programs	Version of a software, Service pack, Updating of OS, Different configurations of Computer system and its peripherals, Compatible with dif hardware/software. Software Installation -Pre-installation -Prerequisites, Ins procedure, Rollback or Un-install procedure, Tests. Post-installation -Backup procedure & specifications, Restore procedure, Periodical view check. Awareness of legal aspectsof using computers such as copyright, patent et
9.	***Junk File Removal*** • How to Remove Junk Files • How to completely remove "deleted" files • How to clear web browser cache firefox, IE, chrome, • 5 steps to clean up your computer files • Personalize yourWindows XP-based PC ***Linux OS*** • Using a Linux Live CD • Why you want a Linux Live CD • Use Ubuntu Live CD to Backup Files from Your Dead Windows Computer • Using a liveCD as your Linux Desktop ***Outlook Configure & Backup*** • Configure outlook • Backup and Restore Outlook • How to restore the Outlook default installation, toolbars and settings • Restore Deleted Items from an Outlook PST-file	Junk files, deleted files, configuration of internet browser. - Introduction to UNIX/LINUX and its structure. - Files and Processes in Linux. - Directory structure of Linux O.S. Outlook - Add and use contacts, Calendar basics, Recall and replace sent messages, automatic replies when you're out of the office, The ins and outs of BCC, Instant Search to find Calendar items, Use Instant Search to find contacts, Instant Search to find messages and text, Add holidays to your calendar, C or delete a search folder, Import and export vCards to Outlook contacts, Make the switch to Outlook 2013, Reach out with contact groups (distributi lists), Send or delete an email stuck in your outbox, Take calendars to the next level, Track email with read receipts, Password protect your mailbox, Use rules to manage you email.
10.	**SMPS:**	a) DC power sourceto PC. Need for SMPS.

	a) Remove the SMPSfrom PCcabinet. Identify the types of output connectors of SMPS. b) Identify output voltages using colour coding. Measure voltage levels. Test power cable and fuse. c) Open and cleaning the cooling fan and other parts. d) Fix the SMPS inside the PCcabinet and test PC. e) Use Of Debug Card PostError & Code, SMPS Tester, PCI slot testing tool.	Specifications, Rating of SMPSbased on type of motherboard and devices u (AT/ATX, Micro ATX, mini ATX) b) Colour coding adopted. Types of connectors used. Output voltagelevels. Measuring technique. c) Precautions to be taken while cleaning the internal area ofSMPS. d) Precautions to be taken while fixing the SMPS inside the cabinet.
11.	**MotherBoard / System board:** a) Remove the mother board from PC cabinet. Identify the main components on the mother board. b) Identify the form factor of the mother board. c) Identify the chipset used. d) Identify the number of slots available for add-in cards (ISA, PCI, AGP). e) Identify the type of processor connector (slot/ socket/ dual). f) Identify the BIOSROM, make, version. g) Identify the jumper settings(if any)on the mother board. h) Identify the types of slots available for memory modules. i) Identify the connectors for Harddisk(IDE) k) Identify the connectorfor Coml, Com2. l) Identify theconnectors for PS/2. m) Identify the connectors for USB. n) Identify theconnectors for Game port. o) Identify the connector for parallel port(Centronics). p) Identify the connector forKeyboard(in exclusivelyavailable) q) Identify thespecifications of the Lithium battery. r) Identify any otherspecial component	a) Mother board function, types, main components on the mother board a their interconnection. Functional description of mother board,specification a variation. Precautions to be taken before removing the mother boardfrom PCcabinet.. b) Form factor of mother board. c) Meaning and function of chipssets.Manufacturers, comparison, importan of quality chip set for performance ofPC. d) Bus standards-evolution, speed, latest trends (ISA, PCI, AGP,new trends). e) Types ofprocessorconnectors,examples of latestprocessorconnectors, number of pins. f) Functionof BIOS,manufacturers ofBIOS. g) IDE ports available. Primary, secondary. Number of drives that can be connected. Methods ofadding SCSIdrives. h) Details ofFDDconnector on mother board. i) Facility for serial Communication ports on mother board. j) Facility for PS/2Communication ports on mother board. k) Meaning and advantage of USB ports. Facility for USBCommunicatio on motherboard. l) Facility forgame portson motherboard. m) Facility forparallelCommunication port on mother board. n) Type of connectors in which keyboards cabbe used, old type full size connector. o) Need ofLithium battery. Itsspecifications. Replacementprocedure.Effect ofremoving the battery from mother board. p) Other specialcomponentsavailable on mother boards such asintegrateddevices/drivers,

	available on the motherboard. s) Identify theconnectors for front panel switches anddisplay.	
12.	**Memory:** a) Identification of different types ofmemory devices. b) Identification of memory chips. c) Identification of SIMM andDIMM memory modules, number of pins, type.	a) Memory devices, types & principle of storing. Data organization 4 bit, 8 bit, word. b) Semiconductor memories, RAM,ROM, PROM,EMPROM, EEPROM, S and dynamic. c) Example of memory chips, pin diagram, pin function of popularly usedRAM, EPROM, and EEPROM Chips inPC's.
13	**Revision & Internal Assessment**	

7.1.3 EMPLOYABILITY SKILLS

GENERAL INFORMATION

1) **Name of the subject**	**:**	**EMPLOYABILITY SKILLS**
2) **Applicability**	**:**	ATS- Mandatory for fresher only
3) **Hours of Instruction**	**:**	**110 Hrs. (55 hrs. in each block)**
4) **Examination**	**:**	The examination will be held at the end of two years Training by NCVT.
5) **Instructor Qualification**	**:**	

MBA/BBA with two years experience or graduate in sociology/social welfare/Economics with two years experience and trained in Employability skill from DGET Institute.

And

Must have studied in English/Communication Skill and Basic Computer at 12th /diploma level

OR

ii) Existing Social Study Instructor duly trained in Employability Skill from DGT Institute.

7.1.3.1 SYLLABUS OF EMPLOYABILITY SKILLS

A. Block – I
Basic Training

Topic No.	Topic	Duration (in hours)
	English Literacy	**15**
1	**Pronunciation :** Accentuation (mode of pronunciation) on simple words, Diction (use of word and speech)	
2	**Functional Grammar** Transformation of sentences, Voice change, Change of tense, Spellings.	
3	**Reading** Reading and understanding simple sentences about self, work and environment	
4	**Writing** Construction of simple sentences Writing simple English	
5	**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.	
	I.T. Literacy	**15**
1	**Basics of Computer** Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of computer.	
2	**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.	
3	**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	
4	**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.	
	Communication Skill	**25**
1	**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. Case study/Exercise	
2	**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.	
3	**Motivational Training** Characteristics Essential to Achieving Success The Power of Positive Attitude Self awareness Importance of Commitment Ethics and Values Ways to Motivate Oneself Personal Goal setting and Employability Planning. Case study/Exercise	
4	**Facing Interviews** Manners, Etiquettes, Dress code for an interview Do's & Don'ts for an interview	
5	**Behavioral Skills** Organizational Behavior Problem Solving Confidence Building Attitude Decision making Case study/Exercise	

B. Block–II
Basic Training

Topic No.	Topic	Duration (in hours)
1	**Entrepreneurship skill**	**10**
	Concept of Entrepreneurship **Entrepreneurship**- Entrepreneurship - Enterprises:-Conceptual issue Entrepreneurship vs. Management, Entrepreneurial motivation. Performance & Record, Role & Function ofentrepreneurs in relation to the enterprise & relation to the economy, Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.	
2	**Project Preparation & Marketing analysis** Qualities of a good Entrepreneur, SWOT and Risk Analysis. Concept & application of Product Life Cycle (PLC), Sales & distribution Management. Different Between Small Scale & Large Scale Business, Market Survey, Method of marketing, Publicity and advertisement, Marketing Mix.	
3	**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.	
4	**Investment Procurement** Project formation, Feasibility, Legal formalities i.e., Shop Act, Estimation & Costing, Investment procedure - Loan procurement - Banking Processes.	
	Productivity	**10**
1	**Productivity** Definition, Necessity, Meaning of GDP.	
2	**Affecting Factors** Skills, Working Aids, Automation, Environment, Motivation How improves or slows down.	
3	**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.	
4	**Personal Finance Management** Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance.	
	Occupational Safety, Health & Environment Education	**10**
1	**Safety & Health** Introduction to Occupational Safety and Health importance of safety and health at workplace.	
2	**Occupational Hazards** Basic Hazards, Chemical Hazards, Vibro-acoustic Hazards, Mechanical Hazards, Electrical Hazards, Thermal Hazards. Occupational health, Occupational hygienic, Occupational Diseases/ Disorders & its prevention.	
3	**Accident & safety** Basic principles for protective equipment. Accident Prevention techniques - control of accidents andsafety measures.	
4	**First Aid**	

	Care of injured & Sick at the workplaces, First-Aid & Transportation of sick person	
5	**Basic Provisions** Idea of basic provision legislation of India. of safety, health, welfare under legislation of India.	
6	**Ecosystem** Introduction to Environment. Relationship between Society and Environment, Ecosystem and Factors causing imbalance.	
7	**Pollution** Pollution and pollutants including liquid, gaseous, solid and hazardous waste.	
8	**Energy Conservation** Conservation of Energy, re-use and recycle.	
9	**Global warming** Global warming, climate change and Ozone layer depletion.	
10	**Ground Water** Hydrological cycle, ground and surface water, Conservation and Harvesting of water	
11	**Environment** Right attitude towards environment, Maintenance of in -house environment	
	Labour Welfare Legislation	**5**
1	**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.	
	Quality Tools	**5**
1	**Quality Consciousness :** Meaning of quality, Quality Characteristic	
2	**Quality Circles :** Definition, Advantage of small group activity, objectives of quality Circle, Roles and function of Quality Circles in Organization, Operation of Quality circle. Approaches to starting Quality Circles, Steps for continuation Quality Circles.	
3	**Quality Management System :** Idea of ISO 9000 and BIS systems and its importance in maintaining qualities.	
4	**House Keeping :** Purpose of Housekeeping, Practice of good Housekeeping.	
5	**Quality Tools** Basic quality tools with a few examples	
	Leadership and Team Building Skills.	**5**
	Leadership Discipline and Morale Team Work Case Study/ Exercise	
	Meet the Mentor **Role - play as a Supervisor**	**5**
	Organizing and Planning.	**5**
	Time Management Group Dynamics Case Study/ Exercise	

7.2 PRACTICAL TRAINING (ON-JOB TRAINING)
(BLOCK – I&II)
DURATION: 18 MONTHS (9 months in each block)

GENERAL INFORMATION

1) **Name of the Trade** :INFORMATION & COMMUNICATION TECHNOLOGY SYSTEMMAINTENANCE

2) **Batch size** : 16 TRAINEES

3) **Examination** : i) The internal assessment will be held on completion of each block

ii) NCVT exam will be conducted at the end of 2nd year.

4) **Instructor Qualification** :

Technical **–**

(i)B.E./B. Tech in Computer Science / IT/Electronics & Communication from RecognizedUniversity with one year expreience in the relevant field.***OR***

(ii) Post Graduate in Computer Science /Computer Application / IT /Electronics with one year expreience in the relevant field.***OR***

(iii)Bachelor in Computer Science / ComputerApplication / IT *OR* NIELIT A Level with two year expreience in the relevant field.***OR***

(iv)Three year Diploma from recognized Board/ Institution in Computer Science / IT/ Electronics & Communication with two year expreience in the relevant field.***OR***

(v) National Apprenticeship Certificate orNational Trade certificate in Information &Communication Technology SystemMaintenance /ITESM trade withthree year expreience in the relevant field.

Desirable: CITS passed in the relevant field

5) **Tools, Equipments& Machinery required** : - As per Annexure – II

7.2.1 BROAD SKILL COMPONENT TO BE COVERED DURING ON-JOB TRAINING

A. BLOCK – I(Duration- 09 months)

The candidate should be competent to execute following operation/ skills after completion of the industrial training: -

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

DURATION: 09 MONTHS (39 WEEKS)	
SL. NO.	**LIST OF OPERATIONS/SKILLS TO BE COVERED DURING INDUSTRIAL TRAINING**
1	Mother board: - Checking and installing motherboards with different form factors,on-board feature, processor, sockets and memory sockets. Programming and re-setting CMOS a making front panel connections.
2	Expansion Cards: - Identification, checking of installing of different expansion cards commonly used.
3	Power supply: - Linear power supply, switch mode power supply, identification of power supply problems based on output voltage, load and electrical noise.
4	Drives: - Maintaining, troubleshooting and repairing FDDs, HDDs, CD drives and DVDs.
5	Key board: - Servicing the key boards, troubleshooting of the key board, Checking key signals and cables, replacing key switches and cables.
6	Monitor : - Servicing, Monitors, Identification, of problems with general symptoms - complete dead, contrast/brightness defects, retrace visibility, vertical hold defect garbage monitors, checking CRT drive card.
7	Printers:- Self test of different Printers - troubleshooting based on symptoms, identifying defective sub-systems(carriage movement, head movement, platen drive, print head, paper seasons, rollers, interfacing) and their rectification.
8	System Assembling:- Assembling a Computer System, loading the driver software, installing the OS, loading application software and optimizing the system for performance.
9	Computer Networking:- Installing, configuring and optimizing p6er-to-peer and client/Server Networks, Troubleshooting the Networks. Network Administration.
10	System & Data Security:-Handling different type of viruses, Installing and configuring Anti-virus software. Using data recovery software and recovering data from crashed & corrupted hard disks.

12	Switches:- ATM Switch, Ethernet Switch, Fast Ethernet Switch, FDDI Switch, FDDI/Ethernet Switch, Fiber Channel Switch, Multi service Switch and Routing Switch – their working principle, operation, Installation, maintenance and repairing.
13	Hubs:- 100VG Hub, ATM Hub, Ethernet Hub, FDDI Hub, Fiber Channel Hub, Repeater Hub, USB Hub, Wireless Hub - their working principle, operation, Installation, maintenance and repairing.
14	Routers:- ISDN Router, Cable/DSL Routers, Ethernet and ATM WAN Routers, Power supplies for Routers, Router with IP- Voice software, Broad Band Router -their working; principle, operation, Installation, maintenance and repairing.
15	UPS:- On-line, Off- line, Line interactive UPS - their working principle, operation, Installation, maintenance and repairing.

B. BLOCK – II(Duration- 09 months)

The candidate should be competent to execute following operation/ skills after completion of the industrial training: -

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

DURATION: 09 MONTHS (39 WEEKS)	
SL. NO.	**LIST OF OPERATIONS/SKILLS TO BE COVERED DURING INDUSTRIAL TRAINING**
1.	Data Transfer equipments:- Modems - Internal Modem, External Modem and Gable Modems Set top boxes, Line amplifiers, reverse path amplifiers, Distribution amplifiers – their working principle, operation, Installation, maintenance and repairing.
2.	Network Communication:- Describe how computers can use WiFi and Bluetooth to connect to a network, Data transfer technique through Local Area Network (LAN), Wireless Local Area Network (WLAN) and Wide Area Network (WAN)
3.	Earth Station:- Fixed and Mobile earth Station, BBP mode/ MSM mode of Operations, High Data Rate Terminal - their working principle, operation, Installation, maintenance and repairing.
4.	ISDN:- NT, Terminal Adopter their working principle, operation, Installation, maintenance and repairing.
5.	ATM:- Fundamentals of ATM, ATM adaptation layer, virtual paths, and virtual channels. ATM signaling, addressing, NNI, LAN emulation, MPOA, ATM in WAN. Switch designs, traffic management, voice over ATM, and ATM's 'relationship to DSL.
6.	Internet & the World Wide Web:- Exploring Cyberspace, Choosing internet access device & physical connection, choosing Internet Service Provider(ISP), sending & receiving E-mail, concept of World Wide Web.
7.	Satellite Systems:- Describe the use of different satellite systems (e.g. Global Positioning Systems (GPS), satellite navigation, Geographic Information Systems (GIS), media communication systems)
8.	Telecommunication:- Communication from the Analog to the Digital Age, Communications channels: The conduits of communications, Factor affecting How dada is transmitted, Cyber ethics: Controversial Materials, privacy and Intellectual property.
9.	System & Application Software:- Demonstrate the components of System software and their uses, Device Drivers & Utility Programs, concepts of Operating System, Android system, Application software and their specialty.
10.	E-Commerce, Files & Databases:- Managing Database Management System, E-Commerce System, Data Mining and B2B systems, concern about Accuracy and Privacy
11.	Digital Age: Security Issues: Threats to Computer & Communications System, Emerging Global

	Telecommunications, Artificial Intelligence, Information & Education, Commerce & Money, Entertainment & the Arts, Government & Electronic Democracy
12.	Information System:- Organizations Managers & Information, Computer-Based Information System, System Development: The six phases of systems analysis & design
13.	Cell Phone:- Study of the front panel & identification and function of different buttons. Disassembling & assembling of different units & Servicing of Cell phone, Identification of problems, troubleshooting & repairing.
14.	Other Electronic Systems:- Demonstration & study of different stages of DVD, Digital Clock, Earphone, Condenser Mice, Music system, Burglar alarm, Electronics Buzzer, Microwave oven, Washing machine. Study of Bar-code reader. Study of photocopying machine , scanner , toner & sensor.

8. ASSESSMENT STANDARD

8.1 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 to be given while assessing for team work, avoidance/reduction of scrape/wastage and disposal of scarp/wastage as per procedure, behavioral attitude and regularity in training.

The following marking pattern to be adopted while assessing:

a) Weightage in the range of 60-75% to be allotted during assessment under following performance level:

For 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.

In this work there is evidence of:

- skill in the use of software tools, network tools and workshop/lab equipment
- tolerances, time & space management while undertaking different work being substantially in line with those demanded by the program/project.
- good documentation, indentation, neatness and consistency in the program.
- occasional support in completing the project/job.

b) Weightage in the range of above 75%- 90% to be allotted during assessment under following performance level:

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.

In this work there is evidence of:

- good skill levels in the use of software tools, network tools and workshop/lab equipment
- good tolerances, time & space management while undertaking different work being substantially in line with those demanded by the program/project.
- a good level of documentation, indentation, neatness and consistency in the program.
- little support in completing the project/job

c) Weightage in the range of above 90% to be allotted during assessment under following performance level:

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.

In this work there is evidence of:

- high skill levels in the use of software tools, network tools and workshop/lab equipment
- high tolerances, time & space management while undertaking different work being substantially in line with those demanded by the program/project.
- a high level of documentation, indentation, neatness and consistency in the program.
- minimal or no support in completing the project

8.2 FINAL ASSESSMENT- ALL INDIA TRADE TEST(SUMMATIVE ASSESSMENT)

	SUBJECTS	Marks	Internal assessment based on competency	Full Marks	Pass Marks	Duration of Exam.
Block – I & II	**Block – I**		**250**	**250**	**150**	
	Professional Skill	250		250	150	**08 hrs.**
	Professional Knowledge	100		100	40	3 hrs.
	Workshop Cal. & Sc.	50		50	20	3 hrs.
	Engineering Drawing	50		50	20	4 hrs.
	Employability Skill	50		50	20	3 hrs.
	Block - II		**250**	**250**	**150**	
	Grand Total	**500**	**500**	**1000**	**550**	

Marks Distribution TOTAL: **1000** marks for I & II Blocks Pass marks: **550**

Note: - The candidate pass in each subject conducted under all India trade test.

9. FURTHER LEARNING PATHWAYS

- On successful completion of the course trainees can opt for Diploma course (Lateral entry).[Applicable for candidates only who undergone ATS after CTS]
- On successful completion of the course trainees can opt for CITS course.

Employment opportunities:

After completion of the course the apprentices shall be qualified for one or more of the following job roles:

1. Office Automation.
2. Smart Accounting.
3. Web design and maintenance.
4. Computer maintenance.
5. Computer Training in schools and institutes.
6. Cyber Cafe setup and management.
7. IT online support

On successful completion of this course, the candidates shall be gainfullyemployed in the following industries with above job role(s):

1. Information Technology industries.
2. Accounting & Legal sector.
3. Business Services.
4. Hardware and Network Maintenance.
5. Finance
6. Health Care
7. Media
8. Retail
8. Govt. Organisations.
9. Self employment

ANNEXURE – I

TOOLS & EQUIPMENT FOR BASIC TRAINING

INFRASTRUCTURE FOR PROFESSIONAL SKILL & PROFESSIONAL KNOWLEDGE

TRADE:INFORMATION & COMMUNICATION TECHNOLOGYSYSTEMMAINTENANCE
LIST OF TOOLS & EQUIPMENTS FOR 16APPRENTICES

A. TRAINEES TOOL KIT FOR 16 TRAINEES +1 INSTRUCTOR

Sl.No.	Specification	Quantity
1	Connecting screwdriver 100 mm	16 nos.
2	Neon tester 500 V.	16 nos.
3	Screw driver set (set of 5)	16 nos.
4	Insulated combination pliers 150 mm	16 nos.
5	Insulated side cutting pliers 150 mm	16 nos.
6	Long nose pliers 150 mm	16 nos.
7	Soldering iron 25 W. 240 V.	16 nos.
8	Electrician knife	16 nos.
9	Tweezers 100mm	16 nos.
10	Digital Multimeter	16 nos.
11	Soldering Iron Changeable bits 15 W	16 nos.
12	De- soldering pump	16 nos.

B. LIST OF TOOLS REQUIRED

Sl.No.	Specification	Quantity
1.	Crimping tool (pliers)	2 Nos.
2.	Soldering Iron 25W	6 Nos.
3.	Magneto spanner set	2 Nos.
4.	Screw driver 150mm	4 Nos.
5.	Steel rule 150mm	2 Nos.
6.	Scriber straight 150mm	2 Nos.
7.	Soldering Iron 240W	1 Nos.
8.	Allen key set (set of 9)	2 Nos.
9.	Tubular box spanner (set of 6nos)	1 No
10.	Magnifying lenses 75mm	3 Nos.
11.	Continuity tester	6 Nos.
12.	Soldering iron 10W	6 Nos.
13.	Cold chisel 20mm	1 No.
14.	Scissors 200mm	1 No.
15.	Handsaw 450mm	1 No.

C. TOOLS & EQUIPMENTS: (Computer Hardware: Installation andMaintenance)

Sl. No.	Name of the Equipment	Quantity
	HARDWARE	
1.	Server Computer	01 no
2.	Desktop Computer	10 nos
3.	Laptop, Notebook	01 each
4.	Intel Mobile Desktop based PC with LCD monitor	01 no
5.	Tablet	02 Nos.
6.	Printers: Laserjet, deskjet, passbook, mfd	01 each
7.	Network Printer	01 no
8.	5KVA online UPS	02 nos
9.	LAN Cards, Wi-fi LAN Cards	06 nos each.
10.	LCD/DLP Projector	01 no
11.	Power Meter	02 nos
12.	Crimping Tools	06 nos
13.	Computer Toolkits	06 Nos.
14.	Computer Spares:	As required
15.	Motherboards (of different make)	4 nos
16.	Cabinets	4 nos
17.	Processors (of different make)	4 nos
18.	Hard Disk (500 GB or better) different types	4 nos
19.	Optical Drives	4 nos
20.	LCD/LED/TFT Monitors	2 nos
21.	Pen Drives	4 nos
22.	External Hard disk	2 nos
23.	External DVD Writer	2 nos
24.	Keyboards	4 nos
25.	Mouse	4 nos
26.	Anti static pads	4 nos
27.	Anti static wrist wraps	4 nos
28.	SMPS	4 nos
29.	Digital Multimeters	10 nos
30.	Blu-Ray drive and player	2 nos
31.	External Hard Disk	2 nos
32.	Digital Camera	2 nos
33.	HD Display	2 nos
34.	Network storage	2 nos
35.	Card Reader	2 nos
36.	Game video card	2 nos
37.	Web Cam	2 nos
38.	Surround sound speakers	2 nos
39.	Different types of memory cards	2 nos each
40.	Laptop kits	12 nos
41.	Laptop spares: Cabinet with display, memory, hard disk, battery pack, keyboard membrane, chargers	As required
42.	SMPS Trainer kit	2 nos
43.	UPS Trainer kit	2 nos

44.	Power electronics Trainer kit	2 nos
45.	Post error debugging card	4 Nos
46.	SMPS Tester	4 Nos.
47.	PCI slot Testing tool	4 Nos.
SOFTWARE		
1.	Windows Server Operating System	1 license
2.	Windows Operating System	2 licenses
3.	Linux Operating System	2 nos.
4.	Network Management Software	01 No.
5.	MS Office	2 nos
6.	Anti virus software	2 nos
7.	Data recovery software	2 nos
8.	LINUX Server Operating System (Samba / Su-se)	01 No.
9.	Open source Pc Utility / Tweak Software	As availabe
FURNITURE and Other Equipments		
1.	Computer Tables	10 nos
2.	Computer Chairs	20 nos
3.	Printer Table	1 no
4.	Class room chairs	20 nos
5.	Air conditioners (optional)	2 nos
6.	Scanner	1 no
7.	Modem	1 no
8.	Telephone Line	1 no
9.	Broadband Internet connection	1 no
10.	Fire fightingequipments	As required
11.	Hardware and Network Trainer Kit	6 nos

D.TOOLS & EQUIPMENTS: (Computer Networking)

Sl. No.	Name of the Equipment	Quantity
HARDWARE		
1.	Wireless Network Adapter	6 nos
2.	Wireless Access Point	4 nos
3.	Router	4 nos
4.	Managed Layer 2 Ethernet Switch 8/16/24 port	2 nos
5.	Managed Layer 3 Ethernet Switch 8/16/24 port	2 nos
6.	Network Training System	2 nos
7.	LAN Protocol Simulation and Analyser Software	2 nos
8.	Network and Internet security trainer	2 nos
9.	LAN cable tester	2 nos
10.	Network cables – UTP	As required
11.	Network Cables – coaxial, flat, ribbon	As required
12.	LAN Cards, wi-fi LAN Card	05 nos each
13.	Connectors for cables	As required
14.	Power Meter	2 nos
15.	Media Convertor	4 each
16.	8/16/24 port UTP jack panel	2 nos
17.	SC Couplers	12 nos

18.	SC Pigtails	12 nos
19.	RJ-45 connector	As required
20.	Fluke Meter	2 nos
21.	Crimping Tools	6 nos
22.	Switch with POE ports	2 nos
23.	POE adapters	2 nos
24.	Network Camera (Outdoor / Indoor)	2 no each
25.	Fibre Optics cable with LC connector	As required
26.	LC connector module	As required

E. <u>RAW MATERIALS</u>:

Sl. No.	Name of the Equipment	Quantity
	HARDWARE	
1.	White Board Marker	1 Dozens
2.	Duster Cloth(2' by 2')	20 Pcs
3.	Cleaning Liquid 500 ml	2 Bottles
4.	Xerox Paper (A4)	As required
5.	Full Scape Paper (White)	1 reams
6.	PCB, solder flux etc& electronic components	As required
7.	Wires, cables Plug sockets switches of various types and other consumables	As required
8.	Resistors, Capacitors, Inductors, Diodes, LED, Transistors, Thyristors, ICs etc.	As required
9.	Spare Transformers and power devices required for servicing SMPS	As required
10.	Various types of Button Cells	As required
11.	Dry Cell	As required
12.	Hand Brush	As required
13.	Silicon grease	As required
14.	Heat sink agent	As required
15.	RAM 512 MB	As required
16.	Cartridges for printer	As required
17.	Optical Mouse P/S2 or USB	As required
18.	P/S2 OR USB Key Board	As required
19.	SMPS	As required
20.	CMOS Battery	As required
21.	3 Pin Power Chord	As required
22.	Cat 5/5e/6 cable	300 meters
23.	Flat Cable	100 meters
24.	Stapler Small	2 pcs
25.	Stapler Big	1 pcs
26.	AAA battery for remote	As required
27.	AA battery for clock	As required
28.	8 GB pen drives	4 Nos
29.	CDs	20 Nos
30.	DVDs	10 Nos.
31.	Wall Clock	1 pcs

32.	Anti static pads	As required
33.	Anti static wrist wraps	As required
34.	Soldering wire and paste	As required
35.	RJ – 45 Connector	As required
36.	Telephone cable	As required
37.	Co-axial cable	As required
38.	RJ-11 connector	As required
39.	BNC connector, T connector, terminator	As required
40.	Keystone jack	As required
41.	Patch / Jack Panel	As required
42.	Patch / Mounting cord	As required
43.	RJ-45 Info outlet with faceplate	As required
44.	RJ-45 I/O Box	As required
45.	RJ – 45 Cable extender	As required
46.	8-port HUB	04 Nos.
47.	LAN Card	04 Nos.
48.	Wi-fi LAN Card both PCI and USB	02 Nos.each
49.	Display Card	02 Nos.
50.	USB to RJ-45 converter	08 Nos.
51.	RJ-45 to USB converter	08 Nos.
52.	USB HDD 500 GB	02 Nos.

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: INFORMATION & COMMUNICATION TECHNOLOGYSYSTEMMAINTENANCE

LIST OF TOOLS& EQUIPMENTS FOR 16APPRENTICES

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

2) Infrastructure:

A : TRAINEES TOOL KIT:-

Sl. No.	Name of the items	Quantity (indicative)
1.	Draughtsman drawing instrument box	16 Nos.
2.	Set square celluloid 45^0 (250 X 1.5 mm)	16 Nos.
3.	Set square celluloid 30^0-60^0 (250 X 1.5 mm)	16 Nos.
4.	Mini drafter	16 Nos.
5.	Drawing board (700mm x500 mm) IS: 1444	16 Nos.

B : FURNITURE REQUIRED

Sl. No.	Name of the items	Quantity (indicative)
1	Drawing Board	16 Nos.
2	Models : Solid & cut section	as required
3	Drawing Table for trainees	as required
4	Stool for trainees	as required
5	Cupboard (big)	01 No.
6	White Board (size: 8ft. x 4ft.)	01 No.
7	Trainer's Table	01 No.
8	Trainer's Chair	01 No.

ANNEXURE – II

INFRASTRUCTURE FOR ON-JOB TRAINING

TRADE: INFORMATION & COMMUNICATION TECHNOLOGY SYSTEMMAINTENANCE

For Batch of 16APPRENTICES

Actual training will depend on the existing facilities available in the establishments. However, the industry should ensure that the broad skills defined against On-Job Training part (i.e. 9 months + 9 months) are imparted. In case of any short fall the concern industry may impart the training in cluster mode/ any other industry/ at ITI.

ANNEXURE-III

GUIDELINES FOR INSTRUCTORS AND PAPER SETTERS

1.Due care to be taken for proper & inclusive delivery among the batch. Some of the following some method of delivery may be adopted:

A) LECTURE
B) LESSON
C) DEMONSTRATION
D) PRACTICE
E) GROUP DISCUSSION
F) DISCUSSION WITH PEER GROUP
G) PROJECT WORK
H) INDUSTRIAL VISIT

2. Maximum utilization of latest form of training viz., audio visual aids, integration of IT, etc. may be adopted.

3. The total hours to be devoted against each topic may be decided with due diligence to safety & with prioritizing transfer of required skills.