

**LIST OF COMMITTEE MEMBERS**  
**FOR THE TRADE OF ELECTRICAL AND ELECTRONICS TECHNICIAN**

1. Members and Experts :
1. Sri T. SUNDARARAJ  
Regional Joint Director of Training  
Guindy, Chennai – 600032.
  2. Sri P. DWARAKA  
Assistant Director  
Guindy, Chennai 600 032.
  3. Sri. T. SUNDARARAJAN  
TRAINING SUPERINTENDANT,  
Industrial Training Unit,  
Thiruvanmiyur, Chennai 600 041.
  4. Tmt, C. JAYASHREE BRAHADHAMBAL  
Assistant Training Officer  
Govt. Industrial Training Unit  
Thiruvanmiyur, Chennai 600 041.
  5. Sri S. KUMAR  
Assistant App. Advisor (Jr)  
Office of RJD, Guindy,  
Chennai – 600 032.
  6. Sri V. MOHAN  
Assistant Training Officer  
Govt. ITI Ambattur,  
Chennai.
  7. Tmt. K. VIJAYALAKSHMI  
Assistant Training Officer  
Govt. ITI  
Thiruvanmiyur.  
Chennai - 600 041.

**COURSE DETAILS 3**

<b>Name of Trade</b>	<b>: ELECTRICAL &amp; ELECTRONIC TECHNICIAN</b>
<b>Qualification</b>	<b>: 10<sup>TH</sup> PASS / FAIL</b>
<b>Age</b>	<b>: 14-40 Years</b>
<b>Duration</b>	<b>: 2 Years</b>
<b>Number of Trainees</b>	<b>: 20</b>
<b>Number of Practical hours</b>	<b>: 32 hrs. per week</b>
<b>Number of Theory Hours</b>	<b>: 8 hrs. per week</b>
<b>Number of Workshop Calculation hours</b>	<b>: 2 hrs. per week.</b>
<b>Number of Engineering Drawing hours</b>	<b>: 2 hrs. per week</b>
<b>Space Required</b>	
<b>Workshop</b>	<b>: 400sq. feet</b>
<b>ClassRoom</b>	<b>: 200 sq. feet</b>
<b>Power Required in KW</b>	<b>: 3 k.w.</b>

No. of Weeks	Trade Theory	Trade Practical	Engg. Drawing	Workshop Calculation and Science
1	<p>Know your Institute Organisation of the Institute, Departments Various trades and functions</p> <p>Safety precautions to be observed in the trade both during 'Theoretical Periods' and Practical hours / workshop hour's.</p> <p>Elementary First Aid</p>	<p>Visit to the Institute the Principal and other teaching staffs</p> <p>Care and safe working habits safety precautions to be demonstrated to the trainees</p> <p>Elementary First Aid Practice - Artificial respiration practice</p>	<p>Importance of Engg. Drawing. Free hand sketching of straight lines, rectangles, square, circles, polygons etc.,</p>	<p>Revision of Arithmetic operations.</p>
2	<p>Hand Tools Identification, specifications uses and maintenance of hand tools.</p>	<p>Demonstration &amp; uses of trade hand tools, Screwdriver cutting player etc.</p> <p>Identification of simple types Screws nuts &amp; bolts, chassis, clamps, rivets etc. Simple fitting practice Demonstration of Pneumatic Screw driver</p>	<p>Free hand sketching of Hand Tools, Reading of simple drawings and concept of dimensions and dotted lines, chain line etc.,</p>	<p>Simple fraction addition - Subtraction - Multiplication &amp; Division</p>
3 and 4	<p>Fundamental of Electricity matter conductor Insulator semi conductor, classifications voltage current, resistance.</p>	<p>Identification of different conductors, Different voltage standards of equipments</p>	<p>Reading of simple hand drawings. Free hand sketching of simple solids with dimension.</p>	<p>Complex fraction simplification by BODMAS Rule.</p>
5	<p>Properties of conductors</p>	<p>Identification of the use of</p>	<p>Conventional symbols of</p>	<p>Introduction to metals</p>

	Insulators and semi conductors, Specific resistance of conductors	conductors and insulators in Electrical field	electrical installation	properties - uses of copper, zinc, tin, Al, Brass, Bronze, Nichrome, Silver
6	Types of wires and cables S.W.G. use of precautions of using cables.	Identification of different cables and their specifications	- Do -	Properties - uses of Solder, Timber Rubber. Different Types of PVC Materials
7	Basic concept of soldering, solders, flux. Soldering types, methods different applications.	Soldering Practice	Free hand sketch of solids viewed perpendicularly to their surface and axes	Properties & uses of cast Iron, Wrought Iron, Plain carbon steel, High Speed alloy steel
8	Common Electrical accessories and their specifications	Demonstration and Practice on fixing common electrical accessories	Circuits and wiring Diagram	Brief description of manufacturing process of steel, copper, Al, plastic and Resins.
9	Concept of Electrical circuits - developments of domestic ckts. Types of circuits as per property as per current flow	Assembling of Small electrical circuits with common accessories.	Example of simple orthographic projections 1 <sup>st</sup> angle.	Metric System, metric Weights and measurement units conversion factors.
10	Ohm's Law - definition, explanation, application use etc.	Verification of ohm's Law using of meters / reading	- Do -	Ratio and Proportion shop problems. Plotting and Reading of simple graphs
11	Principle of Series and Parallel connection / circuits. - necessity / - application / - properties	Connection of series & parallel circuits and testing	Orthographic projection 3 <sup>rd</sup> angle.	Measuring areas of rectangles, squares, Triangles, Circles, regular polygons etc.
12	Kirchhoff's Laws Definition Voltage	Simple verification of Kirchhoff's Law	- Do -	Measuring to tenacity, elasticity, malleability,

	Law/Current Law - Principle Verification and application			brittleness, compressibility and ductility with example
13	Protective Devices - Principle – application – Types – fuses and their types	Identifying different spec. Protective devices in the workshop	- Do -	Algebra Algebraic symbols – calculations
14	Conception of developments of domestic circuit. Alarm and a switch, A lamp, A fan with individual Switches etc / Two way switch	Practice in testing and connecting domestic appliances	Simple isometric drawings. Isometric views of simple objects	Simple algebraic equations and transposition problems
15	Principle of electrolysis Faradays Law of electrolysis cells and Batteries classification. Charging / Grouping of Cells.	Grouping of cells. Care and maintenance of Battery. Study of Battery Charger.	- Do -	Standard formulae algebraic
16	Magnetism – Classification / Properties, methods of magnetizing Types of magnetic materials care and maintenance	Tracing the Magnetic fields of a needle and Bar Magnet.	Diagram of electro magnets.	Simple equations. simultaneous
17	<b>ALLIED TRADE Practice</b> Fitting Practice Sheet metal Practice	Use of different hand tools	Familiarising and sketching the details of components	Work – Power – Energy Force and their Units. Description – Definition – simple problems.
18 and 19	Principle of Electro magnetism Cork Screw	Testing of relays and electric door bell	Detailed diagram of relay and calling bell.	- Do -

	rule, right hand and left hand rules. Solenoid and its properties. Hysteresis. Principle of electro - magnetic induction Faraday's Law, Lenz's Law. Relays - Types - Functions				Calculation of Area - Volume weight of simple solids like cubes - hexagonal prisms - shop problems.
20	Principle of DC Generator Fleming's right hand rules. Use of ship - ring and split rings use of commutator	Dismantling of DC Generator. Identification of parts	Use of drawing Instruments T square drawing board construction of simple figures and solids with dimensions.		Meaning of Horse Power and Brake horse Powr
21 and 22	Types of DC Generators - Function types - Parts. EMF equation - self excitation and separately excited Generators - Practical uses. Use of ohm meter and Megger	Demonstration and use of ohm meter Megger.	Use of different types of scales in inch and millimeters. Lettering numbers and alphabets.		
23 and 24	Types of DC Generators series generators and types. - Shunt Generators - Compound Generators and Types - Their Applications - Simple problems on generator types, capacity etc.	Study the parts of a Dismantled DC Generator. - Voltage Building with panel Board - Measurement of series shunt field resistances Identification of terminals of DC Generators.	- Do -		Heat and Temperature thermometric Scales Fahrenheit, Centigrade and their conversion Kelvin Reamer Celsius.

25 to 27	<p>Basic DC Motor – principle of DC Motor terms used in DC Motor torque, speed, Back emf etc., their relation's practical application problems.</p> <p>Types, characters and practical application of DC motors</p> <p>Types of speed control, their advantages and disadvantages</p>	<p>Demonstration and practice in Identification and testing of DC motor parts and terminals, running speed controls and reversing</p> <p>Study of the characteristics of DC motor</p> <ul style="list-style-type: none"> <li>- study of 3 point &amp; 4 point starters.</li> <li>- Connection, starting speed control of starters with motors.</li> </ul> <p>Use of Tachometers</p> <p>Revolution measurement – routing maintenance.</p>	<p>Free hand sketching of Plan and elevation of simple objects hexagonal bar square bar, circular bar, Tapered bar and Hollow Bar etc.</p>	<p>Meaning of Friction</p> <ul style="list-style-type: none"> <li>- Effect of friction</li> <li>- Angle of Friction</li> </ul> <p>Density and specific gravity.</p>
28 to 31	<p>Explanation of electrical wirings. Types of wiring both domestic and Industrial specifications. Specifications for wiring accessories – wire cables, principle of laying out in domestic wiring – testing by megger. Earthing – Types of Earthing.</p>	<p>Fixing of switches – holders plugs etc in TW board, Identification and use of wiring accessories.</p> <p>Practice in CTS wiring – PVC wiring – Repairing of Domestic appliances and Testing. Plate and pipe earthing</p>	<p>Layout of DC panel board arrangements</p> <ul style="list-style-type: none"> <li>- DC Machine parts diagrams</li> <li>- Starter diagrams</li> </ul>	<p>Measuring of stress strain modulus of elasticity</p>
32 to 34	<p>AC Circuits – comparison of AC and DC. Advantages of AC. AC generation – RMS peak and average values.</p> <p>Form factor In phase, out of phase Impedance, Power</p>	<p>Demonstration of Sine waves – study of behaviour of R, XL, Xc in AC circuits series and parallel.</p>	<p>Graphic symbols for rotating machines and transformers.</p>	<p>Simple problems on liner, angles, triangles and circles.</p>

	factor True power, Reactive power, Apparent Power				
<b>35 and 36</b>	Transformer – explanation and definition of transformer Classification of transformers EMF equation Efficiency transformer winding and connections – cooling – protective devices.	Identification and Testing of different transformers. Connections of Transformers. Efficiency of Transformers use of PT & CT.	Drawing of simple electrical ckts using electrical symbols.	Transformer Calculations	
<b>37 to 39</b>	AC motors – explanation. Construction of Single phase motors – working principle – classification of single phase motors.	Identification of Single-phase motors (squirrel cage type) dismantling and assembling. Starting of single phase motors and reversing.	Parts Diagrams of AC Motors. Drawing development diagram for single phase AC Motors.	Trigonometry functions use of trigonometric tables. Applied problems	
<b>40 to 42</b>	Poly-phase circuits concept star and delta connections Line and Phase voltages. Current, power in 3 phase circuits. Advantages of Poly-phase circuits	Current voltage and power measurement in poly phase circuits. Measurement of energy in single phase and poly phase.	Diagrams related to electrical Trades.	- Do -	
<b>43 and 44</b>	3 phase motors – construction principles – types – characteristics – starting and controlling devices.	Identification of 3 phase motors. Dismantling and assembling. Starting of 3 phase motors and reversing.	Diagram of connection to a squirrel case induction motor.	Applied workshop problems involving, use of Logarithmic tables	
<b>45 to 47</b>	Measuring Instruments Explanation of measuring instruments – working principle function types /	Demonstration of scales in meter for reading Use of different meters	Sketching the connection diagram of controlling protective devices for induction motors.	Different forms of energy heat mechanical and electrical. Conversion from one to another	



	classification Extension and calibration			Front panel of a analog multi-meter	
48 to 50	Illumination - Types of Illumination of lamps. Characteristics wattages, fixing places.	Construction and testing of different circuits with different lamps etc.	Sketching of simple objects related to trades.	Problems on estimation of electrical systems.	
51	- Revision -	- Revision -	- Revision -	- Revision -	
52	- Test -	- Test -	- Test -	- Test -	
53 and 54	<b>Atomic Structure</b> Atom and Molecule - Atomic Structure. Atomic Number. Conduction band Conductors & Semi conductors and insulators Electronic Components - Types - Active / Passive	Identification of different electronic components Active / Passive	Electronic Symbols as per ISI	Problems on electrical circuits. Conversions of electrical of electrical units. Ohms - volts - ampere - watt - hertz etc.	
55 and 56	<b>Semi Conductors</b> Definition - Types development of PN Junction Barrier Potential	Introduction to Semi conductor Data Book. - Identification and using	- Do -	- Do - Scalar and Vector systems. Introduction.	
57 to 60	<b>Diodes:</b> Definition - Function Principle of operation need etc. Characteristic - types - simple diode varacter diode, LED zener diodes. Classification of diodes -	VI Characteristics of diode Identification of different diodes Testing of diodes	Different Rectifier Circuits Half wave, Full wave and Bridge	Rectifier Problems.	

	<p>Application of different diodes Diode as Rectifier Half wave Rectifier, Full Wave, Bridge rectifiers. Application of Rectifiers comparison Testing of diodes Characteristic of Zener Diode, LED etc.</p>	<p>Assembling and Testing of Rectifiers. VI Characteristic of Zener diode, LED</p>	
<p><b>61 to 64</b></p>	<p><b>Transistors</b> Construction, Function principle of operation. Application and types Identification and Testing of different transistors. Types of Transistor biasing - forward / reverse. Transistor configurations CB, CE &amp; CC. Alpha &amp; Beta of Transistor Transistor Characteristics - Input / output</p>	<p>Identification and Testing of different Transistors. Use of Transistor data book</p>	<p>Symbols of different transistors Calculations on Alpha and Beta of Transistors</p>
<p><b>65 to 68</b></p>	<p><b>Amplifier</b> Basic Transistor Amplifier conduction for Amplification classification of Amplifiers Comparison characteristics of different amplifiers. Advantage and disadvantage. Application and limits of different amplifier. Frequency response of</p>	<p>Testing of - Simple amplifier - Different types of Amplifiers</p>	<p>Amplifier Circuits - Schematic (General) - Typical (Practical) Problems in Amplifiers - Voltage gain, current gain and power gain Calculations in decibels Conversion from decibel to simple and vice versa</p>

	<p>Amplifier – Voltage gain and power gain of amplifiers.                  Audio Amplifiers                  - Loud Speakers                  - Types                  - PA Systems                  Bass, Treble &amp; Tone Controls etc                  Stereo Amplifier / Mono Amplifier                  Application of various amplifiers in electronic systems</p>			
<p><b>69 to 71</b></p>	<p><b>Power Supply</b>                  Definition – necessity of application – Types of construction – types of function of simple zener Transistorised regulator                  Advantage of regulated power supply</p>	<p>Construction of                  - Simple Power supply                  - Regulated Power supply</p>	<p>Block diagram of different power supply                  Typical circuit diagram</p>	<p>Power supply Calculations</p>
<p><b>72 to 74</b></p>	<p><b>Oscillator</b>                  Definition of oscillation – oscillator – conduction of oscillation – various types of oscillator – classification of oscillators.</p>	<p>Construction and testing of different oscillators</p>	<p>Block diagram of oscillator                  Different oscillators</p>	<p>Frequency calculations                  Time &amp; frequency                  Oscillator frequency calculations</p>
<p><b>75 and 76</b></p>	<p>Modulation / Demodulation                  Definition of Modulation                  Types / Application of AM, FM, PM                  Definition of modulation,</p>	<p>Construction and Testing of simple modulator                  Testing of detector stage.</p>	<p>Block diagram of AM and frequency modulator</p>	<p>Problems in modulators involving modulation index, percentage of modulation modulated output</p>

	Index, Modulation Depth, Frequency swing etc. Simple Block diagram / circuit diagram				
77 to 79	<b>Special Semi Conductor devices</b> Explanation of Characteristics uses of UJT, FET, MOSFET, SCR, DIAS, TRIAC, Integrated circuits.	Demonstration of characteristics of special semiconductor devices	Symbols of different special components and circuit diagrams	Conversions in electrical units - revision	
80 and 81	<b>Oscilloscope</b> Definition – Types – Use – Functions of different oscilloscopes CRT Block diagram of CRO	Testing a circuit / Amplifier / Oscillator using CRO	Block diagram of different oscilloscopes Front panel diagram of CRO	Frequency calculations from wave forms	
82 and 83	Explanation of Pulse and Wave shaping circuits Differentiator / integrator Circuit Time constant (RC, RL) Multi Vibrators. Astable / monostable / Bistable Multivibrators	Testing of a Differentiator / Integrator Schmitt trigger etc.	Block diagram of Function generator, Signal generations etc.	Revision of Wave form Calculations – RMS to peak average etc, and verify the results from oscilloscope scales.	
84 and 85	<b>Timer</b> Definition – Application Block diagram of Timer Transistorised / IC Version	Construction of Timer circuits using 555	Front Panel diagram of different equipments.	Timer calculations	
86 to 88	<b>Operational Amplifier</b> Principle – definition – construction – application working of operational	Construct and test a circuit- using Op – Amp.	- Do -	Operational calculations	amplifier

89 to 92	<p>amplifier. Types of applications</p> <p><b>Digital Electronics</b>                  Explanation of Digital System – comparison with analog – advantages. Applications, Number system, Binary Hex, Octal conversion. Basic logic gates – Truth tables Multi vibratory memory Flip Flop - counter</p>	Construction and Testing of different Logic gates	<p>Different diagrams</p> <ul style="list-style-type: none"> <li>- Logical diagrams involving different gates</li> </ul>	<p>Boolean Algebra</p> <ul style="list-style-type: none"> <li>- Introduction</li> <li>- Application</li> </ul>
93 to 97	<p>Trouble shooting method different electrical appliances – like Fan – Mixie – Grinder – Iron Box – Heater and Hair Dryers etc.</p>	<p>Trouble shooting of various electrical gadgets using trouble shooting circuit</p>	<p>Trouble shooting chart Service flow diagrams - Problem tree diagrams of various electrical systems.</p>	<p>Electrical data of different systems                  Comparison – selection advantages etc.</p>
98 to 101	<p>Trouble shooting method of different Electronic appliances etc.,                  Like Radio / 2 in one / Amplifiers / CD Players / Black &amp; White and Color Televisions</p>	<p>Trouble shooting of various electronic gadgets using service flow diagram etc.,</p>	<ul style="list-style-type: none"> <li>- Do -</li> <li>- of various electronic systems</li> </ul>	<ul style="list-style-type: none"> <li>- Do -</li> </ul>
102	- Revision -	- Revision -	- Revision -	- Revision -
103	- Test -	- Test -	- Test -	- Test -
104	- Common Test -	- Common Test -	- Common Test -	- Common Test -

## ACHIEVEMENTS

After completion of Training, the Trainee shall be able to :

1. Service and Domestic Electrical Appliances
2. Locate and rectify the defects in Domestic Electronic gadgets
3. Install Connections / Wiring to any Electrical Systems
4. Solve simple Electrical Calculation related to an electrical Wiring

**INDUSTRIAL SCHOOLS****TRADE SYLLABUS – REVISED**

**Name of the Trade** : **ELECTRICAL AND ELECTRONICS  
TECHNICIAN**

**SPACE REQUIRED:**

(1) Workshop/Lab : 400 sq. ft.

(2) Class Room : 200 sq. ft.

**Trade Practical** : No Change

**Trade Theory** : No Change

**Engineering Drawing** : No Change

**Workshop Calculation** : No Change

**LIST OF TOOLS & EQUIPMENT**

**For the trade of ELECTRICAL AND ELECTRONICS TECHNICIAN**

(For a batch of 20 trainees)

**TOOL KIT**

<b><u>Sl.No.</u></b>	<b><u>Name of the item</u></b>	<b><u>QUANTITY REVISED</u></b>
1	Combination Plier 15cm insulated	10
2	Long nose Plier 15cm insulated	10
3	Tweezers 10cm	10
4	Neon Tester (Electrician)	10
5	Screw Driver set 6 pieces	10
6	Watch maker screw driver set	10 set
7	Knife electrician	10
8	Adjustable spanner	10
9	Rule wooden 4 fold 60mm	10
10	Punch centre 150mm x 9mm	10
11	Hammer cross pein 115 gm with handle	10
12	Firmer chisel wood 12mm	10
13	Gimlet 6mm	10
14	Bradawl	10
15	Soldering iron 65 w	10

## SHOP TOOLS, INSTRUMENTS AND MACHINERY

16	Spanner 150mm adjustable 15° as clay	2
17	Blow lamp 0.5 litre	2
18	Melting pot	1
19	Ladder	1
20	Chisel cold flat 12mm x 20mm	2
21	Chisel wood firmer 25mm and 6mm	4
22	Drill machine hand 0 to 6mm capacity	2
23	Electric drill machine portable 6mm capacity	1
24	Raw plug tool and bit	2 set
25	Bearing puller	1
26	Multi meter analog – big size	5
27	K.W. Meter	1
28	Single phase power factor meter	1
29	Frequency meter	1
30	Tong tester (Clipon meter)	1
31	Techno meter or revolution counter with stop watch	1
32	Crimping tool	1 set
33	AC energy meter (single phase 5 amp 230 V)	1
34	Megger 500 V	1
35	Lockers with 3 drawers (standard size)	2
36	Bench working 2.5 x 1.2 x 0.75mts.	4
37	Motor series	1
38	Motor shunt	2
39	Motor of AC squirrel cage 3 phase 400 V 50 cycles 2 to 3 HP with star delta starter & triple pole iron clad switch fuse	1
40	Motor AC phase – wound ship ring type 5 HP 400V 3 phase 50 cycles with starter and switch	1
41	Motor DC compound wound 220V 2 to 3 HP with starter and switch	1
42	Motor AC single phase 230V 50 cycles series type with starter/switch 1HP	1
43	Motor AC single phase 230V 50 cycles capacitor type with starter switch 1HP	1
44	DC shunt generator 2.5 KW 220V with control panel	1
45	DC compound generator 2.5 KW 250V with control panel including field rheostat voltmeter, ammeter and circuit breaker	1
46	Variable auto transformer 0 – 250V 5 amps	2
47	Rubber mat 180 x 45 x 2.5 cm	3
48	Rubber gloves pair	1 set
49	Multi-meter digital small	5
50	Power supply 0 – 30 V 2 A	4



51	RF signal generator	4
52	Cathode ray Oscilloscope 50 MHz	4
53	Function generator	4
54	Digital IC trainer	2
55	Analog IC trainer	2
56	Logic Probes	2
57	Fire bucket	3
58	Fire extinguisher	1
59	First aid box	1
60	Almirah 2.5 x 1.2 x 0.5 mts.	2

**SYLLABUS  
FOR  
ELECTRICAL AND ELECTRONICS TECHNICIAN**

**UNDER CODE OF REGULATIONS FOR  
INDUSTRIAL SCHOOLS**

**AS APPROVED  
BY**

**DEPARTMENT OF EMPLOYMENT AND TRAINING  
CHEPAUK,  
CHENNAI – 600 005.**