

	<p>capacitor Stabilizing the amplifier. Frequency response of CE amplifier CB & CC amplifiers, summary of amplifier configurations. Amplifier coupling methods. Capacitor coupled, Direct coupled, Transformer coupled Amplifiers, Darlington Emitter follower, Tuned RF amplifier. Summary of coupling methods: Voltage gain in coupled amplifier, Construction of FET, types, Advantages of FETs, FET Amplifier,</p>	<p>feedback. Troubleshooting CE amplifier Construct and Test CB, CC amplifiers Frequency response of a CE amplifier, RC Coupled, Transformer coupled, Direct coupled amplifiers, Construct a FET amplifier,</p>
3	<p>Large Signal Amplifier: Classification of amplifiers, concept of operating point, Class A power amplifier & Transformer coupled amplifiers, Class B power and push-pull amplifiers, Class AB amplifier, Cross over distortion, Complementary symmetry amplifiers, Temperature compensation using diodes, IC based amplifiers, Class C power amplifier, RF power amplifier Regulated power supplies: Introduction to Open loop voltage regulation, Line regulation, Ferro resonant transformer, Zener regulator. Series pass transistor. Dual polarity regulated supply, Feed back regulated power supply. Regulated power supply using Op Amp. IC based Regulators 78XX and 79XX series. Current boost circuits. Dual tracking regulators. Dual tracking regulators. Current and voltage limiting circuits. Conventional current limit and feed back current limits circuits. IC723 based regulators. High current supply with crow bar protection. Protective devices like Varistors, MOV etc</p>	<p>Construct and Test Class A, Class B, Class B Push Pull , Class AB amplifiers, Complementary symmetric amplifier, IC based amplifier, Class C Amplifier. Construct and Test Series regulator, Dual polarity regulator, Feed back regulator Wire Regulated power supply using Op Amp. Test the regulation of IC 78XX ,79XX. Series Configure the Current boosting with the above regulator ICs. Implement Current & Voltage limit configure IC 723 for regulation, configure Step down regulators using Op Amp 78S40, Test the protection devices</p>

4	<p>Operational Amplifiers: Differential amplifier analysis. Ideal properties of Op Amp, Major sections of an Op Amp. Significance of offset null terminals. Slew rate distortion. A simple Op Amp specification, Op Amp basic circuits, Inverters, feed back and Non inverting feed back amplifiers, Summing amplifier, Voltage follower Op Amp liner application such as Differential V to I, I to V converters, regulated power supplies using Op Amp. Non linear application such as Zener Limiter. AC to DC converter, comparators, Active filters, Voltage to frequency converter, practical application.</p> <p>Integrated circuit: Block diagram of 555 Timer. Astable Multivibrator, Monostable multivibrator, Bistable multivibrator using 555 Timer IC.</p> <p>Oscillators: Oscillator characteristics, RC circuits, Wein Bridge Oscillator, Phase Shift Oscillator, LC circuits, Hartley & Colpitts oscillators, Highly stable oscillator, Crystal oscillator, Relaxation oscillators.UJT, PUT. Astable Multi-vibrator oscillator, Troubleshooting.</p>	<p>Measure Op Amp parameters, Wire Op Amp based summer, Inverting Amplifier, Non Inverting Amplifier, voltage follower, Integrator, Differentiator, comparator, Reference Regulators, Zener limiter, V to F, F to V converters.</p> <p>Construct and Test Astable, Bistable and Monostable Multi-vibrators using IC 555.</p> <p>RC oscillator, Wien bridge oscillator, Phase shift Oscillator, Hartley oscillator, Colpitt oscillator, Crystal oscillator, UJT relaxation oscillator, Astable oscillators.</p>
5	<p>Power Electronic Devices: Construction and characteristics of SCR, TRIAC, GTO, Power MOSFET, IGBT. Triggering Devices- DIAC, UJT, PUT, SBS, SCS, etc. and triggering methods Power control using Thyristors –Dimmer control , DC motor and Fan Regulator .</p> <p>Opto Electronics: Introduction to Opto electronics, characteristic and applications of photo cell LED, photo Diode, Photo Transistor, Lasers., optocouplers, optoisolators.</p> <p>Switch Mode Regulators: Introduction to pulse width modulation. Duty cycle, Step down , step up and inverter configurations using switching regulators. IC 78S40 Block diagram and</p>	<p>Identify and Test SCRs/Bridge modules of various ratings, Plot SCR characteristics, Construct and Test Battery charger, Plot Triac characteristics, construct and test Triac based AC power circuit, Interpretation of data sheets Phase control circuits using UJT and SCR. Light Dimmer and Fan control circuit using TRIAC /DIAC Identify and Test opto electronic devices</p>

	<p>functionality. width controlled convertors/regulators. Frequency controller, Sine wave oscillators, Trouble shooting regulators, power supplies. Various Electrical and Electronic Protection devices like MCB, ELCB,MOV, Various types of Fuses</p> <p>UPS & SMPS: Switch mode power supplies – working principles Principles of Inverter Circuits UPS – working principles and types Batteries and Types, Maintenance methods of various Batteries</p>	<p>Testing of various Fuses, ECBs, ELCBs, MOVs etc.</p> <p>Circuit tracing and Testing of SMPS Commissioning and testing of UPS Testing and charging of various Batteries</p>
6	<p>Measuring Instruments: Working principles and study of Block diagrams / Schematic diagrams of Digital Multimeter, CRO, Function Generator , Digital Storage Oscilloscope, Frequency Counter and Digital LCR meter, Touch panel specifications and working principles</p> <p>PCB rework : Materials used in PCBs, types of PCBs, layout design and practices, rework of PCB, Multilayer PCBs SMD technology and components, packaging styles, tools used in SMD repairs, HMD components and testing aspects</p> <p>Troubleshooting in Electronics: preliminary checks, service literature, electrical checks, non heating, verify voltage, ESD protection, Static discharge, Causes and analysis for no output from an electronic ckts, Signal injection, click test, signal tracing, voltage, current and resistance analysis, Distortion and Noise.</p>	<p>Operation and familiarization with various measuring instruments like CRO, Function Generator, Digital Storage Oscilloscope, Frequency Counter and Digital LCR meter.</p> <p>Circuit tracing and fault-finding in CRO and Digital LCR meter. Soldering and desoldering practice on ICs, rework of PCBs, preparation of PCB, Familiarization with PCB software tools Id of SMD Components, testing methods, solder and desoldering practice with SMD components. IC Pullers, hot air guns used in SMD repair work</p> <p>Troubleshoot and repair different faulty electronic circuits .</p>

7	<p>Digital Electronics: Number systems: Binary,Decimal,Hexadecimal,BCD, Octal numbers and conversions Logic gates and Digital logic families, TTL,CMOS,ECL etc Logic levels and Noise margin, Digital IC specifications, Interfacing TTL and CMOS with LEDs, Interfacing TTL and CMOS ICs, Interfacing with Buzzers, Relays, Interfacing with Servo and Stepper Motors, Troubleshooting Simple Logic Circuits. R-S Flip Flop, Clocked R-S Flip Flop, D Flip-Flop, J-K Flip Flop, Triggering Flip Flops, Schmitt Triggered Devices.</p> <p>Combinational Circuits- Binary Addition, Half Adders, Full Adders, Three-Bit Adders, Binary Subtraction, Parallel Subtractor , ALU, Multiplexers, De-multiplexers, Encoders/Decoders.</p> <p>Serial Load Shift Registers, Parallel Load shift registers, 74194 IC Shift Register, 8-bit CMOS shift register, Counters – Asynchronous (Ripple) and Synchronous types.</p> <p>Display Devices –LED, Seven-segment LED, LCD Display, Display Drivers, Dot-matrix Displays Digital-to Analog Converters: Binary weighted and R-2R Ladder types. Analog-to-Digital Converters: Single-slope and Dual-slope types, Applications of A/D converters-Digital Volt Meter / DMM.</p> <p>Semiconductor Memories: Types of memories – ROM, PROM, EPROM, EEPROM, Read/Write Memories: SRAM,DRAM SDRAM ,DDR1/DDR2/DDR3,SGRAM / VRAM. Flash Memories & Memory Organization.</p>	<p>Interpretation of TTL, CMOS and ECL ICs data from Data Sheets. Construction and Truth-tables of various logic gates (TTL and CMOS ICs). Wire and verify truth table of different Flip-Flops Construction and testing of various Arithmetic Circuits like Half-adder, Full-adder and ALU circuits. Construction and testing of Multiplexer / De-multiplexer circuits Construction and testing of various Encoder / Decoder Circuits Construction and testing of Seven-segment LED / Decoder-Driver circuits. Construction and testing of Dot-matrix / LCD Displays. Construction and testing of Digital Voltmeter using ADC IC</p> <p>Familiarization with various types of Memory ICs</p> <p>Identification of Flash Memories of various capacities.</p> <p>Connecting a Thumb-wheel switch and displaying the set number on a Seven-segment display</p> <p>Count the no. of events using a up/down counter.</p>
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8-9	<p>Microprocessors and Microcontrollers:</p> <p>Introduction to Microprocessors. 8085 Architecture, , Addressing modes and Instruction set, Interfacing Peripheral ICs like 8155/8255/8179 to Microprocessor - concepts .</p> <p>Introduction to 8051Microcontroller and its applications in embedded systems. 8051 Architecture and Register set Various SFRs, .Interrupt programming, serial communication in 8051.</p> <p>Programming the 8051 Microcontroller. 8051 programming examples in C. Overview of Assemblers and compilers used in Microprocessors / Microcontrollers.. Introduction to PIC microcontrollers and architecture.</p> <p>.</p>	<p>Familiarization with 8085 Microprocessor trainer kit. Coding and execution of simple assembly language programs on 8085 Microprocessor trainer kit. Interfacing and testing of Application modules like Traffic Lights Controller / Stepper Motor Controller to 8085 Microprocessor trainer kit.</p> <p>Familiarization with 8051 Microcontroller trainer kit. Coding and testing of simple 8051 C language programs using C compiler (like KEIL IDE). Develop programs to read the status of inputs and control output devices, Create on delay and off delay to control load and event counting with C language using PIC Microcontrollers</p>
10	<p>Communication Systems:</p> <p>Types of Speakers, Microphones, collar phones, sizes, rating, frequency response, sensitivity and directional properties, PA system and its components Communication system building blocks, various modulation techniques, power considerations, AM receiver and different stages, IC details used, FM receiver, different stages and IC details used. Block diagram and working principles of CTV (CRT,LCD&LED), Various IC details used in CTV</p>	<p>Setup a public address system</p> <p>Testing of various ICs used in AM/FM Receivers, fault rectification of AM/FM Receivers</p> <p>Troubleshooting of CTVs of different types CRT,LCD,LED</p>
11	<p>Satellite communications:</p> <p>Dish antenna types and applications, Different stages of Cable TV system and setup. DTH and IPTV technology and setup. Satellite communication, uplink, downlink, TVRO terminal setup, transponders and various frequency bands used in satellite communication</p>	<p>Setup of cable TV system</p> <p>Setup of DTH system Setup of TVRO terminal for receiving signals from satellites Visit to a commercial cable operator's CATV set up Visit to an Earth Station</p>

12	<p>Communication Equipment: Different types of Telephone receivers, major functional blocks, working principles, mini EPABX and its setup</p> <p>Block Diagram and working principles of Facsimile (FAX) .</p> <p>Cellular phone concepts and working principles, communication process, metering, BTS, WLL Technology, concept of GSM phones, concept of 3G phones .</p>	<p>Familiarize with the different circuits of telephone receivers, fault finding with telephone sets set up a mini EPABX system and fault finding</p> <p>Familiarize with operation of FAX, Identify major functional blocks of FAX machine, maintain & servicing of FAX machine.</p> <p>Maintain and service cell phone hand sets</p> <p>Visits to Cell phone Tower and BTS/MTS. Maintenance of cell Towers.</p>
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Craft Instructor Training- Final Syllabus

TRADE: INFORMATION TECHNOLOGY & ELECTRONIC SYSTEM

MAINTENANCE (IT & ESM)

Module: Trade Technology - II

Duration: 3 months

Week No.	Theory	Practical
1	<p>Block diagram of a Computer System. Standard and common input/ output devices. Memory types, Concept of Virtual Memory. Buses – Control bus, Address bus and Data bus.</p> <p>Mother Boards – Form factors, common components, different Memory Sockets. Buses used – ISA, EISA, PCI & MCA, Motherboard BIOS. Operating Systems Drives – Hard Disk Drives, Floppy Drives and CD Drives. Their types, construction and working. Preparing a HDD, DVD, Pen drive (USB)</p>	<p>Identification of different ports of computer system, identification of internal components of computer.</p> <p>Processor sockets and RAM sockets. Replacing BIOS and Battery. Installing Processors and RAM. Upgrading RAM. Assembling/disassembling practice. Installation of Operating Systems – Windows: Desktop and Server versions and Linux/Unix</p> <p>Installation of FDD, HDD and CD Drives. Formatting and partitioning the HDD. Configuring as Master and Slave, DVD, Pen Drive (USB), Multi-boot configuration</p>
2	<p>Assembling and dismantling of a PC. Configuring the BIOS. Use of windows system utilities for troubleshooting, configure and use Windows Firewall, use of freeware for troubleshooting and information collection, Virus, antivirus, spy ware: concepts and removal, discussion on Windows security tools.</p>	<p>Practice of Assembling and Dismantling a PC</p> <p>Configuring the BIOS.</p> <p>Practice on installation, configuration and use of antivirus, spy ware software utilities, setting up and configuration of Windows firewall, practice on Windows security setting</p>
3	<p>Network components – Cables, Modems, Hub, Router, Gateways, Switch, Bridge, Repeaters, Hardware Firewall concepts et</p>	<p>Installation and testing of various Network Components., Setting up of Hardware Firewall.</p>
4	<p>Local Area Networks, Setting up of client/server network using Windows server 2008, Internet sharing using proxy server, router , Windows ICS program. Concepts of wireless networks</p>	<p>Setting up Windows based LAN, Internet Connection Sharing ,Using Proxy Server, Windows XP ICS, Setting up of Fire-wall, Filtering and internet control options using Proxy server, Windows Server 2008 Installation Setting up of Active Directory, DHCP and DNS services Creating domain users and joining domain Setting up share permissions Setting up of ad-hoc and infrastructure based wireless network</p>

5	Wireless LANs: Hardware used, SSIDs, Access control mechanism, Security issues	Setting up wireless LAN in adhoc and infrastructure mode..
6	Open source software concepts, Discussion of Linux as open source software. Preparing system for installing Linux, concept of Linux file system, partitions, installation and use of software	Installation of Linux based systems Creating Linux partitions, Multi-booting using Linux, Installation of Linux Server, Practice on application software installed on Linux.
7	Data communication through Satellite. Digital transmission. Leased line connectivity, WAN. Over view of ISDN, ISDN Channels, user access, ISDN protocols, Broad band concepts. Fundamentals of Fiber optics, fiber optic cable specifications, different type of fiber optic equipment such as splicing machine, OTDR, Optical MUX/DEMUX, Field strength meter etc	Familiarize with the digital data transmission for WAN. Visit to establishments installed with WAN and earth stations. Familiarization with ISDN, Broadband. Identify and Test the fiber optic cable Measure various transmission losses in a fiber optic cable, join fiber optic cables using splicing equipment.
8	Video conferencing techniques, Voice mail, Internet Telephony, VOIP.	Setting up the video-conferencing hardware and software. Setting up and configuring the Internet Telephony using VOIP.
9,10	Software – Concepts of software & Algorithm, Flow chart, Decision tables & Programming techniques. <u>Programming with C:</u> Character set, tokens, Keywords, identifiers, constants, variables, Data Types, Declaration, assigning values to variables, Symbolic constants, Arithmetic, Relational and Logical operators, Assignments, increment, decrement, conditional operators, Bitwise operators, special operators, Expressions, Precedence of operators, Type conversion, IF ..Else If statements, Switch statement, While, do, for loops, Arrays, Functions, Strings. <u>Programming in C++:</u> Introduction to C++, IDE, Programming Basics, Control Structures, Functions, Objects and Classes, Arrays, Operator Overloading, Inheritance, Virtual Functions, Polymorphism, Files and Streams.	Programming with C & C++, different data types, flow control, data representation. Programming using classes and objects Related practical in C/C++ to supplement the theory topics.

<p>11,12</p>	<p><u>Office Suite:</u> Excel and Access. Use of Open source office suites, Flash, Basic html web page authoring. <u>Excel:</u> Creating, Opening, Deleting, Renaming, Copying workbooks. Password protecting books. Managing workbooks: Insert, delete, move, copy and rename worksheets Formatting Worksheets: Autoformat, borders, background, conditional formats, cell size and text positioning, Applying number formats. Sorting and Filtering Data: Sorting based on single/multiple fields. Autofilter and Writing formula. Validating cell data. Import/Export Data. <u>Access:</u> Introduction to databases, fields, primary key, foreign key. Access Tables: Creating tables, data types, defining primary key, Adding/deleting fields, Keys and indexes, Relationships and referential integrity. Access Queries: Types of queries, Creating, modifying and running queries, Customizing queries, Using multiple tables in queries, Using criteria and expressions to retrieve data, Performing calculations, SQL Queries. Access Forms: Creating, customizing, Creating sub-forms, calculations in forms, Data validation. Access Reports: Creating, modifying and running reports, Sorting and grouping records in reports, Calculating totals and using expressions.</p>	<p>Practical on Excel and Access, Practice on open source office suites like StarOffice and OpenOffice, Practice on creating basic animations using flash, creating web pages using FrontPage/ Dreamweaver</p>
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LIST OF TOOLS AND EQUIPMENT FOR THE *IT&ESM* TRADE (CITS)
FOR A BATCH OF 20 TRAINEES

S.No.	Tools & Equipment	Quantity
	TOOLS:	
1.	Combination Pliers	10 Nos.
2.	Side Cutter	10 Nos.
3.	Spanner Set	5 Sets
4.	Bench Vice	2 Nos.
5.	File	3 Nos.
6.	Screw Driver Set	2 sets
7.	DMM	10 No's
8.	Soldering Iron (25 W)	10 Nos.
9.	Crimping Tool (RJ 45)	4 Nos.
10.	Desoldering Pump	10 Nos.
11.	Neon Tester	17 Nos.
12.	Hand Drilling Machine motorized with required drill bits	2 Nos.
	EQUIPMENT	
1.	Power Supply 0-30V, 2 Amps	5 Nos.
2.	Power Supply 30-0-30V, 2 Amps	5 Nos.
3.	Analog Multimeter	5 Nos.
4.	Bench top Digital Multimeter (4 ½ Dig.)	5 Nos.
5.	Assorted Batteries 12V, 60 Ah	2 Nos. each
6.	True RMS meters	2 no's
7.	Output power meter	1 no.
8.	Digital LCR Meter	2 Nos.
9.	Digital IC Tester	1 no.
10.	Electronic Component Trainer kit	4 no's
11.	Linear IC Trainer kit	4 no's
12.	Digital IC Trainer Kit	4 Nos.
13.	DC Servo Motor ½ HP	1 No.
14.	AC Servo Motor ½ HP	1 NO.
15.	Non contact Tacho Generator	1 No.
16.	CRO 20/ 30 MHz, Dual Trace	4 Nos.
17.	Digital Storage Oscilloscope	1 No.
18.	Function Generator 10 MHz	3 Nos.
19.	Frequency Counter	2 Nos.
20.	Pulse Generator	2 no's
21.	Field strength meter	1 no.
22.	Inverter Trainer 500W	1 No.
23.	UPS Trainer 500VA	1 No.
24.	UPS 5 KVA	1 No.

25.	SMPS	5 Nos.
26.	AM/FM signal generator	1 No.
27.	RF Signal Generator	1 No.
28.	Colour TV (CRT) Receiver	2 Nos.
29.	LCD/LED TV Receiver	2 Nos
30.	DTH Receiver (TVRO Terminal with LNB and Receiver)	1 Set
31.	Cable TV Line Amplifier	2 Nos.
32.	Microprocessor Trainer Kit 8085	4 Nos.
33.	Microcontroller Trainer kit 8051	4 Nos.
34.	PIC Microcontroller Trainer with necessary software	4 Nos.
35.	Application boards for Microprocessor and Microcontroller kits	5 no's each
36.	DVD Player	1 No.
37.	EPBAX with 6 Nos. of Telephone Receivers	1 Set
38.	Touch Panel	1 no.
39.	FAX Machine	1 NO.
40.	Cell Phone Receiver	1 No.,
41.	WLL Phone Set	1 No.
42.	Cable Transmission System	1 No.
43.	PA System	1 No.
44.	Multimedia Desktop Computers with Licensed operating system	21 Nos.
45.	Internet broad band connection	One
	Additional Equipment required for TT- II	
46.	Video Conferencing equipment	As per Requirement
47.	Laptop computer	1 No.
48.	Digital Photo copier	1 No.
49.	Laser Printer	1 No.
50.	Desk jet Printer	2 Nos.
51.	Scanner Flatbed	1 No.
52.	Hub – 8 Port	2 Nos.
53.	Terminal Adopter	1 No.
54.	Broadband MODEM	2 Nos.
55.	Different Expansion Cards for motherboards	1 Each
56.	Web Camera	1 No.
57.	Digital Camera	1 No.
58.	Linux Server Operating System	1
59.	Linux Desktop Operating System	21
60.	Server Computer	1
61.	Server Operating System (latest version)	1
62.	Antivirus Software	21

63.	LAN Switch - 24 port	2
64.	Cat 6 cables - bundles of 1000 meters	2
65.	UTP Connectors	1000
66.	LAN Tester	5
67.	Fluke Meter	2
	LAN IOs	21
68.	Wireless Access Points	21
69.	Wireless LAN Cards	21
70.	Wireless Router	2
71.	MS Office package (latest version)	21
72.	Network Management Software	21
73.	Hardware Firewall	2
74.	Router	2
75.	PC Hardware Trainer Kits	6
76.	Network Training Kits	6
77.	ISDN Connection	1
78.	Compiler for C and C++	21
79.	Spares for PC assembling motherboards, hard drivers, optical media, cabinets, SMPS, keyboard, mouse	As per requirement
	AUDIO VISUAL AIDS (FOR TT-I & TT-II)	
80.	Computer Based Electronic Interactive Training Materials (CD/DVD form).	- As Required
81.	Magnetic Board	2 Nos.
82.	Spares for magnetic board	As reqd.,
83.	OHP	1 No.
84.	Interactive Board	1 No.
85.	LCD/DLP Multimedia Projector	1 No.
86.	Laptop computer	1 No.
87.	Collar Microphones	2 Nos.
	FURNITURE	
88.	Computer Table	10 Nos.
89.	Computer Chair	20 Nos.
90.	Modern Class Room Table with Chairs	20 Nos.
91.	Work Benches	6 Nos.
92.	Almirah	2 Nos.
93.	Component Rack	1
94.	Executive Table for Instructor	1 No.
95.	Executive Chair for Instructor	1 No.

Reference Books:

Written Instructional Materials (WIMs)	-	Prepared by NIMI, Chennai
Electronic principles & applications	-	By Schuler
Digital Electronics	-	By Tokheim
Digital Principles & Applications	-	A P Malvino & Leach
Basic Electronics - a Text Lab Manual	-	P B Zbar
Electronic Principles	-	Malvino
Basic Electronics & Linear Circuits	-	N N Bharghava
Industrial Electronics & Robotics	-	Mcnamee & Schuler
Linear ICs	-	Gaykwad
Microprocessor Architecture, Programming & Applications	-	R S Gaonkar
Microprocessor & Digital Systems	-	D V Hall
The 8051 Microcontroller & Embedded Systems	-	Mazidi, Mazidi & McKinlay
PIC 8051 Microcontroller & Embedded Systems	-	Mazidi & McKinlay
Electronic Communication System	-	Kennedy
IBM PC & Clones	-	B Govindarajalu
Programming in ANSI C	-	E Balagurusamy
C++ and OOP paradigm	-	Debashish Jana
Networking in 24 Hours	-	Habraken & Hayden (PEARSON)
Installing & Administering Linux	-	Mckinnon (WILEY)
Optical Fiber Communications	-	J M Senior
Books on MS OFFICE from Microsoft or Equivalent		
System Manuals for Equipment		