MAHARASHTRA STATE BOARD OF VOCATIONAL EDUCATION EXAMINATION, MUMBAI -51

<table>
<tr><td>1</td><td>Name of Syllabus</td><td>C.C. IN VIDEO MECHANIC CUM OPERATOR (301106)</td></tr>
<tr><td></td><td>Max.Nos of Student</td><td>25 students.</td></tr>
<tr><td>3</td><td>Duration</td><td>6 Month</td></tr>
<tr><td>4</td><td>Type</td><td>Full Time</td></tr>
<tr><td>5</td><td>Nos Of Days / Week</td><td>6 Days</td></tr>
<tr><td>6</td><td>Nos Of Hours /Days</td><td>7 Hr</td></tr>
<tr><td>7</td><td>Space Required</td><td>PRACTICAL = 200 Sq feet
Class Room = 200 Sq feet
TOTAL = 400 Sq feet</td></tr>
<tr><td>8</td><td>Entry Qualification</td><td>S. S. C Appeared</td></tr>
<tr><td>9</td><td>Objective Of Syllabus/ introduction</td><td>OBJECTIVES :-
On completion of the course a student should have----
Knowledge of working and operation principles of modern electronics like up to electronic devices Audio-Video circuits and equipments.</td></tr>
<tr><td>10</td><td>Employment Opportunity</td><td>Self- Employment / may get job in</td></tr>
<tr><td>11</td><td>Teacher’s Qualification</td><td>1. Degree or Diploma in communication/ Electronic engineering and Video Engineering DAVE.
2. S. S. C. / H. S. C. with Licentiate in Television Servicing, S. S. C. with I. T. I. electronics / MRTV with NCTVT Passed.</td></tr>
<tr><td>12</td><td>Training System</td><td>Training System Per Week
<table><tr><td>Theory</td><td>Practical</td><td>Total</td></tr><tr><td>12 Hours</td><td>30 Hours</td><td>42 Hours</td></tr></table></td></tr>
<tr><td>13</td><td>Exam. System</td><td><table><tr><th>Sr. No.</th><th>Paper Code</th><th>Name of Subject</th><th>TH/PR</th><th>Hours</th><th>Max. Marks</th><th>Mini. Marks</th></tr><tr><td>1</td><td>30110611</td><td>Fundamental Electricity & Electronics</td><td>TH-1</td><td>3 Hrs</td><td>100</td><td>35</td></tr><tr><td>2</td><td>30110612</td><td>Video Technique</td><td>TH-2</td><td>3 Hrs</td><td>100</td><td>35</td></tr><tr><td>3</td><td>30110621</td><td>Fundamental Electricity & Electronics</td><td>PR-1</td><td>3 Hrs</td><td>100</td><td>50</td></tr><tr><td>4</td><td>30110622</td><td>Video Technique</td><td>PR-2</td><td>3 Hrs</td><td>100</td><td>50</td></tr><tr><td></td><td></td><td>TOTAL</td><td></td><td></td><td>400</td><td>170</td></tr></table></td></tr>
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Theory - I

FUNDAMENTAL ELECTRICITY AND ELECTRONICS

1. A. C. CIRCUITS

Concept of Alternating current relation between frequency, wave length, Relation between peak, Average and RMS values.

Transformer, Principles of transformer working, types of transmitters and chokes. Series Parallel R-L, R-C, RLC Circuits with impedance concept. Series and Parallel Tuned circuits.

Resistance. Ohm's law. Series circuits. Parallel circuits with simple applications Concept of power. Energy and simple calculations, Types of Resistors Capacitors, their Colours Codes.

2. SEMICONDUCTORS

German, Silicon, atomic structure, Generation of Electrons, Holes, flow of current, concept of N type, P-type impurities P and N semiconductors, effects of temperature on flow of current. PN junction diode, forward biased and reverse biased characteristics, Introduction to practical application of these characteristics i.e. rectifier, regulator, detector, clamper etc. Zener diode.

3. TRANSISTORS

NPN, PNP types, biasing methods, CE, CB, CC configuration. Various practically used. Transistors for low power and high power application.

Field Effect Transistors. Junction FET and MOSFET Construction operation and characteristics and typical (Code. Nos.) Used.

4. DC POWER SUPPLIES

Batteries – Cell and batteries (rating and types), AC to DC Types – half wave, Full wave, Calculation of Ripple factor, regulation characteristics, Types of filter, stabilized power supply (using Zener), use of IC 723, 7805, 7905 in power supply.

5. TRANSISTOR AMPLIFIERS Class A, Class B, Class C type, their operation and application, Various methods of AC coupling phase inverter, feedback in amplifiers, low power amplifiers, single ended, push-pull, complimentary type with ref. To audio frequency

6. Tools:-

Introduction and applications of the following tools in electronics – files, saws, neon tester, screw driver, pliers hand drill, vi as, taps, dies, punches, chisels, hammers, spanners, Allen wrenches, soldering fun, wires, stripper, disordering devices, vernier calipers etc.

7. METERS :-

Principle construction and working of moving coil galvanometer.

Use of moving coil galvanometer as an ammeter and Voltmeter Study of multimeter. It's use as an ammeter, voltmeter and ohmmeter.

8. Study of electronic active components :-

Introduction to FET, UJT and SCR – its characteristics and symbol.

Introduction to discs, triacs, LED, VDR, LDR, its characteristics and applications.

Thermistor – its characteristics and applications.

9. Cathode ray Oscilloscope :-

Block diagram of a CRO.

Working of CRT (Cathode Ray Tube)

Time base generator used in a CRO.

Measurement of amplitude, frequency and phase using a CRO.

10. Signal Generators :-

Principle, construction (with the help of block diagram) working and application of the following:-

Audio frequency (AF) signal generator –

Radio frequency (RF) signal generator –

Function generator. Pattern generator.

Theory - II - VIDEO TECHNIQUE

1. Study of Antenna :-
   Working principle and construction of TV antenna, Antenna for VHF colour T. V., Dimensions, Directional characteristics Impedances of TV antenna, Indoor and Outdoor antenna, multi community antenna, Antenna Installation, reflectors and directors, Transmission lines – coaxial and parallel wire impedance matching balloon, snow and Ghost effect, Booster.

2. TV RECERVER (CRT AND LCD)
   TV System & standards Functional block diagram a schematic diagram if TV set, explanation of various types of TV (tuner, smps power supply. Video amplifier, video IF, picture tube, sweep & EHT, colour section & sound section), Study of different IC's in TV sets. & HD TV standard

3. Study of Picture tube of Television :-
   Construction, working and their operation condition, fittings of tube.

4. Safety precautions while handling TV receiver, Television receiving antenna, and Position of TV receiver in a room, Viewers controls and their effect.
   Test Examination.

5. Colour Television :-
   Colour Physics, Additive colour mixing colorimetry, Hume Saturation Luminosity, Response of human eye chromaticity diagram requirements of colour TV compatibility.

6. Colour Television Transmission, Block Diagram, Luminance signal chrominance signal, choice of colour, Subcarrier, Suppressed carrier, Modulation U and V signals.

7. Block diagram of 'PAL' colour television receiver Tuners :- Study of different types and tuners VHF/UHF tuners, Drum type tuners, Switch type tuners, Push Button electronics tuners, Study of RF amplifier, Mixer and Local Oscillator, Automatic fine tuning (AFT).
   : - inter carrier system of TV receiver, separation of FM sound, sound amplifier FM demodulation. Different FM detectors, choice of I. F. Frequency, I. F. response curve, single double and stagger tuned – IF circuits with I. C., I. F. alignment trouble shooting in I. G. stage, speaker specification.

8. Video Detection :-
   Video detection – Principle and circuits of brightness control.
9. Colour sync. Circuits –
   The burst gate, Automatic frequency phase control (AFPC) reference Oscillator, Control circuit, effect of noise in synchronization TV circuits using IC's.
   The chrominance band pass amplifier. The colour killer Automatic colour control (ACC) colour saturation control. PAL line driver and PAL delay line.

10. Study of Vertical and Horizontal deflection circuits Requirements of Vertical deflection circuits line drive and line output for B/W and colour TV, Diode – Split line output transformer, Pincushion. Distortion of raster and its correction.

11. Power supply in TV. Receiver :-

Different power supplies used for valve, Hybrid and solid state TV receiver. Use of Zoner Diodes and VDR in power supply, Voltage distribution and decoupling net work.

12. Remote Control :-

Type pulse position modulation (PPM), Encoding Infrared transmitter and receiver block diagram.

13. Video Tape recorders :-

1. Principle of Video Recording.
2. Working Principle of VCR and VCP.
3. Study of typical circuit with a block diagram.
4. Principle of operation of TV camera, TV channels and Standards.

14. Cable TV / DTH system

Working of dish antenna & cable TV system, different stages of cable TV systems & setup, satellite communication- up link & down link, TV RO set –up, study of DTH system & IP TV system

Practical - I - FUNDAMENTAL ELECTRICITY AND ELECTRONICS

Sr.no.	List of Experiments.
1	Safety Precautions to be covered in Laboratory while required handling electronic equipments.
2	Drawing sheets: Electrical and electronic symbol as per ISI specifications.
3	Identification of various components and devices, their general testing.
4	Colour coding systems for resistors and capacitors
5	Familiarization of ammeter, voltmeter, ohmmeter multimeter and power supplies.
6	Verification of Ohm's Law.
7	Study of circuits – resistors in series and parallel circuits.
8	Testing of Transformer – continuity, installation and voltage ratio.
9	Practical exercises in soldering and disordering involving lugs, tag boards, diode, and transistor ICs.
10	Identification of materials commonly used in electronics.
11	Study of the construction of various types of loud speakers.
12	Replacement of cone in a loud speaker.
13	Testing of semiconductor diode and transistor using a multimeter, transistor tester.
14	Testing of UJT, FET, SCR, LED etc
15	Study of an Oscilloscope – operation and control.
16	Measurement of frequency and voltage using a CRO.
17	Study of half wave full wave, bridge rectifier with and without filters.
18	To study frequency response of a CE amplifier (one stage and two stage)
19	Study of HARTLEY OSCILLATOR
20	Study of fabrication of eliminator.
21	Fault finding in a regulated power supply
22	Use of IC- 723 as voltage regulator.
23	Study of mechanical drive systems in an audio cassette recorder.
24	Tracing of a circuit in a audio cassette recorder
25	To study installation and operation of a typical stereo-system.
26	Use of Digital multimeter- various measurements with a digital multimeter.
27	To study front panel and operation of instruments Oscilloscope, frequency counter, pattern generator DMM etc.

	Practical –II Video Technique
1	To prepare antenna for different channel, testing of tuners, Orientation of antenna to study its defect in picture tube.
2	To study picture tube of television.
3	To study V. I. F. strips :- a. Discrete component B. I. C. type.
4	To study video IF amplifier and testing of amplifier (For Monochrome and Colour TV)
5	To study sound section of a. Colour TV b. Discrete c. IC type.
6	Testing of power supplies used in TV receiver. To study use of Zener diode and VDR in power supply voltage distribution and decoupling network.
7	Test of syne separator differentiating and integrating Circuits, A. G. C. circuits.
8	To study horizontal and vertical sections for Monochrome and Colour TV.
9	To study of alignment of RF and IF stages in a TV receiver
10	Study of trouble shooting techniques with special attention 6 to following points:- a. Sound, Raster and Picture / colour symptoms. b. Prelimary testing procedure depending upon type of TV receiver and its system. c. Logical approach to the problem by :- 1. Inspection of components. 2. D.C. Voltage analysis. 3. Resistance analysis. 4. Wave form analysis. 5. Replacement of faulty components and devices. 6. Any mechanical adjustments, fittings.
11	Study of different faults in following sections/stages of Colour TV. a. Aerial Installation. b. VHR/UHF tuner. c. C.R.T. circuits/ mechanical faults. d. Vertical sweep section. e. Horizontal sweep section and high voltage section. f. Low voltage/High current power supply. g. Signal path faults. h. A. G. C. i. Colour demodulators and PAL switch. j. Colour pictures tube misconvergence. k. Chroma(colour) trouble fue to the luminance channel etc.
12	Study of alignment procedure of B/W and colour TV receivers
13	To connect V. C.R. to TV and study various controls.
14	Demonstration/To study of VCR and VCP its control and its operation study of faults in various sections of VCR (Demonstration)
15	To study system control, servo, lum, chroma etc of VCR.
16	To study connecting the VCR/VCP to a monitor and camera
17	To study wave form analysis / Voltage analysis of VCR.
18	To study installation of satellite TV equipment (Demon-station/Visit)
19	To study Installation of cable TV (Demonstration Visit)
20	Study of IC's used in disk player & identification of different componants,trouble shooting & repair of disk drive mechanism & blue ray mechanism
21	Set up & experimental study of cable TV system,DTH receiver system & IP TV system

- LIST OF TOOLS AND EQUIPMENT :-

SR.NO.	DESCRIPTION OF TOOLS/EQUIPMENT	NO. REQUIRED
1	Combination Pliers 15 cm insulated	15+1
2	Long Nose Pliers 15 cm insulated	15+1
3	Diagonal cutter 15 cm insulated	15+1
4	End cuttings nipper 15 cm insulated	15+1
5	Tweezers 10 cm insulated	15+1
6	Heat sink Pliers	15+1
7	Neon tester	15+1
8	Knob screw driver 10 cms	15+1
9	Screw driver set of 6	15+1
10	Alignment kit	15+1
11	Wire stripper (insulation)	15+1
12	Soldering Iron 25 Watt	15+1
13	Portable Multimeter (SANWA of Equivalent) 1000 V DC/AC	15+1
14	Digital multimeters	15+1
	WORKSHOP TOOLS AND EQUIPMENTS :	
1	First Aid Kit	1
2	Work Benches 120X 400X75 cm.	5
3	P. V. C. flooring	3
4	Rubber glover pair	1
5	Steel rule 15 cms	8
6	Scriber 15 to 20 cms.	8
7	Center punch 10 cms.	8
8	Hammer cross peen 100 gm with handle	4
9	Spanner set double ended 6mm to 90 mm	4 set
10	Spanner set single ended 6,8,10 mm	1 set.
11	Allen key set up to 10mm.	1 set.
12	Mallet	2
13	Saw Tenon 25 cm.	2
14	Chisel wood 15 mm	2 set
15	Brando	2
16	Hack saw 20-25 cm adjustable with blades	4
17	File flat second cut 20 cms.	2
18	File flat bastered 15 cms	2
19	File half round 10 cms bastered	2
20	File held round 20 cms second cut	2
21	File round 20 cms.	2
22	Instrument files sector 12	2
23	Vice bench 10 cms jaw	2
24	Vice bench 5 cms jaw	4
25	Tape set 2mm to 10mm set of 9 with handle	2 sets
26	Dies set from 2mm to 10 mm set of 9	2 sets
27	Grinder Bench electric 15 cms	1
28	File Triangle 15 cms	5
29	File square 25 cms	5
30	Tools marker's file	5
31	Clamp	8
32	Bench drill 1 mm to 3 mm.	2
	EQUIPMENTS :-	
1	Wire gauge set	2
2	Feeler gauge set	2
3	Rheostats of various values and ratings	10
4	Variable resistance / Potentiometers of various values	As per need
5	DC and AC Ammeter 0-50,0-10 MA	2 each
6	Moving coil Ammeter 0-10 Amp	2
7	Loud speaker cone type pm different varieties.	4
8	Microphone (dynamic -6, Crystal-2, condendor-2)	4

9	Head stereo phone and earphones HI –Fi different types	2
10	Insulation tester 250 V/ 200 V	8
11	Service Oscillator	2
12	Signal Tracer	2
13	Function generator F.E. T. make	2
14	Output meter	4
15	C. R. O. (10 mega Hertz) (20 mega Hertz) Dual Trace 50 mega	1 1 1 2
16	Regulated power supply 0-30 volts -2 MA	4
17	Sweep marker generator	2
18	B/W Television Receiver	2
19	Colour Television Receiver solid state/ digital.	3
20	Disordering pump	4
21	Pulse Generator	1
23	Transistor Tester	2
24	I. C. Tester	2
25	Pattern generator for colour T.V.	1
26	T. V. Antenna complete with cable as required and booster of necessary.	2 unit
27	V.C. R. /V. C. P. Standard VHS	1
28	wobbuloscope	2 optional
29	Video game	1
30	B/W Trainer Kit	1
31	T. V. camera	1 Optional

- REFERENCE BOOKS :-

1	Basic Electronics (Solid State)	B. L. Theraja .S. Chand & Co. Pvt. Ltd. Ram Nagar, New Delhi.
2	Basic Electronics for Scientists	J. J. Brophy.
3	Modern TV Practice	By Gulati
4	Television Electronics	By Milton Kiver, Milton Kaufman
5	Basic Radio & Television	By S.P. Sharma.
6	Fundamentals of Electronics	By ashok Singh Khanna Publishers Delhi-6.
7	Antenna Hand Book.	Business problem Bureau by V. Appakutty B. P. B. Publications. Delhi.
8	Electronic & Radio Engg.	Terman IX Edition.
9	Electronic & Radio Engg.	G. K. Mithal
10	Antenna Engg. And Noise	By Dr. T. K. Bandhopadhyay Khanna Publication- Delhi
11	TV Trouble Shooting and Repair	By Middleton.
12	टेलिव्हीजन दुरुस्तीचा कार्यक्रम	सु . ना . जोशी . सरस्वती ग्रंथ भांडार , बुधवार पेठ , पुणे - २.
13	टेलिव्हीजन कसे दुरुस्त करावेत .	वि . कृ . वाघ . रेडिओ प्रॅक्टीकल ट्रेनिंग इंन्स्टिटयूटचे प्रकाशन , वाघ टेक्नीकल पब्लिशर्स , ४, मोहन बिल्डिंग , जगन्नाथ शंकर शेट रोड , गिरगांव, मुंबई ४०० ००४.

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