

Craft Instructor Training

TRADE: MECHANIC(RADIO/TV)

Module: Trade Technology - I

Duration:12 weeks

Week No	Theory	Practical
1	<p>Basic Electricity and Ohm's law, Series and parallel circuits, Kirchoff's laws, AC fundamentals.</p> <p>Overview of Semiconductor materials, Semiconductor Devices like Diodes, Transistors, FETs / MOSFETs, and other Semiconductor Devices</p>	<p>Study of Ohm's law, Kirchoff's laws, series and parallel circuits.</p> <p>Identification & Interpretation specifications of Semiconductor Devices such as Diodes, BJTs, FET/ MOSFETs from Data sheets</p> <p>Testing of Semiconductor Devices</p>
2	<p>Half and Full-wave Rectifiers (center Tap & Bridge)</p> <p>Filters used in rectifiers-C,LC,& Pie types</p> <p>Zener diode and Voltage regulation, Transistor as amplifier</p> <p>Transistor Biasing-Need for it</p> <p>Biasing methods-fixed bias/Emitter bias/Voltage divider bias</p> <p>Bias stabilization and Thermal runaway</p> <p>Series pass and Shunt voltage Regulators</p> <p>RC coupled/Transformers coupled amplifiers</p> <p>Multistage amplifiers</p>	<p>Construction and Testing of Half wave / Full wave Rectifiers</p> <p>Testing of Effect of ripple filters on Rectifier circuits</p> <p>Zener diode as Voltage Regulator</p> <p>Construction and testing of various transistor Biasing Circuits</p> <p>Frequency response of RC coupled amplifier</p> <p>Frequency response of Transformer coupled amplifier</p> <p>Construction and testing of multistage amplifiers</p>
3	<p>Types of Power Amplifiers- class A,B,AB & C</p> <p>Class B push pull amplifier</p> <p>Complementary- Symmetry amplifiers</p> <p>Power Efficiency, Distortion and thermal considerations</p> <p>Feedback in Amplifiers and Oscillators.</p>	<p>Construction and testing of Class B amplifier</p> <p>Construction and testing of Complementary- Symmetry amplifiers</p> <p>Circuit tracing and testing of Audio amplifier</p> <p>Fault finding and repair of simple problems in Audio amplifier</p> <p>Construction and testing of RC phase shift oscillator and Wein-bridge oscillator.</p>
4	<p>Modulation, Demodulation, Amplitude Modulation, Frequency Modulation and Phase Modulation, Modulation Index, Noise, Bandwidth & Power considerations.</p> <p>Demodulation Techniques-Detectors SSB,DSB-SC.</p> <p>Radio Wave Propagation</p> <p>Ground wave, Sky wave and Space wave propagations.</p> <p>Overview of various types of Antennae.</p>	<p>Experimental study and operation of A.M., F.M., P.M. using Trainer kits.</p> <p>Experimental study of various types of Antennae.</p>

5	<p>Working of Audio System / PA System Microphone types / loudspeakers-Types (Woofer, Midrange & Tweeters). Stereo System and Stereo Amplifiers. Crossover networks. Surround Sound systems & Sound Processors</p>	<p>Identification, testing & repair of various types of Microphones Identification, testing & repair of various types of Speakers Arrangement of stereo systems / surround sound systems and testing their operation Familiarization with sound processor ICs</p>
6	<p>Construction and characteristics of SCR, TRIAC, Power MOSFET Triggering Devices- DIAC, UJT, and triggering methods Power control using Thyristors –Dimmer control , DC motor and Fan Regulator . Switch mode power supplies – working principles IC regulators Principles of Inverter Circuits UPS – working principles and types Batteries and Types, Maintenance methods of various Batteries</p>	<p>Interpretation of data sheets and testing of SCR/TRIAC/DIAC/UJT Phase control circuits using UJT and SCR. Light Dimmer and Fan control circuit using TRIAC /DIAC Circuit tracing and Testing of SMPS Commissioning and testing of UPS Testing and charging of various batteries</p>
7	<p>Introduction to Linear Integrated Circuits Op-Amp basics, virtual ground concept, Op-Amp parameters. Op-Amp circuits – Inverting, Non-inverting and Summing amplifiers, Differentiator, Integrator and Instrumentation amplifiers. 555 Timer IC– Block Diagram and Applications like Astable and Mono-stable multivibrators Wave shaping circuits Waveform Generators and PLLs</p>	<p>Construction and testing of various Op-Amp circuits like Inverting, Non-inverting and Summing Amplifiers, Differentiator, Integrator and Instrumentation Amplifiers. Construction and testing of various 555 IC Timer applications. Construction and testing of various other Linear IC applications like Wave shaping circuits (Clipper, Clamper), Waveform Generators , Phase-locked Loop circuits.</p>
8	<p>Working principles and study of Block diagrams / Schematic diagrams of Digital Multimeter, CRO, Function Generator , Frequency Counter</p>	<p>Operation and familiarization with various measuring instruments like CRO, Function Generator, Frequency Counter</p>
9-10	<p>Number systems, Logic gates and Digital logic families, voltage levels of TTL and CMOS circuits, Number Systems , Boolean Laws. Combinational Circuits- Arithmetic circuits like Half adder and Full adder, ALU, etc., Multiplexers, Demultiplexers, Encoders/Decoders. Sequential circuits: RS, D, JK- Flip Flops, Edge-triggered and Master/ Slave Flip Flops, Shift Registers and Counters – Asynchronous (Ripple) and Synchronous types. Display Devices –LED, Seven-segment</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). Construction and testing of various Arithmetic Circuits like Half-adder, Full-adder and ALU circuits. Construction and testing of Multiplexer / Demultiplexer circuits Construction and testing of various Encoder / Decoder Circuits Construction and testing of Seven-segment LED / Decoder-Driver</p>

	LED, LCD Display, Display Drivers, Dot-matrix Displays.	circuits. Construction and testing of Dot-matrix / LCD Displays.
11	<p><u>D/A & A/D Converters and Semiconductor Memories</u></p> <p>Digital-to Analog Converters: Binary weighted and R-2R Ladder types.</p> <p>Analog-to-Digital Converters: Comparator , Single-slope and Dual-slope types.</p> <p>Conversion times.</p> <p>Applications of A/D converters-Digital Volt Meter / DMM.</p> <p>Semiconductor Memories:</p> <p>Types of memories – ROM, PROM, EPROM, EEPROM.</p> <p>Read/Write Memories (RAM)- Static and Dynamic RAMs.</p> <p>RAM types- SRAM, Dynamic RAM - SDRAM DDRAM, Flash Memories.</p> <p>Memory Organization.</p>	<p>Construction and testing of Binary weighted and R-2R Ladder type Digital-to-Analog Converters.</p> <p>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>
12	<p>Introduction to Microprocessors.</p> <p>8085 Architecture, Programmer's model of 8085, Addressing modes and Instruction set.</p> <p>Interfacing Peripheral ICs to Microprocessor - concepts .</p> <p>Introduction to 8051 Microcontroller and its applications in embedded systems.</p> <p>8051 Architecture and Register set</p> <p>Simple examples of Programming the 8051 Microcontroller.</p> <p>8051 programming examples in C.</p> <p>Overview of Assemblers and compilers used in Microprocessors / Microcontrollers.</p>	<p>Familiarization with 8085 Microprocessor trainer kit.</p> <p>Coding and execution of simple assembly language programs on 8085 Microprocessor trainer kit.</p> <p>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.</p> <p>Coding and testing of simple 8051 C language programs using C compiler (like KEIL IDE).</p>

Craft Instructor Training

TRADE: MECHANIC (RADIO/TV)

Module: Trade Technology (TT-II)

Duration:12 weeks

1	Electronic test equipment Digital storage oscilloscope, Pattern Generator, Field strength meter Digital Q meter	Operation /use/familiarisation of Digital storage oscilloscope, Pattern Generator, Field strength meter Digital Q meter
2-3	Superhetrodyne Receiver-Block Diagram-stage wise explanation Radio transmitter- Block diagram FM radio and circuits AM/FM transmitters, Antennas, types of antennas, transmission lines, feeders Cables ,types, specifications, Fiber optics-advantages	Demonstration/testing/trouble shooting on multibrand AM/FM RF stage with Digital tuning IF stage Detector stage Audio stage Cable connection and testing Antenna connection and testing
4	Intercom systems, digital EPBAX systems, data communications, Serial and parallel communications Networking basics RS 232 , RS 485 standards ,LAN , Ethernet , WAN concepts Cables used in data communication Fibre optics concepts	Study and interwiring of Intercom systems Study of serial and data communication Study and commissioning of Digital EPBAX systems Study of RS 232 and 485standards Fibre optics cable testing
5	Telephone and Cellular telephone Manual and Automatic Exchanges Working of Push button and wireless telephone sets CDMA and GSM technologies Working principle of Cellphone Block Diagram and schematics of Cell phones	Demonstration and study of Push button and wireless telephone sets Study and trouble shooting of cell phones Software testing and loading of software in cell phones
6	Tape recorder and car stereo Block Diagrams and stage wise explanation	Use / operation / testing / circuit tracing /fault finding of tape recorders and stereo system
7 – 8 – 9	Introduction to Television. Broadcasting TV frequency range,, elements of color, composite color signal ,color TV systems-TSC/SECAM/PAL Color picture tube ,cooper TV receiver Antenna ,RF tuner, AFT, video IF amplifier ,Video Detector,, Y amplifier ,Chroma band pass amplifier U and V signals, color burst circuits ,deflection systems and power supply	Identification/testing /Stagewise trouble shooting of at least 4 branded CTV s <ul style="list-style-type: none"> • Smps • Sound section • Horizontal section • Vertical section • Chroma section

10	<p>Fundamentals of LCD/Plasma television Hi definition television Display type-LCD/Plasma, screen size Viewing angle, picture contrast, Multi layer structure of LCD panel Differences between LCD and Plasma Standards-specifications of different manufacturers</p>	<p>Demonstration/testing/initial setting/LCD/Plasma TVs</p>
11	<p>Audio systems VCD/DVD principles Players MP3, WMA, WMV, JPEG, Video CD and DivX discs, composite video, S-Video, component video and HDMI outputs. MPEG technology DVD Recorders, DVD Recorder Formats Differences between CD and DVD Block diagrams and stage wise Explanation</p>	<p>Demonstration/testing/initial setting/recording of CD/DVD players</p>
12	<p>Digital communication/satellite TV/Cable TV and DTH systems Fundamentals of Digital communications Quantisation and sampling PCM and Delta modulation Advanrages of Digital modulation Cable TV and concepts, DTH systems Signal uplinking and down linking Block diagram of Earth station ,frequency Range,Dish Antennas , LNA and Amplifiers TVRO set up CCTV concepts</p>	<p>Study of PCM Setup and installation of Cable TV Tuning set top box for Different channels Gain Adjustment ans fine tuning Installation fof CCTV and DTH systems</p>

**LIST OF TOOLS AND EQUIPMENTS FOR THE TRADE OF
MECHANIC RADIO & TV (CTS) FOR THE BATCH OF 20 TRAINEES.**

SL NO.	DESCRIPTIONS	QTY.
TRAINEES KIT.		
01	Digital Multimeter (3 ½ Digit)	20
02	Long nose insulated plier 15 cms	20
03	Diagonal cutter 15 cms insulated	20
04	End cutting nipper insulated 15 cms	20
05	Tweezer 10 cms insulated	20
06	Soldering iron 25w	20
07	Combination plier 15 cms insulated	20
08	Neon glow tester	20
09	Knob screw driver insulated 10 cms	20
10	Screw driver set of 6	20
11	Watch maker screw driver set	20
12	Knife-with disposable blades	20
13	Wire stripper	20
14	Desoldering pump	20

Workshop tools

1	Adjustable spanner / slide wrench (15 – 20 cms)	8
2	Wire stripper	8
3	Allen key	1 set
4	Work benches 120 x 400 x 75 cms	4
5	Rubber mat – 180 x 45 x 2.5 cms	3
6	Rubber gloves pair	1 set
7	Steel ruler 30 cms	8
8	Scriber 15 to 20 cms	4
9	Center punch 10 cms	4
10	Hammer cross pean- 110 cms with handle	2
11	Hammer ball pean- 220 cm with handle	2
12	Spanner- double ended metric system (6 mm to 19mm by 1.6 mm)	4 sets
13	Spanner single ended (6 mm to 25 mm by 1.6 mm)	2 sets
14	Box spanner set of 4 – 15 mm	1 set
15	Mallet 8 oz	2
16	Gimlet	2
17	Saw tenon 25 cms	2
18	Chisel wood, 15 cms set of 6 mm to 25 mm	2sets
19	Chisel cold flat 10 mm	2 nos
20	Hand shears metal cutting 25 cms	2 nos
21	Bradawl	2 nos
22	Ratchet brace drill 10m	2 nos
23	Soldering iron 35 w	8 nos.
24	Soldering iron 10 w	2 nos.
25	Electric PCB drill	1 no
26	PCB Hand drill	4 nos
27	Drill bits (1 mm to 4 mm)	44
28	Battery storage lead acid	2 nos
29	Hydro meter	2 nos

30	Rheostats assorted values and ratings	8 nos.
31	Variable resistance assorted / potentiometer (HT)	20 nos
32	Crimping tool (RJ-45)	2 nos
33	Loud speaker	16 nos
34	Microphone (assorted)	6 nos
35	Head phone ear phone	4 nos
36	Logic probe	16

Equipment

1	Multi meter analog	4 nos
2	Digital millimeter	8 nos
3	Power supply +- 5 V & +-12 V DC	8 nos
4	Variable DC power supply 0 – 30 V	4 nos
5	Function generator 3/10 Mhz	4 nos
6	Pulse generator	2 nos
7	Frequency counter	2 nos
8	20/30 Mhz C.R.O	6 nos
9	Digital storage oscilloscope-60 Mhz	1 no
10	Signal generator AM / FM	2 nos
11	AF Distortion meter	1 no
12	Basic Electronics Trainer	3 nos
13	Digital Electronics Trainer	3 nos
14	Linear IC trainer	3 nos
15	Microprocessor training kit 8085 / 8086 with application boards	3 nos
16	8051 Micro controller trainer kit with application boards	3 nos
17	Microprocessor based IC Tester	1 no
18	Fractional AC Motors	2 Nos
19	Fractional DC Motors	2 Nos
20	Thermo couple meter R.F. 100mA	1 no
21	Thermo couple meter R.F. 0 - 500mA	1 no
22	Watt meter	1 no
23	Constant voltage transformer	4 nos
24	Coil winding m/c (manual)	1 no.
25	P.A Amplifier	2 nos
26	Frequency modulator	2 nos
27	Strain guage with load cell	2 nos
28	UPS-5 KVA	1 no
29	Temperature Controlled soldering Station	2 nos
30	EPROM Kit	1 no
31	Computer system with latest configuration	1 no
32	Software (M.S.Office latest version)	1 no
33	Antivirus software (latest)	1 no
34	Educational CDs Related to Trade	As regd
35	SMD repair and Rework station	1 no

	Additional Tools required for TT-II	
1	T.V. Receiver color with latest technology	3 nos
2	Pattern generator color	2 nos.
3	DVD Player	4 no
4	A.M. Trainer (modulation and de modulation)	1 no
5	F.M Trainer kit (modulation and de modulation)	1 no
6	P.M. Trainer kit	1 no
7	P A.M Trainer kit (modulation and de modulation)	1 no
8	CD / MP3 / MPEG 4 Player	2 nos
9	Blue ray disc layer	2 nos
10	DTH system	1 no
11	CCTV system	1 no
12	Digital EPBX 8 lines	1 no
13	LCD TV different brands	2 each
14	Home Theatre System	2 nos.
15	Car Stereo	4 nos
16	Cell phones- Different brands	2 each

	<u>Audiovisual aids</u>	
1	Computer with latest configuration	1 no
2	Licensed Software for system	1 set
3	LCD Projector	1 no
4	OHP projector	1 no
5	Laser printer/scanner/copier	1 no
6	White Boards	2 nos
7	Interactive panel Board	1 no
	<u>Furniture</u>	
1	Executive table for Instructor	1 no
2	Executive Chair for Instructor	1 no
3	Lab Work benches	8 nos
4	Modern class room Table	10 nos
5	Modern Class room chairs	20 nos
6	Split type AC for lab and class room	4 nos
7	Almirah	4 nos
8	Compuer Table with chair	1 set

Books

1. Written instruction materials	Prepared by NIMI Chennai
2. Basic electronic	G.K. Mittal
3. Electronics devices and circuits	Allen Motorshed
4. Electronic principles	Malvino
5. Digital principles and Applications	Malvino and Leech
6. basic Electronics	Anil maini
7. Electronic Communications	John .F. Kennedy
8. Basic Electrical Engineering	Theraja
9. Digital Principles	Tokheim
10. Digital circuits	R.P Jain
11. Microprocessor programming and Applications	Ramesh Goankar
12. Microcontroller programming and Applications	Mazidi
13. Basic Television	R.R. Gulati
14. Basic Colour Television(Part I,II,III)	H.A.Cole
15. Basic Television and Video systems	B. Grob
16. Basic Television and Servicing	B. Grob
17. Television Theory and Servicing	Zbar P.B. and Orne P.W
18. Cable Television	Maynard J
19. Colour television servicing Guide	G. J. King
20 Linear Integrated circuits	Ramakant Gaikawad

* * * * *