Syllabus for the trade

Of

MECHANIC RADIO AND TELEVISION

(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-700 091

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. Muhkerjee, 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.	Nilotpal 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: –** **MECHANIC RADIO AND TELEVISION**

2. **NCO Code No.**

3. **Duration** : 2 Years (4 Semesters)

4. **Power Norms** : 3.04 kW

5. **Space Norm** : 56 Sq. mtr

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 Students) :** 16

8. **Instructor's/Trainer's 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 five years or four years experience respectively in the relevant field

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 Mechanic Radio and Television under C.T.S.

Duration:- Six Month

First Semester

Semester Code: MRT: SEM I

Week No.	Trade Practical	Trade Theory	Engineering Drawing	Workshop Calculation & Science
1.	(a) Visit to the Institute. (b) Introduction with the Principal and other Teaching Staffs (c) Demonstration of various system of the 'Trade' like Radio, T.V., controls etc. (d) Care and Safe working habits, safety precautions to be demonstrated to the trainees. (e) 'Elementary First Aid' Practice, 'Artificial respiration' practice.	(a) Organization of the Institute, departments, various trades & functions. (b) Types of work, responsibility to be undertaken, incentives and future Planning of profession. (c) Safety Precautions to be observed in the trade both during, 'Theoretical Periods & Practical hours/ Workshop hours. (d) Elementary First Aid. (e) Earthing types and importance.	What is Engineering Drawing? Importance, Free Hand Sketching of St. lines, rectangles, polygons etc. Free hand sketching of tools, Reading of simple drawings and concept of dimensions and dotted line, chain line etc.	Introduction to electricity supply systems. Properties and uses of metals and non-metals related trade. Copper, Zinc, Tin, Aluminium, Brass, Bronze.
2 & 3	Demonstration & uses of trade hand tools. Screw driver, pliers etc. Simple mechanical fixtures, types of screws, bolts, washers, clamps, rivets, taps, connectors. Simple fitting practice, fitting and drilling practice. Simple threading practice, Simple Sheet metal works. Demonstration on Pneumatic screw driver.	Identification, specifications, uses and maintenance of hand tools.	Reading of simple drawing, Free hand sketching of simple solids with dimension.	Solder Timber, Rubber, Different types of P.V.C materials used in Electronic Industry.
4	Identification of conductors, Insulator with specifications. Use SWG. Demonstration of different soldering iron. Practice of soldering & desoldering. Practice of simple series & parallel circuits. & mixed circuits. Verification of Ohm's Law.	Matter, molecule, atom, conductor, insulator, Semi-conductor and their classifications, Voltage, current, resistance, Ohm's Law, specific resistance & S.W.G. Basic concept of soldering.	-do-	-do-
5	Identification of resistors. Colour code practice. Use of multimeter for	Classification of resistors with specifications & use.	-do-	-do-

	measurement of voltage, current and resistance			
6	Free hand sketch of solids viewed perpendicularly to their surface and axes. " on Thermistor " on VDR resistors " on LDR resistors Test on and use of classified resistors carbon (various W/ W POT (Log & Linear) Preset etc.	Construction of resistors. Colour Code. Kirchhoff's Law and its application. Explanation and only use of multimeter	Free hand sketch of solids viewed perpendicularly to their surface and axes.	Use of different sheets, ferrous and non-ferrous Decimals addition, subtraction multiplication, division, conversion of decimals to common fractions and vice versa.
7	Maintenance of primary and secondary cells, Use of cells and battery in circuit. Preparation of charging by a charger. Use of Sp. Gr. Tube/ Hydrometer.	Explanation of cells. Leclanche cell, primary cells, battery construction, charging rate. Efficiency, Amp. Hr. capacity. Types of charging, Silver oxide L.C.R. bottom cells. Alkali cells-construction, Charging efficiency – use advantages.	Free hand sketches on nuts & bolts with dimension from samples. Circuits. & wiring diagram	Reduction of common fraction to decimals fraction. Brief description of manufacturing process of steel Copper, Al.
8 & 9	Demonstration on the properties of Artificial magnets. Use of magnetic needle. Simple practice of converting a magnetic material into a magnet by a bar magnet. Preparation of a solenoid. Use of magnetic needle. Preparation of electro magnets for a calling bell/buzzer. Preparation of E.M. relays. Testing of types of relays. Rewinding of E.M. Relays, and small repairs. Building of E.M.F in a generator, starting of a D.C. shunt motor.	Explanation of magnetism. Classification of magnets and their materials. Properties of magnets. Use and preparation of artificial magnets. Magnetic needle. Magnetic keepers. Explanation of Electromagnet- ism Properties, advantages, disadvantages application. EM relays-types uses. Concept of generators & motors only. Principle-classification. To build up EMF in a generator. Starting of a D.C. Motor only miniature motors.	Example of simple orthographic projection 1st angle.	Metric system metric weights and metric measurements, units conversion factors. Manufacture
10	Demonstration of A.C. & D.C. Demonstration on induced EMF. Demonstration on L.H. & R.H. rules. Demonstration on Instantaneous values and R.M.S. values.	Explanation of A.C. Comparison with D.C. Example of induction & induced EMF., Faraday's Law, Lenz's Law.	Example of simple orthographic projection 3rd angle.	Meaning of tenacity, elasticity & malleability.
11	Demonstration on phase, - cycle, 'f' Measurement of A.C. voltages and currents.	A.C. Generator-Left hand & Right hand rules. Instantaneous values, R.M.S. values-phase-cycle, Time period, frequency. Single phase motor.		Brittleness, hardness, compressibility and ductility with examples.
12	Identification of assorted inductive reactance-checking, testing rewinding upto a specification. Impedance & P.F measurements	Define-Inductance. Explanation of Inductive reactance-types, specification behavior with A.C. &. D.C. Impedance Coil concept-power factor.	Example of simple orthographic projection 3rd angle.	The weight of a body, Units of weights & shop problem percentage & its application. Shop problems.

	Demonstration on self and mutual induction. Identification of assorted - transformers-testing and rewinding upto a specification.	Self & mutual induction and their uses. Co-efficient of coupling. Example of Transformer-types, turns ratio and losses, efficiency. Hysteresis & eddy current. Types of cores to be used L.F., H.P. & V.H.F. transformer. Defects of transformer.		
13	Identification and testing of different types capacitors. Colour code practice. Behavior of capacitor at different frequencies. Determination of resonance Characters for series and parallel. Turning to a given 'f'.	Example of Capacitance & capacitive reactance. Classification of capacitors with specification, electrostatic reaction, dielectric constants, materials used. Series and parallel connection. Colour codes, application. Explanation of resonance-importance, equations. Series and parallel resonance. Circuit. elements-natural resonance, turning voltage gain, Anti resonance circuit. Uses in electronic circuits	Example of simple orthographic projection 3rd angle. Simple isometric drawings, isometric views of simple objects such as square, cube, rectangular blocks. Detailed diagram of electromagnets.	C.G.S. & M.K.S. and their conversion problem. Ratio and proportion shop problems, plotting & reading of simple graphs works, unit of work, energy power.
14 to 16	Demonstration on the function of M.C. & M.I. meters. Measurement of resistance, voltage, current, frequency etc. by Ammeter, voltmeter, ohm-meter, frequency meter. Experiment on 'range extension' of meters. Use of multimeters. Servicing of multimeters Demonstration on calibration of meters. Demonstration on insulation tester.	What is meter? Importance of meter Classification of meter. Forces necessary to work a meter. M.C. Instruments. M.I. Instruments. Universal instruments. Range Extension of meters. Need of calibration. Multimeter. Characteristics of meters. Use of meters in different circuits. Use of Multimeters. Servicing, care & maintenance. Use of Insulation tester.	Familiarization and sketching the details of components.	Applied problems. Algebraic symbols addition, subtraction, multiplication, division. Standard algebraic formula $(a + b)^2$, $(a-b)^2$. Simple simultaneous equations with two unknown measurement of friction-examples. Meaning of C.G.
17	Film on Semi-conductor Film on PN-junction. Demonstration on Barrier-potential for Ge & Si.	Define 'Semi-conductor', Intrinsic & Extrinsic Semiconductors. Temperature co-efficient. Definition of 'P' and 'N' types of semiconductor, development of P.N. Junction-Barrier potential. Symbols as per B.I.S.	Use of drawing instruments T' square, drawing and construction of simple figures. Solids with dimensions.	Specification Gravity Balancing examples.
18 & 19	Testing of a Diode. Characteristics of diodes. Characteristics of Zener-diode. Half wave rectifier circuit. Full wave rectifier circuit. Bridge rectifier circuit.	Example of Diode, Classifications of Diodes. Characters of Diode. Varactor diode. Zener diode. Temperature effect. Diode as rectifier Half wave-Full wave bridge. Coding of	Use of different types of scales in inch & millimeters. Lettering numbers and alphabets.	Areas of rectangles, circles regular, polygons, Calculation of areas, volume, weight of simple solids-cubes squares, hexagonal prisms shop

		Diodes. Study of the diode junction parameter.		problems.
20	Demonstration on various filter circuits. Assembly, testing & 'L', T & PAI filters. Demonstration on H.P., L.P. & B.P. filter circuits.	What is a filter circuit Types of Filter circuits Example of Hi-pass, Low pass, Band pass filters.		Heat and temperature thermometric scales- Fahrenheit and centigrade and their conversion Kelvin, Reumer, Celsius.
21 to 24	Identification and testing of a transistor. To study Alpha & Beta of a transistor/ characteristics of a transistor (Static and Dynamic). To study the function of a transistor as an amplifier.	Bi-polar junction device, - Example of transistor, Types of transistor, Tests of transistor. Symbol as per I.S., Biasing of transistor, mode of application. Arrangements of transistor in a circuit. Conditions for the use of transistor. Current flow in a transistor. ALPHA &BETA of a transistor. Thermal run away.	Drawing of various electrical circuits, with B.I.S. symbols of circuit. Series and parallel circuit. power transformer, instrument transformer etc.	Meaning of stress & strain, modulus of elasticity, ultimate strength, B-H curve.
25	Project Work / Industrial visit (optional)			
26	Examination			

Syllabus for the trade of Mechanic Radio and Television under C.T.S.

Duration:- Six Month

Second Semester

Semester Code: MRT: SEM II

Week No.	Trade Practical	Trade Theory	Engineering Drawing	Workshop Calculation & Science
1 to 3	Demonstration, assembly and testing of a transistor amplifier in Class A,B.C,P-D, Complementary symmetry modes. Assembly, testing and frequency response of a single stage A.F. amplifier and R.F. amplifier. Assembly, testing and frequency response of a five stage amplifier with volt age amplifier and power amplifier. Study of P.C.B. of an amplifier. Fault location and servicing of amplifier. Study of vol. tone, Bass, Treble and master control circuits.	Explanation of Amplifier. Example frequency spectrum. Classification of Amplifiers, Class A,B.C., A-B, A-B, A.F. amplifier-wave- length, Hi-fi R.F. amplifier. Voltage amplifier, Small signal, large signal, power amplifier types push-pull, complementary-symmetry (transformer less output) Thermal stability and heat dissipation, biasing and couplings Frequency compensation, pre-amplifier. Cascading of amplifiers. PCB of amplifier. Vol. control, tone control, Bass control treble control and master control. P.A. system.	Free hand sketching of plan & elevation of simple objects hexagonal bar, sq. bar, circular bar, tapard bar, hollow bar etc.	Simple problems on lines angles triangles and circles.
4 to 7	Demonstration of various power supply. Assembly & testing of an unregulated power supply. Assembly & testing of a series regulated, shunt regulated P.S. Assembly & testing of voltage stabilizer as per specifications to be used for a T.V. Refrigerator. Demonstration on U.P.S. system. Assembly & testing of a S.M.P.S. for a C.T.V.	Explanation of power supply. Importance, types-unregulated, regulated-types of regulation Stabilizers types. S.M.P.S. Blocks diagram of Inverter circuits. Blocks diagram of S.M.P.S.	Calculation of areas of triangles, polygons with the aid of trigonometry.	
8 to 12	Demonstration and testing of various microphones. Identification, testing & servicing of microphone spares. Identification testing Servicing of loud speakers. Arrangement of speaker/Horns in a room/ Auditorium for a open gathering Impedance matching.	Explanation of sound propagation, importance of channels in sound system. Explanation of micro phones-types uses specifications etc. Explanation of micro phones types uses specifications etc. Explanation of Loud Speakers types matching of speakers/Horns/Baffles/ enclosures. Line transformers.	Symbols as per different semi-conductor devices-L.D.R., V.D.R., Thermistor, & their use in circuits.	Calculation of current & voltage in voltage dividing network using the thermistor, V.C.R., L.D.R at different temp., voltage, light intensity etc.
13 & 14	Demonstration of 'Intercom' system. Study of cradles/ Receiver study of	Definition & Explanation of 'Intercom' system. Block diagram of 'Intercom'	Drawing of A.F. amplifier circuit. with six stage and with types	DC : calculate current in different resistive network using Diode,

	Exchanges Study of power supply of 'Intercom' System. Explanation of 'Exchanges' used, Explanation of power supply.	system. Explanation of cradles/Receiver-types function and testing.	of output P-P. Fault finding and servicing of 'Intercom' system.	Zener in F.B. & R.B.
15 & 16	Demonstration on various oscillators. Study of Feed back in an oscillator circuit. Assembly of A.F. oscillator testing & measuring the 'f' of oscillation. Study of an R.F. Oscillator, Fault finding & servicing of oscillator.	Define oscillator, importance, applications to electrical circuits. Explanation of vibration and oscillation. Factors controlling oscillation. Types-A.F., R.F., Feed back, Tank circuit. crystal oscillator. Oscillators used in Radio circuits, T.V. circuits, Tape recorder, Function Generator. Other applications of oscillators: Tone generation, Remote control etc.	Block diagram of an oscillator. Symbols for different wave shapes-square, Saw tooth, Sine, Triangular etc.	Calculation of 'f', v from f = v/λ, Time Priod Giga Hertz Mega Hertz Micro Hertz etc.
17	A visit to AIR station.	Define modulation, types of modulation-A.M., F.M., P.M. & application. Broad-casting , Bandwidth mod index. Definition and importance of demodulation.	Drawing of AM & FM modulated wave at various modulation 100 pc, 50 pc etc.	Determination of velocity ratio, mechanical advantage & efficiency.
18 to 20	Demonstration on a multiband Receiver. AM and FM receiver. Study of Radio circuit, M.V. - do - Multiband.	Full explanation of Radio Receiver, super heterodyne Principle of 'frequency changing' Radio chain, terms used in radio transmission-specification.	Exercise on Blueprint reading/circuit. reading of house service connections.	Logarithm-Use of log, tables for multiplication and division
21	Identification of R.F. stage Identification of I.F. stage. Identification of A.F. stage. Study of assorted 'Band switches'. Practice on 'Dial Threading' Study of the PCB of the R/R/ circuit.	Ionosphere, ground wave propagations, Electromagnetic waves, reflection, speed of transmission, wave length. Explanation of frequency ranges, resonance, Image frequency, acceptor circuit & rejector circuit. Disadvantages of R.F. amplification. Sensitivity and selectivity, Fidelity. Signal to noise ratio. Block diagram of radio receiver.	Small power circuits, Connection of Ammeter Volt meter, Watt meter Kwh meter with I.S.I symbol circuit. reading and drawing of different stages of R/R/Free hand sketching of-trade objects.	Determination of efficiency of simple machines-wrench, pulley blocks, wheels and compound axels.
22	Study of R.F. section circuits. of R/Rs for both P.N.P./ N.P.N. Ant. & oscillator alignments. Study of different band switches. Fault finding and servicing of R.F. stage. Checking of sensitivity.	Explanation of tuning section/R.F. section. Block diagram. Antenna circuit, oscillator circuit., Mixer stage. I.F. generation, R.F. amplifier, A.G.C.-types of transistors used. Specifications of Ant. & oscillator coils with types of 'gang condensers' Types of 'band' switches. Used	Circuits with dynamic breaking Drawing of conversion Stage of R/R both PNP/NPN Layout of battery charging circuit. from D.C. shunt generator.	Atmospheric pressure, pressure gauges, absol pressure properties of matter.

		connections conditions for better selectivity and sensitivity.		
23	Study of I.F. stage of R/R/ for both PNP/NPN. Study of detector Stage of R/R for both PNP/NPN. Study of A.V.C.,/ A.G.C. circuit. Alignment of I.F.T. for desired I.F. Testing of I.FTs, replacement of I.FT. and realignment. Fault finding by meter/by signal traces/by scope.	Explanation of I.F., the importance of I.F., range for M.W. & S.W., Circuit. analysis of I.F. stage. Transistors/I.C. used & their characters. Alignment of I.F. Stage. Explanation of detection/ demodulation. R.F. by pass. Tuning indicators with their circuit. arrangement types. A.V.C./ A.G.C. line, importance.	Drawing of I.F. stage of both P.N.P. and NPN circuits.	Different of force on material in such application as extending, bending, twisting and shearing. Trigonometric tables, applied problem.
24	Study of Audio stage, driver stage, output stage tons and vol. control stage Fault finding and servicing.	Explanation of audio stage, types of amplification, driver stage, output stage. Transistors used. Tone control, Vol. control.	Details of electrical control panel.	Calculation of bias Determination of gain of amp. at different load
25	Project Work / Industrial visit (optional)			
26	Examination			

Syllabus for the trade of Mechanic Radio and Television under C.T.S.

Duration:- Six Month

Third Semester

Semester Code: MRT: SEM III

Week No.	Trade Practical	Trade Theory	Engineering Drawing	Workshop Calculation & Science
1 - 2	Servicing practices.	Preparation of servicing charts for fault finding of Audio amplifiers in Radio Receivers. Data sheet & History sheet, Replacement charts/equivalent charts Tech. safety & precautions to be observed.	Drawings of C.B. C.E. & C.C. Circuits. Typical voltage amplifier circuit. Drawing of Class A & B amplifier circuit. Different power output stages P-B, complementary symmetry etc.	Simple calculation of power output and biasing.
3- 8	Demonstration and practice on car audio system. Installation and fault finding of car audio system. Demonstration on head unit, radio tuner, CD players, USB connector and Bluetooth devices.	Principle and working amplifier of car audio system. Different components and its working of car stereo. Working principle of two way and four way speaker system.	Block diagram of a tape recorder. Circuit diagram of O/L relay. Drawing of a limit switch.	Problems of mensuration. General conditions of equilibrium for series of forces on a body. Plotting of graph. Simple problems of graph. Brief description and properties of silicon, Nichrome Silver etc.
9- 12	Study & assembly of a V.J.T. triggered circuit. Study of a circuit. Using MOSFET study of a circuit. S.B.S. & S.C.S. Study of S.C.R. in D.C.	Example of characteristics uses of V.J.T., F.E.T., to M.C.S., S.C.R. S.C.S., S.B.S. DIAC & TRIAC, ICS-types and uses. Op-amp, Opto-couplers.	Drawing of V.J.T. trigger circuit. with I.S.I, symbol. Power amplifier circuit. with F.E.T., I.S.I, symbols of S.B.S. S.C.S. voltage regulator circuit. Study of S.C.R. in A.C. Study of voltage control by S.C.R. Study of DIAC, Study of TRIAC & DIAC, Study of I.C. circuits - amplifier, switching circuit.	Problem on mensuration, Atmospheric Pressure, Absolute pressure. Properties of matter. Difference between mass and weight. Motor control circuits A.F. amplifier circuit.- in I.C. Remote control by L.S.I, and M.S.I. Block diagram of microprocessor. Flow chart of microprocessor.
13-14	Demonstrations on various transmitting systems. Study in blocks the circuits of transmitters.	Example of transmission systems Block diagram. Frequency multiplier. Feeders & Antenna & phase modulation. High voltage power units phase modulation. Police wireless microwave link and satelite communication (Example & Block- diagram only). Walkie-Talkie.	Drawing of circuit. of signal generator, E.V.M., Funtion generator, D.C. speed control circuits. with I.S.I, symbols.	Representation of forces by vectors, simple problems on lifting tackles- jig, wall cranes, solution by vectors.
15-16	Demonstration a C.R.O. Exam, of 'X' & ' Y' axes controllers. Measurements	Example of oscilloscope, Importance, applications. Block diagram. Introduction	Drawing of Block diagram of oscilloscope, C.R.T.,	General condition of equilibrium for series of forces on a body.

	of D.C. voltages, A.C. voltages, frequency etc. Comparison of waves. Use of 'Scope' in testing & fault location. Practice on scope for measurements. Testing through Lissajous pattern.	to VALVE only. Construction & function of C.R.T. - C.R.O. Use of C.R.O. & it's Care and maintenance. Lissajous" fig.	circuit diagram of oscilloscope.	Plotting of graph. Simple equation of graphs.
17- 24	Demonstration on Home theatre system. Identification of different components of home theater. Distributing signals from main line installation, of splitters, tap off, finding the cable loss, power loss of different channels. Familiarization of modulators, their alignment, adjustment of gain etc, familiarization with mixers, practice on balancing the gain of different channels, overlapping etc. Installation procedure with the video display/ wall mounted TV. Installation procedure with TV, DVD and other display unit..	Working principle of Home theatre system. Working of audio and video system of home theatre. Working principle of different controls. Working of home theater with networking with DVD, TV etc. Types of mixers, their functions, application, gain of different channels, over lapping, methods of balancing, line amplifiers, power pass amplifiers, methods of adjustments of gain for different amplifiers, wide band amplifiers	Drawing of AM, FM modulated wave and various modulation Drawing of TV block diagram Drawing block diagram- ' of CRT, oscilloscope and Picture Tube Drawing of .Video amplifier circuit.	Trigonometric function - Use of trigonometric tables. Applied problems. Calculation of areas of triangles, polygons etc. Density of solids, liquids & simple experimental determination. Centre of gravity & simple experiment for its determination. Magnetic deflection theory, Photo conductivity, demodulation principle.
25	Project Work / Industrial visit (optional)			
26	Examination			

Syllabus for the trade of Mechanic Radio and Television under C.T.S.

Duration:- Six Month

Fourth Semester

Semester Code: MRT: SEM IV

Week No.	Trade Practical	Trade Theory	Engineering Drawing	Workshop Calculation & Science
1 to 9	Demonstration on C.T.V. Identification & use of diff. controls. Identification, Study & Test points of: —Tuner —V.I.F. —Video Amplifier —Sync, circuit —Sweep circuit. —Picture tube —Sound section —Power supply Fault finding. Adjustment of white colour. Demonstration on LCD/LED TV. Identification of different modules and fault findings.	Example of colour T.V. Functional Block Diagram. Example of circuit. description and test points of: —Tuner —V.H.F. —A.G.C. —Video Amplifier —Synchronization & sweep circuit. —Matrix —Picture tube —Sound section —Power supply Preparation of servicing chart/data sheet. Fault finding-step by step. Balancing of white colour. Principle and working of LCD/LED TV.	Drawing of different tuner diagrams. V.H.F. Channel charts. Typical Video I.F. response curve, staggered tuned amplifier circuit. F.M. detector response curve. Sound section circuit. diagram.	Qty. of heat, specific heat of solid, liquid & gases. Heat gained, heat lost. Problems on mensuration. Resolution and composition of forces. Principle of video recording. Cutting & bending of Aluminium pipes. Principle & calculation for different channels. Calculation of frequencies due to channel interference.
10 to 14	Use of test instruments for fault finding as per charts.	Development of fault flow chart, Data charts, Replacement charts. Test point charts-showing Voltage and signals for both B&W and CTV. Types of switches, cables, connectors etc. P.O.T.	-do-	-do-
15 to 17	Fault finding and servicing of DVD players and car music system.	Procedure of fault finding and servicing of DVD. & Car music system.	Symbols of various digital electronics components,	Vector algebra. Addition and subtraction of vector. Vector product. Scalar and vector product.
18 to 24	Building blocks on various Gates and combination of Gates. Assembly and test of Gate circuits. for a desired drive with digital and microprocessor circuits.	Concept of —number system —Binary and Hex —Gate circuits —Registers —Counters —7 segment drives —Introduction to microprocessors —Memory —Digital ICs microprocessor (Instruction) —Remote control	Diagram of different types of logic gates. Practice on full adder and half adder diagram. Free hand sketches of counters and registers.	Boolean algebra. Number system. 1's and 2's complement. Binary addition, subtraction, multiplication and divisions.
25	Revision			
26	Examination			

TRADE: MECHANIC RADIO AND TELEVISION
LIST OF TOOLS & EQUIPMENT

A. TRAINEES TOOL KIT FOR 16 TRAINEES +1 INSTRUCTOR

Sl. No.	Item	Quantity
1	Electronomic Tool Kit	17 nos
2	Combination pliers 15 cms insulated	17 nos
3	Long nose pliers 15 cms insulated	17 nos
4	Diagonal cutter 15 cms	17 nos
5	End cutting nipper 15 cms insulated	17 nos
6	Tweezers 10 cms insulated.	17 nos
7	Heat sink pliers	4 nos
8	Neon Tester	17 nos
9	Knob screw driver 10 cms.	17 nos
10	Screw driver set of 6	4 sets
11	Philips alignment kit	8 nos
12	Wire stripper (insulation)	17 nos
13	Desoldering pump and soldering iron, 25 watt.	17 nos

B. GENERAL MACHINERY SHOP OUTFIT (as per the table)

14	Fire extinguisher	2 nos
15	First aid kit	1 no
16	Artificial respiration chart	4 nos
17	Work benches 120 x 400 x 75 cm	4 nos
18	Rubber gloves pair	3 nos
19	Steel rule 300mm	2 nos
20	Scriber 18 to 20 cms	8 nos
21	Centre Punch 10 cms	8 nos
22	Hammer cross pein 110 gm	4 nos
23	Hammer ball pein 110 gm	4 nos
24	Spanners double ended 6 mm to 25 mm by 1.6 mm	4 sets
25	Allen key upto 10 mm	1 no
26	Mallet 8 Oz	2 nos
27	Tenon Saw 25 cms	2 nos
28	Chisel wood 15 cms	2 sets
29	Electronic drill 10 mm with bits all sizes with polishing and buffing accessories.	2 nos
30	Hacksaw 20-25 cm. adjustable with blade	4 nos
31	Micro processor Training kit	2 nos
32	Junior Saw 20 cms	1 no
33	File flat 20 cms second cut with handle	2 nos
34	File flat 15 cm. bustered with handle	4 nos
35	File half round 20 cms bustered	4 nos
36	File round 20 cms. second cut with handle	2 nos
37	File round 20 cms. with handle	4 nos
38	Instrument files set of 12	2 nos
39	Vice bench 10 cms jaw	2 nos
40	Vice bench 5 cms jaw	4 nos
41	Taps set 2 mm to 10 mm with handle set of 9	2 sets
42	Dies set 2 mm to 10 mm with handle set of 9	2 sets
43	Grinder bench electric 15 cm	1 no
44	File square 25 mm	8 nos
45	File triangle 15 mm	4 nos
46	P.C.B. development kit	8 nos

47	Tool maker clamp	4 sets
48	Bench drill 1 mm	1 no
49	Soldering iron 250 W	2 nos
50	Soldering iron 60 W	4 nos
51	Soldering iron 10W	4 nos
52	Wire gauge set	2 nos
53	Feeler gauge set	2 nos
54	Rheostat various values and ratings	8 nos
55	Wrist Strap (Electro-static)	8 nos.
56	Fractional horse power motor AC/Induction type/universal type	2 nos
57	Transformers constant voltage 500 VA	4 nos
58	Coil winding machine (Manual)	1 no
59	Multimeter (small) voltage, current and resistance	8 nos
60	DC and AC Ammeter 0-50 mA	2 nos
61	Multimeters (big) 20 K-ohms/V	4 nos
62	Moving iron meter 0-1 A	2 nos
63	Watt meter 5 Amp/250 V	1 no
64	Home Theatre system	1 set
65	Commercial Radio receivers AM and FM	4 nos each
66	Microphones different types	6 nos
67	Head stereo phone and earphones, H3, FI,	4 each
68	Insulation tester 250 V/500 V	2 nos
69	Service oscillator	8 nos
70	Signal tracer	2 nos
71	Function generator	4 nos
72	Output meter	4 nos
73	CRO Dual trace	4 nos
74	Regulated power supply 0-30 volts, 5 amp	2 nos
75	Wobbulator or sweep gen. 240 MHz with mark	2 nos
76	Wobbularscope 1 MHz to 240 MHz	2 nos
77	Reflex speaker horn type	2 nos
78	Pattern generator for colour	1 no
79	Handy cam digital	1 no
80	LCR meter digital	1 no
81	Speaker columns/Sound columns	2 nos
82	Car music system with blue tooth connectivity	1 no
83	TV receiver (Flat and LCD 14'' minimum)	1each
84	Signal generator (AM/FM) 10 MHz	4 nos
85	Transistor tester and I.C. tester	2 each
86	Steel cabinet 120x60x45cm	4 nos
87	Steel lockers with 8 drawer (standard size)	2 nos
88	Signal injector (Transistorised)	4 nos
89	Distortion meter	4 nos
90	T.V. games	4 nos
91	Loudspeaker column type elect	2 nos
92	Pulse Generator	1 no
93	Digital Training Kit	4 nos
94	Discrete component tester	4 nos
95	Scientific Calculator	2 nos
96	Colour T.V. Trainer	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	1 No
5	Steel Almirah 2.5 m x 1.20 m x 0.5 m	2 Nos
6	Black board/white board	1 No