

SYLLABUS FOR (TRADE NAME) : MECHANIC (VIDEO)

UNDER CODE OF REGULATIONS
FOR INDUSTRIAL SCHOOLS : SCVT

AS APPROVED BY

DEPARTMENT OF EMPLOYMENT
& TRAINING, CHEPAUK
CHENNAI - 600 005.

..... 2004

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LIST OF COMMITTEE MEMBERS

FOR THE TRADE MECHANIC VIDEO

1. Members and Experts
- : 1. T. Sundar Raj
Regional Joint Director, Guindy
Department of the Employment & Training,
Chennai.
 - 2. P. Dwaraka
Assistant Director, Guindy
Department of the Employment & Training
Chennai.
 - 3. R. ULAGA NAMBI M.A.,D.T.T., D.E.E.E
Principal
Agasthya Samee Industrial Training School
Maduranthagam.
 - 4. A. Selvaraj D.E.E.E
Instructor
Agasthya Samee Industrial Training School
Maduranthagam.

COURSE DETAILS

Name of Trade : **MECHANIC VIDEO**

Qualification : **10TH PASS / FAIL**

Age : **14-40 Years**

Duration : **1 Year**

Number of Trainees : **20**

Number of Practical hours : **32 hrs. per week**

Number of Theory Hours : **8 hrs. per week**

Number of Workshop Calculation hours : **2 hrs. per week.**

Number of Engineering Drawing hours : **2 hrs. per week**

Space Required

Workshop : **400sq. feet**

ClassRoom : **200 sq. feet**

Power Required in KW : **3 k.w.**

MECHANIC VIDEO TRADE TIME TABLE

ENGINEERING DRAWING

FRIDAY → Morning 9.30 - 11.30 A.M → E. D → 2 Hrs / Week

WORKSHOP CALCULATION & SCIENCE

Monday & Tuesday → Morning 11.00 - 12.00 P.M → W / Cal & Science → 2 Hrs / Week
 Wednesday & Thursday

TRADE THEORY

Monday & Tuesday → Morning 11.00 - 12.00 P.M → Theory (1 1/2 Hrs . Day)
 Wednesday & Thursday }
 Saturday → Morning 9.30 - 11.30 P.M → Theory (2 Hrs. Day)
 8 Hrs / Week

TRADE PRACTICALS

Monday & Wednesday → Noon → 12.00 - 5.30 P.M → Practicals (5 Hrs . Day)
 Friday → Noon → 11.30 - 5.30 P.M → Practicals (5 1/2 Hrs . Day)
 Saturday → Noon → 11.30 - 4.30 P.M → Practicals (4 1/2 Hrs . Day)
 Tuesday & Thursday → Noon → 11.30 - 5.30 P.M → Practicals (6 Hrs . Day)
 32 Hrs / Week

Note : Daily Afternoon 1.00 - 1.30 P.M Lunch

SYLLABUS FOR THE TRADE OF MECHANIC VIDEO

Period of Training : 1 Year

WEEK NO.	TRADE THEORY	TRADE PRACTICAL	W.S	ENGG.DRG
1.	<p>Familiarisation with Trade Instructor, Supervisor, Foreman, Principal. Activities, of the Trade, Future Prospect etc. Duties and Responsibilities of Trainees, Safety measures to be observed. Elementary First Aid. Concept of Standard & Standardisation</p>	<p>Visit to the different sections of the Institute. Demonstration on elementary first aid. Artificial Respiration. Handling of emergencies like Electric Shock, Fracture Demonstration & Practice.</p>	<p>Fraction – addition, subtraction, multiplication & division. Unit & measurement, fundamental & derived unit</p>	<p>Free hand sketching Projection of Solid & hollow object. Lettering Practice.</p>
2.	<p>Matter, Atoms-Structure, Importance of Physics-Basic Principles – Work, Power, Energy.</p>	<p>Demonstration Trade hand tools. Identification of simple types – screws, nuts & bolts, chassis, rivets etc.,</p>	<p>Matter, mass, volume, density & specific gravity.</p>	<p>Free hand sketching of simple solid cube, rectangular block cylinder etc.,</p>
3.	<p>Identification of Trade, Hand tools – Specification and uses, Cares and maintenance of Hand Tools. Fundamentals of Electricity & Electron Theory – Solar System – Elements, Free Electrons Fundamental Terms, Definitions, Units & Effects of Electric Current.</p>	<p>Practice in using steel rules, cutting plier, screw drivers etc., Skinning the cables, and joint practice on single strand.</p>	<p>Decimal addition, subtraction, multiplication & division. Conversion of decimals to common fraction. Motion displacement speed, velocity acceleration.</p>	<p>Use of different types of line & symbol for drawing.</p>

WEEK NO.	TRADE THEORY	TRADE PRACTICAL	W.S	ENGG.DRG
4.	<p>Radio Receiver & tape Recorder</p> <p>Basics of Electricals & Electronics</p> <p>Atomic structure</p> <p>Source of Electricity - Cells</p> <p>Current & Voltage (Direct & Alternating)</p> <p>Magnet & Electromagnets</p>	<p>Drawing of electrical, electronic symbols</p> <p>Use of different tools & equipments.</p> <p>Soldering & de soldering</p> <p>Practice on old PCB's</p> <p>Practice of drawing simple locks, including diagrams of electronic circuits (Radio/TV) Layout</p> <p>Schematic & wiring</p> <p>Relay: Electro Magnet, Electric Bell.</p> <p>Connections of Ammeter & Voltmeter in a circuit</p> <p>Practice in using Multimeter & R.F.Signal Generator.</p> <p>To Measure the value of resistance using multimeter</p> <p>To measure current flowing in a circuit</p> <p>Verification of Ohms law & Kirchoff's Laws</p> <p>Finding the value of current & total resistance for parallel & series connections of resistances.</p>	<p>Reduction of common fraction to decimal.</p> <p>Motion displacement speed, velocity, acceleration.</p> <p>Percentage and its application.</p> <p>Weight, gravitation and centre of gravity.</p> <p>Mensuration area of square, triangle, circle and ellipse.</p> <p>Evaporation, boiling, condensation freezing.</p> <p>Effect of pressure on boiling and freezing point.</p> <p>Work, power, energy, source of energy,</p>	<p>Free hand sketching nut bolt rivet and washers etc.,</p> <p>Free hand sketching of screw and screw threads.</p> <p>Simple ortho graphic projecton 1st angle and 3rd angle.</p> <p>Drawing different types of Mechanism of Tape Recorder diagram of Tape Recorder.</p> <p>Sketching of different views of simple solid, hollow bodies.</p>
5.	<p>Measuring Instruments</p> <p>Functions and uses of : Ammeter, Voltmeter & Multimeter.</p> <p>R.F. Signal generator.</p>			
6.	<p>Resistance</p> <p>Concept & Types</p> <p>Resistance in series</p> <p>Resistance in parallel</p> <p>Resistance in network etc.,</p> <p>Ohm's Law & Kirchoff's Law</p>			

WEEK NO.	TRADE THEORY	TRADE PRACTICAL	W.S	ENGG.DRG
7.	<p>Inductance</p> <p>Definitions and meaning of self and mutual inductance, choke, IFT.</p>	<p>Testing of different types of coil. Behaviour of L in AC & DC circuit.</p>	<p>Square root of perfect square. Square root of whole number & decimal.</p>	<p>Isometric views of simple object such as cubes, rectangular block, prism etc.</p>
8.	<p>Capacitance</p> <p>Capacity – Types of Capacitors (Fixed & Variable).</p>	<p>Testing of capacitor with the help of multi meter / circuits.</p>	<p>Horse power indicated horse power, brake horse power.</p>	<p>Ckt Diagrams of CB, CC & CE Connections.</p>
9.	<p>Transformer</p> <p>Types of Transformers (Step up, Step down, auto IFT'S etc.)</p>	<p>Testing of transformers with the help of multi meter.</p>	<p>Transformer's Problems</p>	<p>Drawing of simple figure and solid with dimensions & titles.</p>
10.	<p>Resonance & Oscillators</p> <p>Importance of resonance</p> <p>Tuned circuits</p> <p>Advantages and disadvantages of Transformers L.C. circuits (Series and parallel)</p> <p>Oscillator : Types & uses</p>	<p>To construct a resonance circuit</p> <p>Preparation of (Pie) failters for Battery eliminators</p> <p>Construction & testing of an oscillator</p>	<p>Simple machine & mechanical advantage.</p> <p>Simple equations & transposition problems.</p> <p>Stress & strain .</p> <p>Modules of elasticity</p> <p>ultimates strength. Factor of safety.</p>	<p>Use of drawing instruments, Tsquare, Drawing boards.</p> <p>Use of different types of scales, inch and mm</p> <p>lettering, number and alphabets.</p>

WEEK NO.	TRADE THEORY	TRADE PRACTICAL	W.S	ENGG.DRG
11.	Microphones & Speakers Principles & Construction of : Microphone, Earphone, Loudspeaker Vacuum Tubes Circuits and uses of : Diode, Triode, Tetrode, Pentode, Valves.	Testing of Microphone, Earphone and Loud speaker with the help of multimeter - do -	Electric Power Energy Calculation - do -	Drawing of simple figure & solid with dimensions & titles. Construction of Micro Phone & Loudspeaker
12.	Semi Conductors Elementary knowledge of : Semi conductors (P.Type and N Type) P.N., junction, Diode and Zenor diode.	Semi Conductors Elementary knowledge of : Semi conductors (P. Type and N Type) P.N., junction, Diode and Zenor diode. NPN and PNP Transistors Common emitter, common Collector, common base	Standard formulas. Simple simultaneous equations with two unknown quantities. Pressure, atmospheric pressure, absolute pressure, gauge pressure and vacuum.	Symbols of all Electronic Components. Projection of Square, Circle, Polygon etc.,
13.	NPN and PNP Transistors Common emitter, common Collector, common base.	Recognition, Installation & testing of different types of Antenna. Testing of balun transformer.	Series R,L,C Circuit	Projection of solid and hollow object.
14.	Radio Receiver Transmission of Radio signal Brief description of wave propagation Need for modulation: Amplitude modulation Frequency modulation Diode detection FM detector Antenna.	Assembling & Testing of Detector Circuit.		Symbol of all electronic components.

WEEK NO.	TRADE THEORY	TRADE PRACTICAL	W.S	ENGG.DRG
15.	<p>Power Supply Director (D) Alternate (A) Regulated and stabilized power supply.</p> <p>Super - Hetrodyne Receiver (Transistorize) Principles of hetrodyne & superhydrodyne Block of diagram of super hetrodyne receiver & function of Circuits & function of: RF Amplifier Mixer & converter stage with local oscillator</p>	<p>Circuit Tracing Assembling of AC power supply. Fault finding with voltage check</p> <p>Assembling Voltage checking Tracing & fault finding of RF Section IF Section Detector Mixer Local oscillators Band change wiring (Three Banding)</p>	<p>Chemistry Of Common Elements Such As Carbon, Oxygen, Hydrogen & Halogen.</p> <p style="text-align: center;">- do -</p> <p>Radio Receiver $\lambda = C / F$ Image Frequency, Local Oscillator Frequency Problems</p>	<p>Circuit diagram of different types of Amplifiers.</p> <p>Circuit diagram of Oscillators & Regulated power supplies.</p> <p>Block diagram of Super Hetrodyne Radio Receiver.</p>
16.	<p>Tape recorder & Compact Disc Magnetic Recording Principles of magnetic recording, various processes of sound recording</p>	<p>To study the function of Tape recorder's, and jacks.</p>	<p>Logarithm Reading from table determination of characteristic & anti logarithm.</p>	<p>Block diagram of Super heterodyne receiver.</p>
17.	<p>Biasing D.C Bias - A.C Bias Optimum Bias level Bias Frequency</p>	<p>Tracing of biasing circuits Testing of various types of biasing circuits.</p>	<p>Application of logarithm, Geometry - prline, angle, triangle and circle.</p>	<p>Complete circuit diagram of Radio receiver.</p>

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19.	<p>Electronic Circuit Microphone Recording & play back head Erase head, Pre- Amplifier Driver stage Automatic level control Bias oscillator Power supplies Motor circuit.</p>	<p>Tracing / Wiring of Electronic circuits.</p>	<p>The chemistry compound like carbon di oxide, ammonia, freon Graph object & use of plotting graph. Interpolation. Properties and use cast-iron, wrought iron, plain carbon steel & alloy steel.</p>	<p>Isometric view to orthographic views. Orthographic views to isometric views.</p>
20.	<p>Driving Mechanism Tape driving mechanism Capstan Rewinding, Fast forward winding Speed control, Breaks etc., Complete circuit diagram of a Tape Recorder</p>	<p>Assembling of a mechanical deck of a tape recorder Checking mechanical coupling system Adjustment of heads & HF Biasing Cleaning & oiling</p>	<p>Effect of alloying elements on properties of metals. Properties of copper, zinc, lead, tin, aluminium etc.,</p>	<p>Ckt Diagram of regulated Power Supply.</p>
21.	<p>Two-in-One Various connection with circuitry Complete circuit diagram Comparison of different types of tape recorder / two in one</p>	<p>Wiring if a two - in - one Comparing a two-in-one with a standard recorder Assembling of various additional switches required for two-in-one.</p>	<p>-do-</p>	<p>Circuit diagram of Tape - recorder.</p>

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22.	<p>Compact Disc Explanation of Drive mechanism Explanation of circuit involved.</p>	<p>Checking of mechanical coupling system Tracing & Testing electronic circuitry.</p>	<p>Unit Conversion Current - A, mA, μA, nA Voltage - mv, v, kv Resistance - Ω, kΩ, MΩ</p>	<p>Driving mechanism of CD & Block diagram of CD Player.</p>
23.	<p>Fault Finding Procedure of fault finding Different types of faults & their remedies in Tape Recorder, Two-in-one Compact disc</p>	<p>Fault finding & rectification in electrical & electronic circuits of Tape Recorder Two-in-one Compact Disc Fault finding & servicing of mechanical parts of Desks.</p>	<p>Ohms law problems V.I.R Power</p>	<p>Block diagram of CD Player</p>
24.	<p>Television Tuner Section, RF Amplifier Mixer Explanation of SCR supply Fine tuning control Trap circuit</p>	<p>Recording of voltage at various test points in turner Detection of fault and their rectification</p>	<p>- do -</p>	<p>Drawing of different types threads, nuts, bolts, locking devices, keys and cutters.</p>

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25.	IF & Video Detector Stage Cascade amplifier: its utility Staggered tuning Picture & Sound IF Signals Function of video detector.	Tracing of IF & Video Detector stage Recording of voltage check at various test points Fault finding.	Series, Parallel Combination connection of resistors	Drawing of different types threads, nuts, bolts, locking devices, keys and cutters, riveted joints.
26.	Audio System Limiter Discriminator Sound IF detector Audio Amplifier Volume & Tone controls	Tracing of Audio section Recording of voltage at various test points. Detection & rectification of faults.	Inductor's Problems Capacitor's Problems	Block diagram of TV Receiver. Circuit diagram of Video Section.
27.	Video amplifier Amplification of video signal Contrast control Brightness control.	Tracing of video amplifier Studying effects of contrast & Brightness control on voltages of CRT. Detection & rectification of faults.	Transistor's Biasing	Construction of Picture Tube. Circuit diagram of different types of AGC.
28.	A.G.C. System	Delayed A.G.C circuit Keyed A.G.C. circuit	- do -	Circuit diagram of Sync separator.
29.	Sync Separation Section Separation of sync pulses from composite video signal Separation of vertical & horizontal synchronous pulses from each other	Tracing of sync circuit Recording of voltage check at various test points Detection & rectification of faults.	- do -	

WEEK NO.	TRADE THEORY	TRADE PRACTICAL	W.S	ENGG.DRG
30.	Vertical section Vertical oscillator Height & vertical hold control Vertical linearity control.	Tracing of vertical section Studying the effect of linearity Height control on picture & circuit voltage Detection & rectification of faults.	Frequency Calculation in all types of Oscillators	Drawing of details components from assemblies.
31.	Horizontal section Horizontal Oscillator Automatic frequency control Boost voltage E.H.T Horizontal Oscillator Horizontal O / P Section EHT Section.	Tracing of horizontal section & EHT stage Recording of voltage at test points Common faults finding & repairing Tracing & Testing of Horizontal Oscillator. Tracing & Testing of EHT Section.	Circuit diagram of Horizontal Section & EHT Section.	Circuit diagram of Vertical section.
32.	Typical faults Explanation of typical faults on TV Important case studies	Creation of possible faults in TV & studying their effects on picture & sound Fault finding & repairing.	Simple algebraic formulas problems.	- do -
33.	Study of complete circuit Study of various circuits	Tracing of complete circuit Fault finding & repairing	- do -	Sound IF Amplifier & Output Section.

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34.	Black & White T. V Concept of T.V. System Block diagram of television system Electromagnetic wave Output to speaker and picture tube	- do -	Algebraic equation with Single & Two unknown quantities.	Block diagram of Black & White TV Picture Tubes Construction.
35.	Use of Instruments Pattern Generator Oscilloscope Digital Multimeter	Practice in using instruments	- do -	- do -
36.	VHF Propagation & T.V Standards TV Receiving Antenna: Dipole - Folded Dipole Antenna impedance, Balun Receiver input impedance	Testing of Antenna Joining of transmission line Detecting & Rectifying faults due to transmission line & Antenna.	Kirchoff's law problems	Drawing of different types Antenna.
37.	Scanning & Pulse Generation Frame & field: Their frequencies as per standards Number of horizontal lines per frame Vertical & horizontal blanking & equalizing pulses Separation of vertical & horizontal synchronous pulses from composite video signal	- do -	- do -	- do -

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38.	Block Diagram of T.V Block Diagram of T.V receiver showing all the stages.	Studying the effects of controls on picture tube & band system Fault locating through block diagram.	- do -	Front panel diagram of pattern generator Oscilloscope & Digital Multimeter.
39.	Picture Tube & Yoke Assembly Electron gun Electrostatic Focusing Electromagnetic deflection	Study of base connections of picture tube Fixing of EHT leads Fixing of Yoke Assembly on picture tube Fault detection & rectification in picture tube & Yoke Assembly	Kinetic energy & potential energy. Ratio, proportion & its application	- do -
40.	Low Voltage Power Supply Detailed explanation of low voltage power supply.	Tracing of low voltage power supply.	- do -	Electricals Wiring Diagram. (Extension Board)
41.	Colour T.V. Introduction History of Colour TV Compatibility with B & W TV Colour signal, band width & interference.	- do -	Trigonometry Formulae & Functions & Problems	- do -
42.	Light & Colour White light Colour fundamentals Primary colours Colour characteristics Colour pictures	Showing white light a combination of seven colours using disc	- do -	- do -

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43.	Colour TV System Colour system (NTSC, PAL & SCAM) PAL colour system Luminance & Chroma signal Colour Standards	Recording various grid voltages.	Unit of Real, Specific heat of solids, liquids & gases Heat gained & loss	Construction of Colour Picture Tube.
44.	Colour Picture tube Types of tubes, colour guns & their working.	Study of base connections of Picture Tube Detecting & rectifying faults due to picture tube.	- do -	-do-
45.	Block Diagram Complete block diagram of colour TV Functions of Tuner section Video IF Video Amplifier Sound section, colour killer section Chroma section Sweep section Burst amplifier, power supply	Tracing of various blocks Recording of voltages at various test points	Estimating & costing applied problems.	Code of practice for general engineering drawing by I.S.I

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46.	Switch Mode Power Supply Switching regulators Switching converters Voltage comparator Ramp generator Circuit of SMPs	Tracing of SMPs Recording of voltages at various check points Detection & rectification of faults	α, β, δ	Circuit diagram of Electronic Tuner.
47.	Tuner section- VHF / UHF Tuner Frequency changer , AFT	Tracing of Tuner Circuit Voltage measurements at various points	Metric system weight and measurement unit and conversion factors problems.	- do -
48.	Sound Section Sound I.F amplification Audio Output.	Tracing of circuit Voltage measurement at various test points Common faults finding & repairing	- do -	Reading & Plotting of Graphs
49.	Video Amplification section Buffer Amplification Video amplification	Tracing of circuit Study the effects of contrast & brightness control Measuring voltage at various test points	Revision	- do -

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50.	Common Section Colour composite signal IF Amplifier, SAW filter Inter carrier sound IF signal	Tracing of circuit Voltage measurement at various test points. Common faults finding & repairing	Revision Test	Revision
51.	Entrepreneurship Project formulation Budgeting Finances (including loans) Marketing Store Keeping.	Preparation of sample project Budget preparation Account Keeping Practice in Market survey Stock taking & Verification	Revision Test	Revision Test
52.	Model Trade Test			

INDUSTRIAL SCHOOLS

TRADE SYLLABUS – REVISED

Name of the Trade : MECHANIC (VIDEO)

SPACE REQUIRED :

(1) Workshop/Lab : 400 sq.ft

(2) Class Room : 200 sq.ft

Trade Theory : No change

Trade Practical : No change

Engineering Drawings : No change

Workshop Calculations : No change

List of Tools & Equipments
For The Trade of MACHNIC (VIDEO)

FOR A BATCH OF 20 TRAINEES

TOOL KIT

<u>Sl.No.</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u> <u>REVISED</u>
1	Combination plier 15 cm insulated	10
2	Long nose plier 15 cm insulated	10
3	Diagonal plier 15cm insulated	10
4	End cutting nipper 15cm insulated	10
5	Tweezers 10cm insulated	10
6	Heat sink plier insulated	10
7	Neon tester	10
8	Knob screw driver	10
9	Screw driver set of 6	10
10	Alignment kit	10
11	Wire stripper	10
12	Soldering iron 25 w soldron	10
13	Portable Multimeter	10

WORKSHOP TOOLS & EQUIPMENTS

SL.NO	DESCRIPTION	QUANTITY
1	Fire Extinguisher	1
2	First Aid Kit	1
3	Work Bench with all Electrical Fittings	4
4	Steel Rule	4
5	Scriber	4
6	Center Punch	4
7	Hammer Cross pein	4
8	Hammer Ball Pein	4
9	Spanner set Double ended set	4
10	Tenon Saw 25 cm	4
11	Hacksaw 20-25 cm adjustable with blades	2
12	File flat second cut 20 cm	2
13	File half round 10 cm bar	2
14	File round 20 cm	2
15	Instrument files set of 12	2

EQUIPMENTS

<u>SL.NO</u>	<u>DESCRIPTION</u>	<u>QUANTITY REVISED</u>
1	20cm Wire Gauge Set	1
2	Feeler Gauge Set	1
3	Permanent Magnet Bar 15cm	2
4	Rheostat Various Values & Ratings.	5
5	Digital Multimeter	2
6	Moving Coil meter different ranges	1
7	Public address amplifier -40 W	1
8	Microphone	2
9	Loudspeaker	2
10	Service Oscillator	2
11	CRO-50MHZ	1
12	Regulated Power Supply (0-30)v	2
13	AM/FM Generator	1
14	Steel Cabinet	2
15	Commercial Radio Receiver AM/FM	4
16	Tape Recorder / Two-in-One	4
17	TV Receiver Colour / B & W	2 each
18	DVD Player	1

Equipments (Video)

Sl.No.	Description	Quantity Revised
1	Pattern Generator	1
2	Colour TV Trainer	1
3	Black & White TV Trainer	1
4	TV Receiver Colour, Black & White	2 each