

Syllabus for the trade
of

"Information Technology & Electronics System Maintenance"

(SEMESTER PATTERN)

Under
CRAFTSMAN TRAINING SCHEME

Designed in : 2013

By
Government of India
CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE
Directorate General of Employment & Training
Ministry of Labour & Employment
EN-81, SECTOR-V, SALT LAKE CITY
KOLKATA-700091

List of Members of trade Committee Meeting for the trade of "Information Technology & Electronics System Maintenance" held on 14.12,2005 at CSTARI, Kolkata.

Sl. No.	Name & Designation	Organisation	Remarks
1	Shri G. Bhowmik	Director, CSTARI, Kolkata	Chairman
2	Shri Surajit Ukil	Scientific Officer, ERTL (E) Kolkata	Member
3	Shri S. Chattopadhy	CETE, Kolkata	Member
4	P.N.Sanyal	Faculty of Electronics & Telecommunication Member The George Telegraph Trg. Instt., Kol	Member
5	Shri D.Bhadury	Technical Officer C-DAC, Kolkata	Member
6	Shri Asim Sarkar	Technical Officer C-DAC, Kolkata	Member
7	Shri T.Mukhopadhyay,	Dy. Director of Trg. CSTARI, Kolkata	Member
8	Shri V.Babu,	ADT, CSTARI, Kolkata	Member
9	Shri G.Giri,	ADT,RDAT(ER),Kolkata	Member
10	Shri A.Chakraborty	ADT	Member
11	Sk.Altaf Hossain ,	Training Officer	Member
12	Shri Mohan Singh	Training Officer	Member

List of members attended the Workshop to finalize the syllabi of existing CTS into Semester Pattern held from 6th to 10th May'2013 at CSTARI, Kolkata.

Sl. No.	Name & Designation	Organisation	Remarks
1.	R.N. Bandyopadhyaya, Director	CSTARI, Kolkata-91	Chairman
2.	K. L. Kuli, Joint Director of Training	CSTARI, Kolkata-91	Member
3.	K. Srinivasa Rao, Joint Director of Training	CSTARI, Kolkata-91	Member
4.	L.K. Mukherjee, Deputy Director of Training	CSTARI, Kolkata-91	Member
5.	Ashoke Rarhi, Deputy Director of Training	ATI-EPI, Dehradun	Member
6.	N. Nath, Assistant Director of Training	CSTARI, Kolkata-91	Member
7.	S. Srinivasu, Assistant Director of Training	ATI-EPI, Hyderabad-13	Member
8.	Sharanappa, Assistant Director of Training	ATI-EPI, Hyderabad-13	Member
9.	Ramakrishne Gowda, Assistant Director of Training	FTI, Bangalore	Member
10.	Goutam Das Modak, Assistant Director of Trg./Principal	RVTI, Kolkata-91	Member
11.	Venketesh. Ch. , Principal	Govt. ITI, Dollygunj, Andaman & Nicobar Island	Member
12.	A.K. Ghate, Training Officer	ATI, Mumbai	Member
13.	V.B. Zumbre, Training Officer	ATI, Mumbai	Member
14.	P.M. Radhakrishna pillai, Training Officer	CTI, Chennai-32	Member
15.	A.Jayaraman, Training officer	CTI Chennai-32,	Member
16.	S. Bandyopadhyay, Training Officer	ATI, Kanpur	Member
17.	Suriya Kumari .K , Training Officer	RVTI, Kolkata-91	Member
18.	R.K. Bhattacharyya, Training Officer	RVTI, Trivandrum	Member
19.	Vijay Kumar, Training Officer	ATI, Ludhiana	Member
20.	Anil Kumar, Training Officer	ATI, Ludhiana	Member
21.	Sunil M.K. Training Officer	ATI, Kolkata	Member
22.	Devender, Training Officer	ATI, Kolkata	Member
23.	R. N. Manna, Training Officer	CSTARI, Kolkata-91	Member
24.	Mrs. S. Das, Training Officer	CSTARI, Kolkata-91	Member
25.	Jyoti Balwani, Training Officer	RVTI, Kolkata-91	Member
26.	Pragna H. Ravat, Training Officer	RVTI, Kolkata-91	Member
27.	Sarbojit Neogi, Vocational Instructor	RVTI, Kolkata-91	Member
28.	Nilotpall Saha, Vocational Instructor	I.T.I., Berhampore, Murshidabad, (W.B.)	Member
29.	Vijay Kumar, Data Entry Operator	RVTI, Kolkata-91	Member

GENERAL INFORMATION

1. Name of the Trade : Information Technology & Electronics System Maintenance
2. N.C.O. Code No :
3. Duration : 2 Years (4 Semesters having duration of six months each)
4. Power Norms : 7.2 Kw
5. Space Norms : 80 sq. Mtrs
6. Entry Qualification : Passed 10th class examination under 10+2 system of education with Science and Mathematics or its equivalent.
7. Unit Size (No of Student) : 16
8. Instructors'/trainers Qualification :
 - a) B.E./B.Tech in Electronics/Electronics & Telecommunication with one yrs. experience in the relevant field
OR
Diploma in Electronics/Electronics & telecommunication/from recognized board of technical education with two years experience in the relevant field.
OR
NTC/NAC in the trade with three years or four years experience respectively in the relevant field
9. **Desirable qualification** : (b) Preference will be given to a candidate with Craft Instructors Certificate (CIC).

Note: At least one Instructor must have Degree / Diploma in the relevant field.

**SYLLABUS FOR THE TRADE OF
"INFORMATION TECHNOLOGY AND ELECTRONICS SYSTEM MAINTENANCE (IT&ESM)"
UNDER CTS**

First Semester

Duration : Six Months

Semester Code: ISM: SEM I

Week No.	PRACTICAL	THEORY	Engineering Drawing	Workshop cal. & sc.
1	Visit to various labs, First aid Exercises and Fire fighting Procedures.	Familiarize with Hand Tools, and their uses, Elementary First Aid, General Safety Pre-Cautions	What is Engineering drawing, Importance, free hand sketching of straight lines, rectangles, square, circles, polygons, etc.	Quadratic equation, Simultaneous linear equation in two variables.
2	Handling and uses of Ammeter, Voltmeter, Ohm meter and Multimeters. Resistance measurement. Verification of Ohm's law, Measure the current, Voltage, Resistance in Series circuit, Parallel Circuit and Series parallel circuits.	Basic Atomic structure, Conductors and Insulators, Electrical Terms and definitions. Resistance, Laws of Resistance and Resistivity. Ohm's law, Series circuit, Parallel circuit, series parallel circuit - their connections and characteristics	-do-	-do-
3	Familiarize with the Log, Linear potentiometers, Wire wound resistors, Find the relation between resistance vs light in LDR, find the relation between resistance vs voltage in VDR.	Types of resistors, Linear and Non linear resistance, Carbon, Wire wound, Carbon film, Metal film resistors, LDR, VDR their characteristics, Variable resistors.	Free hand sketching of tools, reading of simple drawings and concepts of dimensions and dotted lines, chain lines etc. Magnifying glass.	Electricity: Negative & positive polarities, structure of Atoms, Electrons & protons, coulomb, unit of charge, volt, unit of potential difference, and charge in motion is current.
4	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.	-do-	-do-
5	Measurement of Inductance in various circuits, Flux adding, flux canceling connections.	Magnetism and Electromagnetism. Faraday's law of electromagnetic induction, Self induction, Mutual Induction, Hysteresis curve of magnetic materials.	Free hand sketching of tools, reading of simple drawings and concepts of dimensions and	Electricity: Negative & positive polarities, structure of Atoms, Electrons

			dotted lines, chain lines etc. Magnifying glass.	& protons, coulomb, unit of charge, volt, unit of potential difference, and charge in motion is current.
6	Measurement of capacitance, Capacitors in series, capacitors in parallel. RC time constant.	Capacitors, types and constructional details, Laws of capacitance, di-electric strength, capacitors in series and parallel, Variable capacitors, trimmer etc. Charge, RC time constant.	-do-	-do-
7	Find out the Inductive reactance, Capacitive reactance, Impedance, Power factor in series ac circuits. Measure the power in single phase circuit. Voltage, current, power measurements	AC fundamentals, series Ac circuit, Inductive reactance, Capacitive reactance, Impedance, Power factor, RC circuit, LC circuit, RLC circuits, Resonance. Single phase ac supply.	Introduction to different types of wave shape and drawing practice.	Fundamentals and derived units, Supplementary units, of electrical parameters. Standards-definition, types-primary and secondary standards, working standards, Standards of length, mass, time, current, voltage.
8	DC generator characteristics, Connect and start DC motors and change the direction of rotation.	DC Generator & Motor, Shunt motor, Series motor and compound motors their working and applications Starters used for DC motors.	-do-	-do-
9	Speed control of DC motors-flux control method and armature current control method.	Characteristics of DC Motors and their speed control methods.	Electronic Component symbols, Series circuit, Representation of IR voltage drops.	Series circuits: Total resistance, same current in series circuits, IR voltage drops, Sum of IR drops equal to the applied voltage, Polarity of IR voltage drops, Total power in series circuits, related exercise.
10- 11	Familiarize with the connection details and measure the current and voltage in the	DC servo motor, AC servo motor, Stepper motor, Tachogenerator and their	-do-	-do-

	DC servo motor, AC servo motor, Stepper motor and Tacho -generator circuits.	constructional details, applications and uses.		
12	Find the meter resistance and extend the range of the meters. Measure the Power in ac & . DC circuit. Measurement' of Energy in single phase ac and three phase ac circuits.	Measuring instruments, moving iron, moving coil meters, Ammeter, Voltmeter, Ohm Meter, Watt meter, energy meter their construction and working principles. Extend the range of the meters.	-do-	-do-
13	Make star and delta Connection with small step-down transformers and measure the voltage in primary and secondary windings.	Transformers, step up, step down, efficiency of transformer, auto transformer, Star and delta connection in transformers	Free hand sketch of nuts with dimensions from samples. Circuits and wiring diagrams.	Conversion of star / delta, delta/star connections.
14	Connect and check various types of relays, Circuit breakers, Switch gears and contactors Practice on soldering and de-soldering.	Types of Relays, Switches, Circuit Breakers (MCB, ELCB), Contactors their connections and applications. Soldering and de-soldering.	Free hand sketches of nuts with dimensions from samples. Circuit s and wiring diagrams.	-do-
15	Measure the peak value, peak to peak value, Find out the rms value, measure the DC voltage, Measure the time and find out the frequency using CRO.	CRO- block . diagram, Working principle of CRT, Functions of X-shift, Y-shift controls, time/div controls, Internal triggering and external triggering. Use of CRO for the measurement of AC voltage, DC voltage, time and frequency.	-do-	Parallel circuits: Applied voltage is the same across parallel branches, Each branch current, Total current equal to the sum of the branch currents.
16	Forward and reverse characteristics of PN junction diode. Diode as a rectifier.	Semi conductors, Intrinsic and Extrinsic semiconductor, Majority carrier, Minority carrier, P type, N type. PN junction diode, forward characteristics and reverse characteristics. Rectification, Diodes in series and in parallel.	Diagram of PN junctions, forward bias and reverse bias circuit.	Find the average DC in Half, Full wave rectifier circuits with filter and without filter.
17	Measure the voltage and observe the output wave forms of Half wave, Full wave and Bridge rectifier circuits. Measure the output with different-filter circuits.	Half wave rectifier, Full wave rectifier and bridge rectifier their construction, working and output. Filter circuits, Capacitor input filter, Choke input filter and n Filter.	Parallel circuits, Branch currents, representation	Resistance in parallel circuits, Total power in parallel circuits, effect of open branch, short circuit across parallel branches, related exercise.
18	Construct and measure the output in Low pass, High pass and Band pass filter circuits.	Passive, filter, Low pass, High pass, Band pass and Band stop filter and their' applications, LT type, P type.	-do-	Temperature, pressure. Newton's law of motion,

				applications, momentum. Simple problems
19	Find and draw the characteristics curves of Bi-polar transistors. Testing of transistors by multimeter.	Bi-polar Transistors, PNP, NPN type, Characteristics of transistors, Transistor as an amplifier, Transistor as a switch.	Explanation of simple orthographic projection 3 rd angle.	-do-
20	Characteristics of Zener Diode, Simple ' voltage regulator, Characteristics of Varicap, Photo diode and LED.	Zener Diode, its characteristics, Voltage regulator, Varicap diode, Photo diode, LED, Opto-Coupler their construction, working and applications.	-do-	Calculation related to Zener Voltage regulator. Find the voltage regulation in various regulator circuits.
21	Characteristics of CE, CC configurations and find their input impedance, Current gain and voltage gain.	CB, CE, CC configuration of transistors and their characteristics, Voltage gain, current gain, alpha, beta, and impedance.	-do-	Calculation related to alpha and beta gain. Calculation of biasing voltages in different biasing circuits.
22	Assembling of voltage divider biasing circuit, Self bias, auto bias and emitter feedback bias circuits and measure the voltages at base, collector and emitter.	Biasing of transistors, Voltage divider bias, self bias, emitter feedback bias, Collector feedback bias- their effects and uses & stabilization. Thermal run away in transistors. Basics of PCB, grades, lamination, multi layers PCB.	Drawing of various Electrical circuits with B.I.S symbol of circuit, Series and Parallel circuit, Power transformer, Instrument transformer, etc.	Calculate gain in various amplifier circuits. Calculate the Voltage gain, Current gain, Power gain in decibel units.
23	Observe the input and output waveforms in Class A, Class B, Class AB, Class C amplifiers.	Classification of amplifiers, Class A, Class B, Class AB and Class C amplifier their biasing, conduction period and distortion; applications.	-do-	Calculate the filter components for the woofer and Tweeter.
24	Construct and measure the gain in two stage RC coupled, LC coupled, Transformer coupled and Direct coupled amplifier.	Coupling of amplifiers, RC coupling, LC coupling, Transformer coupling and Direct Coupling their features and applications. Frequency response.	-do-	Calculation related to positive feedback and negative feedback in amplifier circuits.
25	Project Work / Industrial visit (optional)			
26	Examination			

**SYLLABUS FOR THE TRADE OF
"INFORMATION TECHNOLOGY AND ELECTRONICS SYSTEM MAINTENANCE (IT&ESM)"
UNDER CTS**

Second Semester

Duration : Six Months

Semester Code: ISM: SEM II

1	Assemble and measure the output power of power amplifier circuits.	Power amplifier, Single ended, Complementary Push-Pull Power amplifier. IC amplifiers. Fabrication of IC circuits. Voltage gain, Current gain, Power gain in decibels.	Schematic diagram of Moving coil meter, Moving Iron meters, voltmeter, Ammeter, Ohm meter.	Voltage dividers, & current dividers: Series voltage dividers, current divider with two parallel resistances.
2	Study about the woofer, Mid range, Tweeter and find their frequency response. Familiarize with various types of microphones.	Speakers and Micro-phones, Dynamic. Types of speakers their sizes, rating and frequency response. Sensitivity and directional properties of various microphones.	-do-	-do-
3	Amplifier with feedback circuits; measure their output with feedback and without feedback.	Distortion in amplifiers, Amplitude distortion, Phase distortion and frequency distortion. Feedback, Positive feedback, Negative feedback their effects and applications. Voltage feedback and current feedback circuits.	Explanation of simple orthographic projection 3 rd angle.	Direct-current meters: Moving coil meter, design of voltmeter, ammeter, loading effect of voltmeters, related problems.
4	Assemble and find the voltage gain in FET and MOSFET amplifiers. Find the stand-off ratio of UJT.	Field Effect transistors, P Channel, N Channel, MOSFET their construction, Characteristics and applications. IC fabrication with MOSFET technology. Handling of CMOS ICs. UJT construction and characteristics.	-do-	-do-
5	Assemble and find the regulation in series regulator, Series parallel regulator, 3 terminal IC regulator, Variable voltage regulator.	Power supplies, Simple voltage regulator, Series voltage regulators, Series parallel voltage regulator with short circuit protection, regulation, 3 terminal regulators, variable power supply, Current control in regulators.	-do-	-do-
6	Assemble and observe the output of different types of Oscillators, Multivibrators and Schmitt trigger. Operations of Function generator, AF & RF signal injector.	Oscillators, LC oscillators, Crystal Oscillator. Mono stable, Bistable and Astable Multivibrators. Schmitt trigger. Function generator working principles AF, RF signal injector.	Different types of series parallel circuits, representation of nodes, etc.	Complex numbers. Simple problems Work, power and energy-definition, units,

				and simple problems and on shop floor practices. Conservation of momentum and energy
7	Circuit tracing and fault finding in SMPS, Inverters and UPS.	SMPS, Inverters and UPS their working principle and circuit functions.,	-do-	-do-
8	Assemble and measure/observe the output on Inverting Amplifier, Non -Inverting Amplifier, Differential Amplifier, Summing Amplifier, Integrator and Differentiator.	Operational Amplifier, Inverting amplifier, Non-Inverting Amplifier, Differential Amplifier, Summing amplifier, gain, DC- offset, CMRR Integrator and-Differentiator.	-do-	Kirchoff's laws: Kirchoff's voltage& current law, Branch currents, node voltages, Mesh currents, related problems.
9	Familiarize with the Audio section and Detector section of AM receiver.	Principles of Radio Propagation, Surface propagation, Ionospheric propagation. Amplitude modulation, Side band, LSB, USB, Percentage of modulation, their feature and application.	Familiarization and sketching the details of components	-do-
10	Familiarize with FM receiver and FM stereo receiver.	Frequency modulation, advantages over Amplitude, modulation, FM Detector. FM stereo transmission.	-do-	Introduction to trigonometry and ratio
11	Fault finding in AM receiver and AM/FM receiver.	AM receiver, RF amplifier, Local Oscillator, Mixer, TF section - their functions and working. Multi band receiver, FM receiver .and AM/FM Receiver.	-do-	Trigonometrical identities and application
12- 17	Familiarization with the TV receiver controls and their functions. Voltage and waveform measurement's in different sections. Familiarize With the monochrome and colour picture tubes- their voltages and connections. Trace the circuits of Various sections of the receiver and find out the signal flow, and power supply, Fault finding procedure related to individual sections of TV receiver. Familiarization with the LCD and LED TV components and different sector of LCD and LED TV.	Television principles, Scanning and synchronizing. Television transmission. TV receiver, Tuner circuit, Channel selector, RF and IF section, AGC, Chroma section, Sync circuits, Vertical section, Horizontal section, AFC, EHT, Auxiliary power supply, Sound IF, Audio amplifier SMPS, System control, Remote control-circuit. Video amplifier, OSD, Blanking circuits, Picture tubes, Degaussing. Principle of LC D and LED TV and function of its different section. Basic principle and working of 3D TV.	Symbols as per different semi conductor devices, LDR, VDR, Thermister, their use in circuits.	Calculation of Centre frequency and frequency deviation

18-19&19	Setting up of TVRO Terminal and Receive signal of different Satellites. Familiarize with the control room setup of a Cable TV service Provider.	Satellite Communication, UP link, Down Link, TVRO terminal, Setting up of TVRO terminal, Dish Antenna - its types and applications, LNB, Receivers, Cable TV network and its systems. Line loss, Line, amplifiers. DTH systems. VSAT, Satellite Communication system, Transponders, UP link and Down Link, S-band, C-band.	Drawing of Different types of amplifier circuits	Calculate the Oscillator frequency, RF amplifier frequency in AM receivers and FM receivers. Calculation of signal loss for various signal frequencies.
20	Familiarize with the cable network systems and signal transmission in forward and reverse.	Reverse path systems, Reverse path amplifiers, Internet connection through Cable network	-do-	-do-
21	Familiarize with the Logic probe and digital signals. Assemble and verify the truth table for Basic logic gates and Combinational Logic gates.	Digital Signal and Analog signal, Advantages of digital signals, Number system, Binary, Bit, Byte, Octal, Hexadecimal systems and their conversion, 2' s complement system. Basic Logic gates, AND, OR, NOT gates. Combinational. Logic circuits, NAND, NOR, EX-OR, EX-NOR circuits. Timing diagram.	Draw different rectifier circuit.	-do-
22	Assemble and verify the truth table of Half adder, Full adder, Controlled inverter and 2's complement adder/subtractor.	Half adder, Full adder, Half subtracter, Controlled inverter, 2's complement adder/subtractor. Concept of ALU.	-do-	-do-
23	Verify the truth tables of Various Flip -Flop circuits.	Flip-Flop, RS Flip-Flop, Clock pulse, Edge triggered, D Flip -Flop, JK Flip-flop and JK Master Slave Flip -Flop, T-Flip Flop.	-do-	-do-
24	Assemble and observe the output of series shift register, Parallel shift register.	Registers, Series shift register, Bidirectional series shift register, Parallel shift register, Latch, Serial in-parallel out register, Parallel in-serial out register,	-do-	-do-
25	Project Work / Industrial visit (optional)			
26	Examination			

**SYLLABUS FOR THE TRADE OF
"INFORMATION TECHNOLOGY AND ELECTRONICS SYSTEM MAINTENANCE (IT&ESM)"
UNDER CTS**

Third Semester

Duration : Six Months

Semester Code: ISM: SEM III

1	Verify the output and draw the timing diagrams for various counters. Testing of digital IC's.	Counters, Ripple Up counter, Ripple down counter, Up-Down counter, Parallel counter, Frequency dividers, Decade counter, Modulo N Counter, Ring counter, Johnson counter.	Exercise on Blue print reading circuits.	Network theorems. Thevenin's, Norton's theorems, conversion of voltage and current sources.
2	Familiarize with the display devices, Assembling of digital counter circuits and familiarize with digital multimeter circuits. Study about the servo system - motor position and speed control systems.	Display devices, 7 segment format, LED, LCD displays, Dot matrix format, Multiplexing and de-multiplexing. PLL, Open loop and closed loop systems, servo system for various variables.	Reading and drawing of different stages of Radio receiver circuits.	-do-
3	Visit to establishments with general purpose and special purpose computers. Visit to Computer Centres with Mainframe, Mini and micro Computers. Familiarization with different type of Computers.	Computer - Definition, features and applications. Hardware, software, live ware and firm ware. Data, data types, physical & logical concepts of data. Bit, byte, Kilo Byte, Megabyte and Gigabyte. Generation, Classification and Applications of Computers. Study latest features of Laptop devices with blue ray disc drive.	-do-	Arithmetic and geometric progression, sum of n-terms, simple calculations.
4	Familiarize with the memory chips. Programming the ROMs. Copying PROM, Erasing PROM. Connecting and dismantling cords, cables and peripheral devices. Identifying and handling different types of CDs, DVDs, BRDs etc.	Block diagram of a Computer System. Standard and common input/output devices. Primary and Secondary Memory. Memories : RAM, ROM PROM, EPROM, EEPROM. Dynamic and Static RAM. Cache Memory. L1 and L2 cache. Concept of Virtual Memory. Buses - Control bus, Address bus and Data bus.	Practice on block diagram of computer system	-do-
5 to 8	Familiarize with the Microprocessors, Address bus, Data Bus. Assembly language programs using 8085 instruction set. Interrupt Interfacing. A/D and D/A converters.	Micro processor-Program counter, Stack pointer. Internal address bus, External address bus, Data bus, Registers, ALU, Memory interfacing, I/O interfacing and Interrupt interfacing techniques. DMA Controller. A to D and D to A converters.	Practice on different types of output and input devices	Binary and hexadecimal number system Boolean algebra Truth tables and logic gates problems.
9	Understanding the keys and their functions in keyboard. Keyboard operation and practicing with mouse. Booting the computer under Windows.	Booting - Booting sequence, cold and warm booting. Booting files and their functions. Power On Self Test (POST). Storage and retrieval of data - concept of	-do-	Conversion; 'Decimal to Binary, Octal, Hexa decimal numbers from

		tracks, sectors, blocks, cylinders. Boot record and Master Boot Record. File Allocation Tables (FATs).		decimal and vice versa.
10-11	Introduction to Windows - The user interface, Using mouse, status bar, Start, Menus, Running applications. My Computer, Recycle Bin, Windows Explorer. Creating, Renaming and Moving Files and Folders. Using Help.'	MS Windows - Starting Windows and its operations. File management through Windows Explorer; Display and Sound properties. Screen savers. Font management. Installation of Programs. Settings, using and applications of Control Panel.	Use of drawing instruments, 'T' square, drawing board, construction of simple figures & solids with dimensions, use of different types of scales in inch & millimeters, lettering numbers & alphabets.	Batteries: Cells & Batteries, Series and parallel cells, related exercise,
12	Advanced Windows - Creating shortcuts & Folders. Using Accessories. Adding and removing components of windows.	Applications of essential accessories such as notepad, Paintbrush, Calculator, Calendar, Media player and Sounds. Multimedia and photo shop for designing.		
13	Identification of different Buses, Processor sockets and RAM sockets. Resetting CMOS. Installing Processors and RAM. Extending RAM. Installation of operating system.	Mother Boards- Form factors, common components, different connectors HDD, Power Supply; Different processor sockets. Motherboard functions, Operating Systems - Functions and types. Concept of Timesharing, Multiprocessing and Multiprogramming	Drawing of various electrical circuits with B.I.S. symbols of circuits, series & parallel circuits, power transformer instrument transformer etc.	Magnetism & Magnetic units: The magnetic field, flux, flux density, Ampere-turns,
14	Identification, Installing and checking of add-on cards by configuring	Expansion cards- different types, their uses. Checking and replacing the cards.	-do-	Areas of rectangle, circles, regular polygons, calculation of areas, volumes & weight of simple solids, cubes, hexagonal prism. Shop problems
15- 17	Installation of HDD and CD Drives. Formatting and partition the HDD. Configuring as Master and Slave. DVD, Pen Drive (USB) and BRDs.	Drives - Hard Disk drives, CD Drives. ' Their types, construction and working. Preparing a HDD, DVD, Pen drive (USB) and BRDs.	-do-	-do-
18	Identification and interfacing different type of Keyboards and mouse.	Key board and Mouse- different types, working, and interfacing Ports - Serial & parallel, PS/2	Block diagram of an oscillator,	Concept of shear forces, bending moment, torsion

	Checking and cleaning of Keyboard switches and cables. Servicing of Mouse. Installation of various peripherals in the serial port, parallel port, USB and PS/2	and USB.	symbols for different wave shapes, Sq., saw tooth, sine, triangular etc.	in shaft, simple problems.
19	Fault finding procedure in monitors. Adjusting the brightness and contrast pots.	Monitors- their working and study the circuit functioning. VGA, SVGA, XVGA and their control cards AGPs.	-do-	-do-
20- 22	Installation, Servicing of Different types of Printers, Scanners, Plotters and Bar code readers. Self Test for Printers.	Printers- types, servicing, Interfacing of Various printers. Scanners and plotters their types, Interfacing. Concept of Bar Coding and Bar code reader.	-do-	Properties of triangles, simple problem of height & distance
23- 24	Installation and setting of Multi -media components. Installation of various multimedia soft-wares. Operation, Interfacing and maintenance of Digital Camera;	Multi media - their hard-wares and supporting soft -wares. Digital Camera, Principle and working, Interface with computers. Image transfer, storage	-do-	-do-
25	Project Work / Industrial visit (optional)			
26	Examination			

**SYLLABUS FOR THE TRADE OF
"INFORMATION TECHNOLOGY AND ELECTRONICS SYSTEM MAINTENANCE
(IT&ESM)" UNDER CTS**

Fourth Semester

Duration : Six Months

Semester Code: ISM: SEM IV

1	Practice of Assembling and Dismantling a PC. Configuring the BIOS.	Assembling and dismantling of a PC. Configuring the BIOS.	Symbols of various digital electronics components,	Boolean algebra
2	Familiarize with the circuits and maintenance of CD/VCD/DVD players and blue tooth devices.	ACD, VCD, DVD, Laser recording, Playback, VCD players & DVD player, and blue tooth devices	-do-	-do-
3	Familiarize with the Circuits of the Telephone Receiver. Testing of Receivers. Demonstration on EPABX system.	Different types of telephone receiver its function and working, Ringer, Dialer, Audio Circuits. Functions of EPABX.	Free hand sketches of counters and registers.	1's and 2's compliment. Binary addition, subtraction, multiplication and divisions.
4	Servicing and maintenance of mobile phone hand sets. Familiarize with the base unit and hand set of WLL	Mobile phone concepts and its principle, Communication process, metering, SMS, Receiving e-mail Wireless Local Loop (WLL) technology and its application. Concept of blue tooth and Wi-fi technology.	-do-	-do-
5	Installation, operation and maintenance of FAX machines and Scanners.	Data Communication Network - Fundamentals. Data transmission through Telephone systems, Facsimile system, FAX & Scanner its working principle.	-do-	-do-
6	Programming with C & C++, different data types, flow control, data representation.	Software - concepts of software & Algorithm, Flow chart, Decision tables & Programming techniques. Programming with C & C++.	Computer block diagram. Drawing of ADC and DAC	Estimation and calculation on repairing and reconditioning of electronic instruments and microprocessor based
7-8	Preparation of cables for Networking. Structured Cabling. Installing & Configuring a peer-to-peer network using Windows. Installing & Configuring Windows based Server and setting nodes and print server.	Networking - its advantages and systems, topologies, client/Server system, Peer-to-peer systems, LAN, WAN, ISO-OSI Model, Various protocols used for net working, Net work soft-wares. Ethernet.	-do-	-do-
9	Installing & Configuring Netware Server and setting nodes and print server.	Communication Media & Connectors -UTP, STP and co-axial cables. Fibre optic cables and its types. Single mode fibre, Multi mode step index fibre and multi-mode graded index fiber. RJ45, PJ11, BNC.	-Do-	Calculation on cost of repairing / reconditioning networking system with multiple connection.

10	Installation and testing of various Network Components.	Network Components, - Modems, Hub, Router, Gateways, Switch, Bridge, Repeaters etc.	-Do-	Calculation on cost of repairing / reconditioning networking system with multiple connection.
11-13	Installing & configuring Internet & Intranet using PSTN & ISDN.	Internet & Intranets-Principle, uses, Services, Protocols & Layout. Addressing system. TCP/IP Reference Model - layers & functions.	Block diagram of different types of internet protocol system	-do-
14-16	Installation of Mail Server, Web Server, Proxy Server and Database Server. Setting E-mail Accounts.	Simple Mail Transfer Protocol (SMTP), Telnet, File Transfer Protocol (FTP), Hyper Text Transfer Protocol (HTTP), Simple Network Management Protocol (SNMP).	-do-	-do-
17	Familiarize with the ' digital data transmission for WAN. Visit to establishments installed with WAN and earth stations. Familiarization with ATM. Familiarization with ISDN, Broadband.	Data communication through Satellite. Digital transmission. Leased line connectivity, WAN. Basic concept of ATM with Architecture, Over view of ISDN, ISDN Channels, user access, ISDN protocols, Broad band concepts.	-do-	-do-
18	Setting tip the video-conferencing hardware and software; Setting up and configuring the Internet Telephony using VOIP.	Video conferencing techniques, Voice mail, Internet Telephony.	-do-	Vector – definition of scalar, and vector, notations and representation of vectors
19	Familiarization with e-commerce and related sites, Familiarization with E-governance.	Concept of E-Commerce. E-governance.	-do-	-do-
20-23	Word processing: Word - Opening documents, creating documents saving & quitting. Cursor controls, using tool bar, printing, documents, formatting. Tabs, indents and table formation and working with tables, font management. Borders and shading, Multiple columns, Merging and mail merge, Graphics and suing wizards and templates, Hyperlinking, sending through internet. Excel — Worksheet basics, data entry and formulae. Moving data in worksheet.. Using tool bars and menu bars. Formatting and calculations,	Word processing concepts, and applications. Different menu bars and tool bars of Word, file management and print management. Hyper linking, Excel - Worksheet basics, data entry and formulae. Graph and chart wizard. Placing excel sheet, charts in other applications and hyper linking. Power Point - Concepts and application of Power point.	Drawing of table and shapes using word processing soft-wares.	Addition and subtraction of vector. Vector multiplication.

	<p>printing worksheet, creating multiple work sheets, creating charts, changing chart types, Adding titles, legends and gridlines, colouring charts, printing charts, placing charts in Word file.</p> <p>Power Point - Creating slides, designing slides, back ground, layout of slides, back ground, layout of slides, editing text/deleting, aligning, making bold, italic and underlining, changing background colours and designs. Creating auto shape, drawings, clip art, shading, rotating text and pictures, saving, quitting and printing.</p> <p>Making animation effects, viewing slides, making sound effects. Grouping and ungrouping the objects.</p>			
24	Familiarization with ongoing IT Projects.	Exposure to on-going IT projects-Railway Reservation Systems, e-Banking etc.	-do-	-do-
25	Revision			
26	Examination			

TRADE: INFORMATION TECHNOLOGY AND ELECTRONICS SYSTEM MAINTENANCE**LIST OF TOOLS & EQUIPMENT****A. TRAINEES TOOL KIT FOR 16 TRAINEES +1 INSTRUCTOR**

Sl. No.	Name of the item	Quantity
1	Long Nose Plier	17 Nos
2	Combination Pliers	17 Nos
3	Side Cutter	17 Nos
4	Soldering Iron (25W)	10 Nos
5	Screw Driver Set	17 Nos
6	Spanner set	17 Set
7	Crimping Tool (RJ45)	04 Nos
8	Bench Vice	02 Nos
9	File	03 Nos
10	Desoldering Pump	10 Nos
11	Hand Drilling Machine motorised	01 No.

B. General Machinery, Shop outfit

Sl. No.	Item	Quantity
1	Power Supply 0-30 V, 2 Amps	5 Nos
2	Power Supply 30-0-30 V, 2 Amps	2 Nos
3	Multi meter Analog	2 Nos
4	Multimeter Digital	5 Nos
5	Lead Acid Battery 12V, 60 Ah	2 Nos
6	Capacitance meter Digital	1 No
7	DC servo Motor	1 No
8	AC servo Motor	1 No
9	Tacho Generator	1 No
10	CRO 10 MHz, Dual trace	2 Nos
11	Inverter 500W	1 No.
12	UPS 2 KVA	1 No
13	Function Generator	1 No.
14	AM/FM signal generator	1 No.
15	RF Signal Generator	1 No.
16	Colour TV ,LCD/ LED TV	1 No each
17	TVRO Terminal with LNB and Receiver	1 Set
18	Cable TV Line Amplifier	2 Nos
19	Digital IC trainer Kit	1 No
20	Microprocessor Trainer Kit 8085	1 No
21	VCD Player	1 No
22	DVD Player	1 No
23	EPBAX with 5 Nos of Telephone receivers	1 set
24	FAX Machine	1 No
25	Computer with latest configuration	8 Nos
26	Terminal Adopter	1 No
27	Laser Printer	1 No
28	Hub - 8 Port	1 No

29	Cable MODEM	2 Nos
30	Different Expansion Cards	1 each
31	Scanner flatbed	1 No.
32	Bar code Reader	1 No
33	Mobile phone	1 No
34	Web Camera	1 No
35	Digital Camera	1 No
36	WLL Phone set	1 No
37	Word processing software	8 Nos
38	Linux operating system	1 No
39	Cable Transmission system with set top box	1 No

C. WORKSHOP FURNITURE:

Sl. No.	Name of the items	Quantity
1	Instructor's table	1 No
2	Instructor's chair	2 Nos
3	Metal Rack 100cm x 150cm x 45cm	4 Nos
4	Lockers with 16 drawers standard size	2 Nos
5	Steel Almirah 2.5 m x 1.20 m x 0.5 m	2 Nos
6	Black board/white board	1 No
7	Computer table	8 Nos
8	Computer chair	16 Nos
9	Printer table	1 No