

General Information

1. Name of the Trade : Electronic Mechanic
2. N.C.O. Code No. : 852.20
3. Duration of Craftsmen Training : 2 years
4. Duration of Apprenticeship Training : 3 years including 2 years of Basic Training
5. Entry Qualification : Passed in Matriculation Examination under 10+2 system of education with Mathematics and Science or its equivalent.
6. Rebate for Ex-craftsmen Trainees : 2 years (Mech. Radio & TV or Mech. (General Electronics))
7. Ratio of Apprentice to Workers : 1:5

SYLLABUS FOR THE TRADE OF ELECTRONIC MECHANIC UNDER CRAFTSMENSHIP TRAINING SCHEME

Period of Training: 2 years

Note: 1. The syllabus given below is a guide for the Instructors to prepare their own schedule of training. The portion in respect of different subjects, which has been indicated against different weeks, may be adjusted according to the training schedule prepared by the Instructors concerned. While teaching Engineering Drawing, emphasis should be laid on free hand sketching, blue print reading, drawing of circuits and parts related to the trade. Similarly emphasis should be given on problems related to the trade according to the syllabus given for Workshop Calculation and Science.

Note: 2. Bi Publications for components and measurements for Radio and TVs are available as standard publications. The Instructors should emphasize the use of these specifications during course of teaching.

No. of Weeks	Syllabus List	Theory	Practical	Equipment Required	Engineering Drawing	Workshop Calculation & Science
1	2	3	4	5	6	7
1.	Know your Institute	(a) Organization of the Institute, Departments various trades & functions	(a) Visit to the Institute.	Power Supply switchers, Fire extinguishers. First Aid Kit First Aid Chart Artificial Respiration Chart. Instrument boxes and Drawing materials.	What is Engineering Drawing? Importance, - free hand sketching of St. lines, rectangles square, circles, polygons etc.	Introduction to electricity supplies systems.
		(b) Types of work, responsibility to be undertaken, incentives and future. Planning of profession.	(b) Introduction with the Principal & other teaching staffs.			
		(c) Safety precautions to be observed in the trade oath during 'Theoretical Periods' and 'Practical hours/ workshop hours'.	(c) Demonstration of various systems of the 'Trade' like Radio, Tape, T.V. Controls etc.			
		(d) Elementary First Aid.	(d) Care & Safe working habits, safety precautions to be demonstrated to the	Student's tool kits and workshop tools.	Free hand sketching of tools. Reading of simple drawings and concept	Properties and uses metals and non metals related to trade. Copper,

			trainees.		of dimensions and dotted lines, chain line etc. Magnifying glass.	Zinc, Tin, Aluminum, Brass, Bronze.
		(e) Earthing types and importance.	(e) Elementary First Aid' practice, 'Artificial respiration' practice.			
2. & 3	Hand Tools	Identification, specifications, uses and maintenance of hand tools.	Demonstration & uses of trade hand tools-Screw-driver, plier 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.			
4.	Introduction to Electricity	Matter, molecule atom, conductor, Insulator, Semi-conductor, Classifications. Voltage, current, resistance, Ohm's Law, specific resistance & O.S.W.G.	Identification of conductors, Insulators, with specifications. Use S.W.G. demonstration of different soldering iron. Practice of soldering & de-	S.W.G. Multimeter soldering iron. Temp. controlled soldering station.	Reading of simple drawing, Free hand sketching of simple solids with dimension.	Solder Timber, Rubber Diff. Types of P.V.C. materials used in Electronic Industry.

			<p>soldering. Practice of simple series and parallel ckts & mixed.</p> <p>Verification of OHM's Law.</p>			
5 & 6	Resistors	<p>Classification of resistors with specifications & use. Construction of resistors, Colour Code. Kirchhoff's Law and its application. Explanation and only use of multimeter.</p>	<p>Identification of resistors. Colour code practice. Use of multimeter measurement of voltage, current and resistance. Experiments on P.T.C. resistors.</p> <p>Experiment on N.T.C. resistors.</p> <p>Experiment on Thermister resistors.</p> <p>Experiment on V.D.R. resistors.</p> <p>Experiment on L.D.R. resistors.</p> <p>Tests on and use of classified resistors Carbon (Various W), W/W, Potentiometer Carbon Type (Log & Linear) Pre-set etc.</p>	<p>S.W.G. Multimeter soldering iron.</p> <p>Lead acid battery, cells, Multimeter.</p>	<p>Free hand sketch of solids viewed perpendicularly to their surface and axes.</p>	<p>Use of diff. Sheets, ferrous and non ferrous. Decimals addition, subtraction, multiplication, division, conversion of decimals to common fractions and vice versa.</p>
7.	Battery	<p>Explanation of cells. Leclanches cell. Primary cells, Secondary cells, Battery construction – charging rate. Efficiency Amp.hr. capacity. Types of charging Silver oxide L.C.R. bottom cells. Alkali</p>	<p>Testing of primary and secondary cells. Use of cells and battery in ckts. Preparation</p>	<p>Assorted cells and batteries Assorted rheostat, Hydrometer . Battery charger,</p>	<p>Free hand sketches of nuts & bolts with dimensions from samples. Ckts and</p>	<p>Reduction of common fraction to decimals fractions. Brief description of</p>

		cells – construction- charging efficiency – use, advantages.	of Electrolyte, Preparation of Charging by a charger. Use of Sp. Gr. tube/ hydrometer.	Battery tester, Cells Testor.	wiring diagram.	manufacturi ng process of Steel, Copper Aluminium
8 & 9	Electro- Magnetism.	Explanation of magnetism. Classification of magnets and their materials. Properties of magnets. Uses and preparation of artificial magnets. Magnetic needle. Magnetic keepers. Explanation of Electro-magnetism. Properties advantages, disadvantages-application- types of cores. E.M. relays- types – uses. Concept of generators & motors only. Principle classification. To build up E.M.F. in a generator only starting of a D.C. motors only miniature motors.	Demonstratio n on the properties of P.M. 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. relay. Testing of types of relays. Rewinding of E.M. relays & small repairs. Building of E.M.F. in a Generator starting of a D.C. Shunt motors.	Smart assorted D.C. motors.		
10 & 11	Alternating Current.	Explanation of A.C. Comparison with D.C. Expl. Of Induction & induced E.M.F. Faraday's Law, Lenz's Law A.C. Generator – Left hand and	Demonstratio n of A.C. & D.C. Demonstratio n on Induced E.M.F. Demonstratio	Oscilloscop e A.C. Auto var. Models on L.H. & R.M. rules. Low frequency	Expl. Of simple or thographic projection 3 rd angle.	Meaning of tenacity elasticity malleability brittleness hardness compressibi

		<p>Right hand rules.</p> <p>Instantaneous values R.M.S. values – Phase – cycle – Time period – frequency. Single phase motor. Three phase motor. Principle classification uses Fractional H.P. Motors ... Capacitor motor.</p>	<p>n on L.H. & R.H. Rules. Demonstration on Instantaneous values and R.M.S. values. Demonstration on phase, cycle, 'f' Measurement A.C. voltages and current.</p>	<p>oscillator Multimeter 'f' – counter.</p>		<p>ility and ductility with examples.</p>
12.	Inductance	<p>Define – Inductance. Explanation of Inductive reactance, - types specification. Behavior with A.C. Impedance.</p> <p>Coil concept – power factor. Self & mutual induction co-efficient of coupling. Expl. Of Transformer-types-turns-ratio-uses-losses-efficiency.</p> <p>Hysterisis & eddy current – types of cores to be used for L.F.H.F. & V.H.F. transformer.</p>	<p>Identification of assorted inductive reactances – checking, testing & rewinding upto a specification. Impedance & P.F. measurement s.</p> <p>Demonstration on self and mutual induction.</p> <p>Identification of assorted transformers-testing and rewinding upto a specification.</p>	<p>Oscilloscope A.C. Auto Var Models on L.H. & R.H. rules. Low frequency oscillator. Multimeter 'f' counter.</p> <p>Assorted Inductive reactances. Assorted Transformers.</p>	<p>Expl. Of simple orthographic projection 3rd angle.</p>	<p>The weight of a body, Units of weights & shop problem percentage & its application. Shop problems.</p>
13.	Capacitance	<p>Expl. Of capacitance & capacitive reactance. Classification of capacitors with specification Electrostatic action dielectric constants, materials used. Seris and parrallel connection Colour cores uses.</p>	<p>Identification and testing of difernet types capacitors. Colour code practice. Behavior of capacitor at different frequencies.</p>	<p>Bridges-RCL or Digital Multimeter. Power supply, Oscillator, E.V.M.</p>	<p>Expl. Of simple orthographic projection 3rd angle.</p>	<p>C.G.S.M.K. S. and their conversion problem.</p>
	Resonance	<p>Expl. of resonance. Importance – equations Series and parallel resonance. Ckt. Elements – natural resonance, tuning, voltage gain Anti – resonance ckt. Of faster.</p>	<p>Determination of resonance. Characters for series and E.V.M. parallel.</p>	<p>Oscilloscope, signal generator E.V.M.</p>	<p>Simple isometric drawings, isometric views of simple objects such as square,</p>	<p>Ratio and proportion shop problems, plotting and reading of simple graphs.</p>

		Uses in electronic ckts.	Tuning to a given 'f'.		cube rectangular blocks, Detailed diagram of Electro magnets.	Works unit of work, energy power.
14 to 16	Simple Analogue Meter	<p>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.</p> <p>Characteristics of meters. Use of meters in different ckts use of Multi meters servicing , care and maintenance use of insulation meter</p>	<p>Demonstration on the function of M.C & M.I. meters.</p> <p>Measurement of resistance, voltage, current frequency, etc. by Am-meter, Voltmeter, frequency meters. Expts on 'range extension' of meters. Use of multimeters</p> <p>Servicing of multimeters.</p> <p>Demonstration on calibration of Demonstration on insulation tester.</p>	<p>Assorted analogue meters. Multimeters . Models/Kits for assorted ckts. Shunt & series resistors. Standard meters.</p>	<p>Familiarising and sketching the details of components .</p>	<p>Applied problems. Algebraic symbols addition, subtraction, multiplication division. Standard algebraic formula $(a+b)^2$, $(a-b)^2$. Simple simultaneous equations with two unknown measuring of friction examples, meaning of C.G.</p>
17.	Semi-Conductor	<p>Define 'Semi-conductor' Intrinsic & Extrinsic semi-conductors.</p> <p>Temperature co-efficients.</p> <p>Definition of 'P' and 'N' types of semi conductor. Development of P.N. Junction – Barrier potential symbol.</p> <p>Symbols as per B.I.S./graphic.</p>	<p>Film on Semi-conductor. Film on P.N. Junction.</p> <p>Demonstration on Barrier – potential for G & Si.</p>	<p>Video Films on Semi-conductor Video films on P.N. Junction Digital multimeter</p>	<p>Use of drawing instruments 'T' squares, drawing board construction of simple figures s. & solids with dimensions</p>	<p>Specification gravity Balancing examples.</p>
18to 19	DIODE	<p>Expl. of Diode Classifications of Diodes Characters of diodes. Varactor diode. Zener diode. Temperature effect.</p>	<p>Testing of a Diode. Characteristics of Diode. Characteristi</p>	<p>Multimeter E.V.M. Oscilloscope.</p>	<p>Use of different types of scales in inch &</p>	<p>Areas of rectangles, circles, regular, polygons.</p>

		Diode as rectifier – Half wave – Fullwave Bridge. Coding of Diodes. Study of the diode junction parameter.	cs of Zener-diode. Half wave rectifier ckt. Full wave rectifier ckt. Bridge rectifier ckt.		millimeters. Lettering numbers and alphabets.	Calculation of areas, volume, weight of simple solids – cubes squares, hexagonal prisms shop problems.
20.	Filter Circuits	What is a filter circuit? Types of Filter circuits. Expl. of Xc, XL. Hipass, Low pass, Band pass filters.	Demonstration on various filter ckt. Assembly, testing & 'L' 'T' & PAI filters. Demonstration on H.P., L.P. & B.P. filter circuits.	Multimeter oscilloscope.		Heat and temperature thermometric scales – Fahrenheit, centigrade and their conversion Kelvin Reamer Celsius.
21 to 23.	Transistor	Bi-polar junction Device. Expl. of transistor Types of transistor. Tests of transistor. Symbol as per B.I.S. Biasing of Transistor & mode of application. Arrangements of a transistor in a ckt. Conditions for the use of a transistor. Current flow in a transistor. ALPHA & BETA of a transistor. Thermal run way, Transistor CB, CC, CE amplification.	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.	Multimeter milli-ammeter, micro-ammeter, milli-voltmeter. Transistor tests. Signal Generator Oscilloscope.	Drawing of various electrical ckt., with B.I.S. symbols of ckt. series and parallel ckt. power transformer instrument transformer etc.	Meaning of stress, strain modules of elasticity, ultimate strength B-11 curve.
24 to 26	Amplifier	Explanation of Amplifier. 'f' spectrum. Classification of Amplifiers. Class A,B,C. A-B. A.F. amplifier Wave-length, propagation, Val. Of sound Hi-fi. R.F. amplifier. Voltage amplifier. Small signal. Large signal, Signal to noise ratio. Power amplifier-types Push-Pull, Complementary symmetry (transformers out put). Thermal stability and heat	Demonstration, assembly and testing of a transistor amplifier in Class A,B,C, P-P complementary symmetry modes. Assembly, testing and frequency response of a single stage A.F.	Multimeter. D.C. Low voltage power supply. Signal generator. A.F. –do- R.F. HF oscilloscope output meter.	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.

		dissipation. Biasing and couplings Frequency compensation, pre-amplifier. Cascading of amplifiers. FC of amplifier. Vol. coape control, Bass control. Treble control and master control P.a. system.	amplifier and R.F. amplifier. Assembly, testing and frequency response of a five stage amplifier with voltage amplifier and power amplifier. Study of P.C.B. of an amplifier. Fault location and servicing of a amplifier. Study of Vol. Tone, Bass, Treble and master control ckts.			
27 to 30.	Power Supply	Explanation of power supply, Importance, types-un regulated, regulated-types of regulation. Stabilizers-types. On S.M.P.S. Blocks Investor ckts. And convator ckts. Blocks of U.P.S.	Demonstratio n of various power supply. Assembly & testing of an unregulated power supply. Assembly & testing of a series regulated, shunt regulated P.S. Assembly & testing of a voltage stabilizers as per specifications to be used for a T.V. Refrigerator. Demonstratio n on U.P.S. system. (Not in list) Assembly & testing of a	Reading of simple ckts.	Calculation of areas of triangles, polygons with the aid of trigonometr y.	

			S.M.P.S. for a C.T.V. (Not in List) (Equipment list0			
31 to 33.	Stereo system	<p>Explanation of sound propagation, sound importance of channels in sound system.</p> <p>Explanation of microphones- types, uses specifications etc.</p> <p>Explanation of Loud-Speakers-types matching of speakers/Horns/Baffles/enclosures. Line transformers. Explanation of stereo system.</p> <p>Stereo amplifiers. Arrangement of stereo for a specified area. Surround sound systems.</p>	<p>Demonstrations and testing of various microphones. Identification, testing & servicing of microphone spares. Identification testing & servicing of Loud Speakers.</p> <p>Arrangement of speaker/Horns in a room/Auditorium & for a open gathering. Impedence matching.</p> <p>Demonstration on 2/4/6 channels stereo system.</p>	<p>Assorted microphones.</p> <p>Assorted Loud Speakers.</p> <p>Assorted Horns A.F. amplifier</p> <p>Line transformer. Multi channels stereo system.</p> <p>Multimeter E.V.M. oscilloscope.</p>	<p>Symbols as per different semi-conductor devices- L.D.R., V.D.R., thermister, & their use in ckts.</p>	<p>Calculation of current voltage, in voltage dividing network using thermister, V.D.R., L.D.R. at different temp., voltage, light intensity etc.</p>
34 to 35	Intercom	<p>Definition & Explanation of 'Intercom' system. Block diagram of 'Intercom' system. Explanation of cradles/ Receiver types, function and testing.</p> <p>Explanation of 'Exchanges' used, Explanation of power supply.</p>	<p>Demonstration of 'Intercom' system. Study of cradles/ Receiver study of Exchanges. Study of power supply of 'Intercom' system. Fault finding and Servicing of 'Intercom' system.</p>	<p>12 line intercom system with 'exchange' Multimeter.</p>	<p>Drawing of A.F. amplifier ckt. with six stage and with types of out-put P-P.</p>	<p>To calculate current in different resistive network using Diode, Zener in F.B. & R.B.</p>
36 to 38	Oscillator.	<p>Define Oscillator, Importance, applications to electronic ckts.</p> <p>Explanation of vibration &</p>	<p>Demonstration on various oscillators. Study of</p>	<p>Various AF & RF oscillators. Multimeter</p>	<p>Block diagram of an oscillator.</p>	<p>Calculation of 'f' V from $f=v$ time period</p>

		<p>oscillation. Factors controlling oscillations</p> <p>Types – A.F.-R.F. Feed back, Tank ckt, crystal oscillator,</p> <p>Oscillators – used in Radio ckt, T.V. ckt. Tape recorder etc.</p> <p>Function Generator other applications of oscillators. Tone generation, Remote etc.</p>	<p>Feed back in an oscillator ckt.</p> <p>Assembly of an A.F. oscillator testing & measuring the 'f' of generated oscillations.</p> <p>Study of an R.F. oscillator.</p> <p>Fault finding & servicing of oscillator.</p>	<p>oscilloscope.</p> <p>Frequency counter.</p> <p>Remote control Devices- Toys etc.</p>	<p>Symbols for different wave shapes –square, Saw tooth, Sine, Triangular etc.</p>	<p>Giga heat z Mega heat z micro etc..</p>
39.	Modulation.	<p>Define modulation types of mode – A.M., F.M., P.M., - application Broadcasting. Bandwidth mode index. Definition and importance and demode.</p>			<p>Drawing of AM & FM modulated wave at various modulation – 100 pc, 50 pc etc.</p>	<p>Determination of velocity ratio, mechanical advantage & efficiency.</p>
40 to 42	Radio Receivers.	<p>Full explanation of Radio receiver Superheterodyne principle of 'frequency changin' Radio chain, terms used in radio transmission – Ionosphere, ground wave propagations Electromagnetic waves, reflection, speed of transmission, wave length. Explanation of 'frequency' ranges Resonance. Image frequency, acceptor ckt. & rejector ckt. Disadvantages of R.F. amplification. Sensivity and selectivity. Fidelity. Signal to noise ratio. Block diagram of a radio receiver.</p>	<p>Demonstration on a multiband Radio Receiver.</p> <p>Study of radio ckt. M.W.</p> <p>-do- Multiband.</p> <p>Identification of R.F. stage.</p> <p>Identification of I.F. stage.</p> <p>Identification of A.F. stage.</p> <p>Study of assorted 'Band Switches' Practice on 'Dial Threading'</p> <p>Study of the PCB of the R/R ckt.</p>	<p>Assorted Radio Receivers (Multiband) Multimeter oscilloscope.</p>	<p>Exercise on Blue print reading/ckt. reading of house service connections and small power ckt. Connection of Ammeter Volt meter, Watt-meter Kwh meter with I.S.I. symbol ckt. reading and drawing of different stages of R/R/.</p> <p>Free hand sketching of trade objects.</p>	<p>Logarithm. Use of log-tables for multiplication and division.</p> <p>Determination of efficiency of simple machines- Wrench, pulley blocks, wheels and compound axles.</p>
43.	Tuning Section	<p>Explanation of tuning section / R.F. Section.</p>	<p>Study of R.F. section of</p>	<p>R/R both P.N.P. and</p>	<p>Ckts. Of magnetic</p>	<p>Problems of</p>

	(R.F. Section)	Block diagram. Antenna ckt. oscillator ckt. 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-connections conditions for better selectivity ant. Sensitivity.	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 selectivity. Checking of sensitivity.	N.P.N. Multimeter signal generator. Oscilloscope D.C. power supply.	controller with dynamic breaking Drawing of conversion. Stage of R/R/ both PNP/NPN. Layout of Battery charging ckt. from D.C. shunt generator.	mensuration, Sq. hexagon, Prism Atmospheric pressure, pressure gauges, absolute pressure properties of matter.
44.	I.F. Stage and Detection.	Explanation of I.F. the importance of I.F. range for M.W. & S.W. Ckt. 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 ckt. arrangement types. A.V.C./A.G.C. Line, importance.	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. ckt. Alignment of I.F.T. for desired I.F. Testing of I.F.Ts. replacement of I.F.Ts. and relignment. Fault finding by meter/by signal traces/ by scope.	R/R both P.N.P. and N.P.N. Multimeter E.V.M. Signal Generator. Signal tracer oscilloscope.	Drawing of I.F. Stage of both P.N.P. and N.P.N. ckts.	Diffect of force on material in such application as extending, bending, twisting and shearing. Trigonometric tables, applied problems.
45.	Audio Stage	Explanation of audio stage, types of amplification, driver stage, output stage. Transistors used. Tone control, Vol. Control.	Study of Audio stage, driver stage, output stage, tone and vol. Control stage. Fault finding and serving.	-do-	Details of electrical control pannel.	Calculation of bias. Determinati on of gain of air at different load.
46 to 48	Fault Finding	Preparation of servicing charts for fault finding in Audio amplifiers are in R/Receivers.	Servicing practices.	Signal tracer oscilloscope.	Drawing of C.B., C.E. & C.C. Ckts.	Simple calculation of power output and

		Data sheet & history sheet. Replacement charts/equivalent charts.			Typical voltage amplifier ckt. Drawing of Class A & B amplifier ckt. Dirreret power output stages P-P, complementary symmetry etc.	ilasing.
49 to 50.	Record Player & Changer	Expl. of record player and record changer, block diagrams. Principle of operation of pickup (types) speed changer, mechanical assembly. Stylus adjustment, replacement study of the motors and speed control.	Demonstration on Record player and record changer. Study of Record Player. Study of Record changer. Identification, testing & replacement various pick ups, idlers and motors-speed testing by stroboscope.	Record player. Record changer stroboscope	Drawing of the mechanical assembly of speed changer. Drawing of transistorised R/R set.	Simple problems on lefting devices. Solution of problems by vectors. Ex. On simple supported load. Calculation of area Vol. And weight of simple solids – cubes, squares, hexagons, prism.
51.		REVISION	+ Need of standards-types of standards + National standards – diff. Standard bodies – implementation.			
52		T	E	S	T	
	Achievement	At the end of first year, trainees will be in a position to assemble/test and repair different power supplies, Audio amplifier and A.M. radio receivers.				
53 to	Tape Recorder	Expl. of magnetic recording principle with	Demonstration on	Tape	Block diagram of	Problems of

58	and compact disc.	block diagram types. Function & use of magnetic tapes, recording heads, erasing heads. Bias oscillator. Dobby system. Motors used and speed control speeds of tapes. Care and maintenance idea of stereophonic recording and reproduction system. Servicing charts. Specification of tapes and cassettes. Idea of standard Recorder. Idea of equalizers. Examples of Car Stereo system. Expl. of compact Disc. System.	magnetic recording, play back, Fast forward and Rewind Study of recording and erasing circuit. Study of Mechanical assemble with motor. Cleaning of Heads. Fault finding and Servicing Study of 'Auto Stop'. Study of two-in-one circuit. Study of a carstereo circuit. Azimuth correction Demonstration on C.D. player. (Not in Eqp. List)	Recorder i) i) Cassette ii) ii) Spool Multimeter	a tape recorder. Circuit diagram of C/L relay. Drawing of a limit switch.	mensuration. General condition of equilibrium for series of forces on a body. Plotting of grapher. Simple problems of grapher. Brief description and properties of silicon. Nichrome silver etc.
59 to 61.	Special semiconductors	Expl. of characteristics, uses of – U.J.T., F.E.T., M.O.S., F. E.T., S.C.R., S.C.S., S.B.S., C. DIAC TRIAC, I.C.	Study & assembly of a U.J.T. triggered ckt. Study and assembly of F.E.T. amplifier ckt. Study of a ckt. Using MOSFET Study of a ckt. S.B.S. & S.C.S. Study of S.C.R. in D.C. Study of S.C.R. in A.C. Study of voltage control by S.C.R. Study of DIAC. Study of TRIAC &	Models of U.J.T. triggered ckt. FET as power Amplifier. Models as S.B.S. S.C.S. Electronic power regulator. Analogue I.C. tester. Microprocessor kit. Oscilloscope Multimeter E.V.M. Function generator.	Drawing of U.J.T. triggered ckt. with I.S.I. symbol. Power amplifier ckt. with F.E.T. I.S.I. symbols of S.B.S., S.C.S. voltage regulator ckt. Motor control ckts. A.F. amplifier Ckt is I.C. Remote control by L.S.I. and M.S.I. Block diagram of microproces	Problems on mensuration problems. Atmospheric pressure. Pressure gauges Absolute pressure. Properties of matter. The molecule and atoms. Different between mass and weight.

			DIAC. Study of I.C. ckt. – amplifier, switching ckt.		Flow chart of microprocessor.	
62 to 63	Transmitter.	Example of transmission systems. Block diagram. Frequency multiplier. Feeders & Antenna & Phase modulation, High voltage power units phase modulation. Police wireless, microwave link and satellite communication. (Example & Block dia only)	Demonstration on various transmitting systems. Study in blocks the ckt. Of transmitters.	Transmitter (if available)	Drawing of ckt. of signal generator, E.V.M. Function generator. D.C. speed control ckt. With I.S.I. symbols.	Representation of forces by vectors, simple problems on lifting tackles Jig, wall cranes solution by vectors.
64 to 65	Oscilloscope.	Expl. of oscilloscope, Importance, applications. Block diagram. Introduction to VALVE only. Construction & function of C.R.T. – C.R.O. Use of C.R.O. Care and maintenance Lissajer's fig.	Demonstration a C.R.O. Example of 'X' & 'Y' axes controls. Measurements of D.C. voltages, A.C. voltages frequency etc. Comparison of waves. Use of 'Scope' in testing & fault location. Practice on scope for measurements. Test on Lissejus pattern.	C.R.O., L.P. & H.F. Signal generation 'VIDEO FILM' Oscilloscope.	Drawing of Block diagram of oscilloscope, C.R.T. circuits diagram of oscilloscope.	General conditions of equilibrium for series of forces on a body. Plotting of graph. Simple equation of graphs.
66 to 75	Television systems	Expl. of T.V. systems B&W Block diagrams for both. Transmitter & Receiver. Idea about video camera. Scanning system. Frame, Field, Raster, Picture elements. Composite video signal. Aspect ratio, resolution, flickering, contrast, Brightness video signal, sound signal channels, Bands. Expl. Data	Demonstration on a B&W T.V. Identification of diff. Controls. -do- Tuner, testing & replacement. -do- wave trap ckt. &	'Video film' 'How T.V. works' T.V. sets B&W make diff. Company with servicing manual. Pattern generator. Multimeter	Drawing of the block diagram of a T.V. set. Drawing of picture tube. --o- Electronic gum. -do- Deffection Yoke.	Trigonometric function- Use of trigonometric tables. Applied problems. Calculation of areas of triangles, polygons etc.

		<p>preparation for Tuners.</p> <p>i) i) Mechanical</p> <p>ii) ii) Electronic</p> <p>-do- Fitter ckt. SWAF</p> <p>-do- Video I.F. with staggered tuned</p> <p>-do- Video amplifier & picture tube</p> <p>-do- Sweep section & E.H.T.</p> <p>-do- Sound Section</p> <p>-do- Power supply T.V. Antenna-YAGI & feeder cables.</p>	<p>testing.</p> <p>-do- Video I.F. -do-</p> <p>-do- Staggered tuning of video I.F.</p> <p>-do- Video amplifier -do-</p> <p>-do- Picture tube -do-</p> <p>-do- Sweep ckt. -do- Haizcutal-E.H.T.</p> <p>-do- F.M. Sound -do- section.</p> <p>-do- Power supply.</p> <p>-do- S.M.P.S.</p> <p>-do- S.T.R.</p> <p>-do- Preparation servicing charts.</p> <p>Installation of T.V. antenna.</p>	<p>DATA Book T.V. demonstrati on kit. Sweep generator with 'X-Y' display.</p>	<p>-do- Speaker</p> <p>-do- Video Amplifier ckt.</p> <p>-do- S.W.A.F.</p> <p>-do- E.H.T. ckt.</p> <p>-do- compositve video signal</p> <p>-do- 'YAGI' Antenna</p> <p>-do- the circuit of wabbulator.</p> <p>-do- Vidicon camera-tube.</p>	<p>Density of solids, liquids & simple experimental determinati on centre of gravity. Simple experiment for its determinati on. Magnetic defection theory Photo conductivit y demodulati on principle.</p>
76.to 83	Color T.V.	<p>Expl. of colour T.V. Functional Block diagram.</p> <p>Expl. ckt. description and test points of Tuner.</p> <p>-do- V.I.F.</p> <p>-do- A.G.C.</p> <p>-do- Video Amplifier</p> <p>-do- Synchronization & Sweep ckt.do- matrix</p> <p>-do- Picture tube</p> <p>-do- Sound Section</p> <p>-do- Power supply</p> <p>Preparation of servicing charts/data sheet. Fault finding step by step. Balancing of white colour.</p>	<p>Demonstratio n on C.T.V. Identification & use of diff. Controls. Identification , study & test points of Tuner.</p> <p>-do- V.I.F.</p> <p>-do- Video Amplifier.</p> <p>-do- Sync. Ckt.</p> <p>-do- Sweep ckt.</p> <p>-do- Picture tube</p> <p>-do- Sound</p>	<p>C.T.V. (diff. Make) with manual. Colour pattern generator. Multimeter CTV demonstrat or. Oscilloscop e. Sweep generator with 'X-Y' display. Video film 'How CTV works'.</p>	<p>Drawing of different tuner diagrams. V.H.F. Channel charts. Typical video I.F. response curve, staggered tuned amplifier ckt. F.M. detector response curve. Sound section ckt. diagram.</p>	<p>Qty. of heat, specific heat of solids, liquids & gases. Heat gained heat lost. Problems on mensuratio n. Resolution and compositio n of forces. Principle of video regarding. Cutting & bending of</p>

			sec. -do- Power supply Fault finding. Adjustment of white colour.			Aluminium pipes principle & calculations for different channels. Calculation of frequencies due to channel interference. Calculation of Video and Sound I.F. frequencies for different channels.
84 to 86	Communication system	Function Block diagram & Example of Telegraph system. -do- Tele Phone system. -do- Radio Photo system. -do- Trans Receivers -do- U.H.F., V.H.F., micro wave and Radar system. -do- Satellite system. -do- Navigation I.L.S.	Study/ demonstration on Telegraph system. -do- Telephone -do- Digital phone -do- Trans receiver VISIT to Different Transmitting Stn. (If possible) Video Film show on satellite communication.	Model of Telegraph & Telephone system. Trans Receiver. Video Films.	Drawing of separated sync. Pulses, A.G.C. and sync separator ckt.	Simple calculation of compensating components values for frequency ranges. Calculation of voltage dividing network using resistance.
87 to 90	D.C. Motors	Expl. D.C. motors, parts required principle of operation types, speed control by S.C.R./Diac and Triac. Example of micro meters.	Demonstration in different types of motors study of speed control by S.C.R. by Diac & Triac. Speed control of micro-meters.	D.C. motors, series, shunt. Micrometer . Electronic Starters.	--	Calculation of R.C. constant in A.G.C. ckt. Frequency calculation of R-C and L-C oscillator.

91.	A.C. Motors.	Expl. of principle A.C. 1 Ph. Motors, types, construction. -do- 3 Ph. Motors.	Identification , testing & running of 1 Ph. Motors. -do- 3 Ph. Motors.	Capacitor motor. Electric Fan Grinder Washing machine	Power supply ckts. Solid state.	Calculation of voltage in resistive net work using V.C.P. Zener etc..
92 to 93.	Wave Shaping Ckt.	Expl. of pulse/wave shaping ckts. -do- Differentiation and Integration ckt.	Study of different pulse shaping ckts. Assembly & testing of a differentiation and a integration ckt.	Function Generator oscilloscope. T.V. set.	Drawing of different wave shaping ckt., timer ckt of ampl. Etc.	
	Timer	Expl. of Timer, Types of Time constant etc.	Study of relay ckts. -do- D.C. timer.	Assorted relay. S.C.R. driven timers.	Block diagram of Digital clock.	
	Operational Amplifier.	Example of op-Amp. – uses.	-do- A.C. timer. -do- of op. Amp. Ckt.			
94 to 98.	Digital Electronics	Expl. of Digital system, comparison with Analogue. Advantages-application. No. systems-Binary, Hex. Conversion. Octal basic logic gates, Truth Table Multivibratory Memory, FLIP-FLOP, counter, Binary. M.S.I., L.S.I., V.L.S.I.C. mets. & Bipolar and proper use.	Study of Digital I.C. Verification of logic gates. -do- Multivibrator -do- FLIP-FLOP -do- Counter.	Digital I.C. Trainer.		
99 to 102.	Specific Defices.	Study of 1. 1. Photo devices 2. 2. R.F. heating Introduction heating. 3. 3. Thermocouple & R.T.D. 4. 4. Level controls 5. 5. Tacho generator 6. 6. Alarm ckts. 7. 7. Digital meter and introduction to 'micro-processor' & computer and	Study of Photo devices. -do- R.F. heating ckt. -do- Temperature control ckt. -do- Level control ckt. -do- Tacho generator ckt. -do- Digital	Models of photo device a) a) Operating ckts. b) b) R.F. heating ckt. c) c) Temperature		

		perilherate 8. 8. L.E.D. 9. 9. Remote control.	meter. Demonstratio n on Ferasel computer. -do- L.E.D. Remote control	contro l ckt. d) d) Level contro l ckt. e) e) Tacho genera tors. f) f) Alarm ckt. g) g) Assort ed digital meter. h) h) Person al compu ter.		
103		PROJECT WORK				
104		REVISION				

