

**MAHARASHTRA STATE BOARD OF VOCATIONAL EDUCATION EXAMINATION,  
MUMBAI - 51**

1	Name of Syllabus	<b>LICENTIAE IN ADVANCE ELECTRONICS &amp; VIDEO SERVICING (L.A.E.V.S.) (301204)</b>																																																													
2	Max.Nos of Student	25 Students																																																													
3	Duration	1 year																																																													
4	Type	<b>Full Time</b>																																																													
5	Nos Of Days / Week	6 days																																																													
6	Nos Of Hours /Days	7 hrs.																																																													
7	Space Required	1) Workshop = 200 sqfeet 2) Class Room = 200 sqfeet TOTAL = 400 sqfeet																																																													
8	Entry Qualification	L.E.R.S. PASS of MSBVE																																																													
9	Objective Of Syllabus/ introduction	On completion of the course a student should have – a) Knowledge of working and operation principles of modern electronic like Digital. Video circuits and equipments. b) Logical approach to fault analysis and diagnosis of digital and video equipments. Repairs and Replacement of delicate components. c) Developed skills in installation, maintenance and repairs of Colour T.V., V.C.R., Satellite head and equipments for Cable T.V. and other Electronic equipments. d) Awareness of safety precautions.																																																													
10	Employment Opportunity	They may start his own Business / May get job in Establishment																																																													
11	Teacher’s Qualification	For Lecturer: - Diploma in Electronics & Video Egg. ( DAVE) For Instructor :- L.A.E.V.S. / ITI NCTVT ( Electronics / RTV)																																																													
12	Training System	<table><tr><th colspan="3">Training System Per Week</th></tr><tr><td>Theory</td><td>Practical</td><td>Total</td></tr><tr><td>12hrs</td><td>30hrs</td><td>42 hrs</td></tr></table>						Training System Per Week			Theory	Practical	Total	12hrs	30hrs	42 hrs																																															
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## **Syllabus**

### **Theory Paper – I      Basic & Digital electronics**

#### **1.      SEMICONDUCTOR DEVICES & APPLICATIONS :-**

Fundamentals of AC & DC theory and passive components (R,C,L)

Semiconductor Devices (Active components): -

Study of diodes- Junction diode, Zener diode, Scotty diode and Light Emitting Diode (LED)

Study of Transistors- NPN & PNP basing methods Study of ICs- concept of SSI, MSI, LSI, VLSI.

#### **2      APPLICATION OF SEMICONDUCTOR DEVICES :-**

Died as rectifier, Zener diode as a voltage stabilizer, Transitory as a switch, Transistor as an Amplifier, Transistor as an Oscillator (LC, RC, Crystal oscillators only)

#### **3.      OPERATION AMPLIFIER**

741, 555 TIMER VOLTAGE REGULATOR ICs: - Introduction & block diagram study of 741, 555, study of simple application of 741, 555.

#### **4.      BASIS OF DIGITAL ELECTRONICS**

Study of Number System: - Binary, BCD, Hexadecimal and ASCII code.

Study Logic Gates: - OR, AND, NOT, NOR, NAND, EX-OR, EX-NOR, NAND gate as universal gate, Binary Adder, Subtract or (Half and Full adder and subtract or and study of IC 7483).

Study of Logic Families: - TTL, CMOS, ECL

Study of FLIP FLOP: - S-R, D, T, J-K flip flop using gates.

Study of FF ICs Like 7474, 7473/ 7476.

Study of Counters: - 4 bit binary counter (up & down).

Using flip flop, study of Ring and Johnson counter

Using Flip Flop Study of ICs like 7490, 7493 and 7193.

Study of Shift Register using Flip Flops, Serial & Parallel.

Study of shift registers ICs like 7164, 74165.

#### **5.      DIGITAL TECHNIQUES :-**

Combination Logic circuits :- Encoder, Decoder, Multiplier Demultiplexer, parity Generator & Checker, Study of ICs 7151, 74138, 74147, 74280.

Timing circuits: - Characteristics of a digital clock Pulse duration, pulse width, duty cycle, Mono stable and stable multivibrator using gates, study of IC 74121.

#### **6.      MEASURING AND TESTING INSTRUMENTS :-**

Study of front panel and operation of DMM and CRO study of Logic Probe and Pulsar, Logic Analyzer (basic concept of Logic analyzer only is expected).

#### **7.      SWITCH MODE POWER SUPPLY :-**

Basic principles & operation of SMPS power supply SMPS used in computer systems, output voltage, capacity, cable colour cod and connectors. Power good signal. Common faults in SMPS.

8) Fundamentals A/D & D/A converters (ADC: -

8 bit ladder net work type Study of ADC IC 0809 and DAC: - 8 bit ladder net work type study of ADC IC 0808. Electronics display: - 7 segment display, LCD, LED, matrix Plasma Display.

### **PRACTICAL - I      Basic & Digital electronics**

- 1) Assemble & Test Logic Gates.
- 2) Study of Digital Multimeter. & Measure A.C. & D.C. Voltage, Current & Resistance
- 3) Study of Oscilloscope. & Measure A.C. & D.C. Voltage & Frequency
- 4) Assemble & Test Flip flops (S-R, D and J-K, 7474, 7478 / 7473).
- 5) Assemble & Test Counter (7490, 74193).
- 6) Assemble & Test Adder 7483
- 7) Assemble & Test seven segment Decoder Driver Using Lts542 Display IC 7447 And Lts542 / 543 Display
8. Assemble Monostable Multivibrator & Test it ( by use of IC 555)
9. Assemble Astable Multivibrator & Test it ( by use of IC 555)
10. Assemble op - amp as a inverting Amplifier & Test it
11. Assemble op - amp as a Non inverting Amplifier & Test it
12. Assemble RS Flip - Flop & Test it
13. Assemble Digital Counter & Test it

## **Theory Paper – II - Colour Television**

### **1. PRINCIPLES OF COLOUR T.V.**

Colour physics, Additive colour mixing, colorimetry, hue, saturation and luminosity. Response of human eye, chromaticity diagram, requirements of colour T.V. compatibility, colour Television Transmission. Block diagram, Luminance and chrominance signal, choice of colour sub carrier, Suppressed carrier modulation. U and V signal. Block diagram of PAL colour Television receiver.

### **2. 3. THE SOUND STRIP**

Sound IF amplifier, sound amplifier circuits, sound detectors, integrated circuit, detectors, Audio Amp. IC.

### **4. PICTURE TUBE AND ASSOCIATED CIRCUIT**

Basic structure electron Gun. The B/W picture tube. The colour picture tube. FST. FFST. Flat Phosphor screen. The shadow masks purity, Automatic degaussing, ADC, circuits, Purity, Adjustments, convergence, Static convergence, Dynamic Convergence, convergence circuit, convergence adjustments Pincushion cause and correction. The gray scale.

### **COLOUR SYNC CIRCUITS**

The burst gate, Automatic Frequency Phase Control (AFPC) reference oscillator, control circuit. The integrated circuit sub carrier processor, Ident pulse generation.

### **5. VIDEO AMPLIFIER**

Picture tube light output characteristics, Amplifier Distortion, video frequency and picture content. Methods of frequency Compensation, D.C. restoration, video amplifier controls and typical circuits, peaking controls, Retrace, blanking circuits, Luminance amplifier, Luminance delay line, beam current limiting.

### **6. LOW VOLTAGE POWER SUPPLIES**

Shock Hazard, Overload protective Devices, basic Television power supply arrangements, Heater circuits, Regulators circuit Switch Mode Power Supplies.

### **7. SYNC SEPARATION, AFT AND DEFLECTION OSCILLATORS**

Amplifier & frequency separation, sync. Amp. Automatic frequency control, AFC circuits, Deflection current, waveforms deflection oscillators, Blocking Multi vibrator, Relaxation OSC, Deflections Ics.

8. VERTICAL DEFLECTION CIRCUITS  
Requirements of vertical deflection circuits, Discrete vertical deflection circuits, vertical deflection IC.
9. HORIZONTAL DEFLECTION CIRCUITS  
Line drive and line output for colour receiver. Various functions of line output stage. Line output stage circuits. Diode-split line output transformer. Pincushion distortion of raster and its correction. Beam current limit. X radiation.
10. THE CHROMINANCE BAND PASS AMPLIFIER AND ASSOCIATED CIRCUITS.  
Circuits composite Chroma band pass amplifier, the colour killer, Automatic colour control (ACC), Colour Saturation control. PAL line driver and PAL delay line.
11. COLOUR DEMODULATORS, OUTPUT AMPLIFIER CIRCUIT  
Colour demodulators, PAL switch, demodulator types, demodulator circuits, Colour difference amp. RGB matrix. RGB video amp. Integrated circuit demodulator.
12. REMOTE CONTROL  
Types, pulse Position Modulation Encoding, Infra red transmitter and receiver, block diagram.
13. SATELLITE RECEIVING SYSTEM  
Satellite down link, Disk antenna system, L.N.B. satellite receiver Foot Print, Cable T.V.:- M.A.T.C. /C.A.T.V., Modem cable T.V. System, DTH System.

## **PRACTICAL – II - Colour Television**

- 1 Procedure for safety in T.V. Workshop
- 2 Tracing of different stages in Colour Colour T.V. Receiver
- 3 Installation of different stages in Colour Colour T.V. Receiver
- 4 Checking for different voltages at Test Points in Colour Colour T.V. Receiver
- 5 Identification of main ( special) components in different stages in Colour Colour T.V. Receiver
- 6 Checking of EHT Section for various faults
- 7 Checking of Tuner section for different Tuning problems
- 8 Checking of vertical & Horizontal section for various Oscillation
- 9 Allignment of RF , IF Stages in colour T.V. Receiver
- 10 Allignment of yoke in Colour T.V.
- 11 Study of picture Tube
- 12 Study of Remote Control
- 13 Assemble yogi Antenna
- 14 Study of different Antenna
15. Colour T.V. Receiver study and faults in different sections, like - Horizontal Section, Vertical Section, EHT Section, Video Section, Sync Section, VIF Section, RF Tuner Section, Sound Section and Power Supply.chroma section R.G.B., Output section and Remote control – system control circuit
16. Tracing and Alignment of different stages in colour T, V. like - Horizontal Section, Vertical Section, EHT Section, Video Section, Sync Section, VIF Section, RF Tuner Section, Sound Section and Power Supply.
17. Voltage and wave form testing at different test point in colour T.V.

## Theory Paper - III - Television and Video Equipment Servicing

### 1. INSTRUMENTS

Functioning requirements and use of following instruments in trouble shooting of T.V. receiver Oscilloscope, marker Generator, Sweep Generator, H.V. probe, B/W Pattern Gen., Colour bar generator.

### 2. TROUBLE SHOOTING TECHNIQUES WITH SPECIAL ATTENTION TO FOLLOWING POINTS :

- a) Sound, Raster and picture / colour symptoms.
- b) Preliminary testing procedure depending upon type of T.V. receiver and its symptoms
- c) Precautions
- d) Logical approach to the problem by
  1. Inspection of components
  2. D.C. voltage analysis
  3. Resistance analysis
  4. Waveform analysis
  5. Any quick tests, useful on field servicing
  6. Replacement of faulty components and devices
  7. Any mechanical adjustment or fitting

### 3. With above background faults in the following section / stage television receiver should be explained.

- i) Aerial Installation
- ii) VHF/ UHF Tuner
- iii) Vision IF board including wave traps
- iv) Vision detector
- v) Sound IF with FM detector and AF amplifier
- vi) Video amp.
- vii) C.R.T. Circuits / Mechanical faults
- viii) Sync. Sep. and amplifier
- ix) A.G.C.
- x) Vertical sweep section.
- xi) Horizontal sweep section and high Voltage.
- xii) Low Voltage / High current power supply.

### 4. In the case of colour television in addition to the above (3) the faults in the following section / stages of a colour Television receiver should be explained.

- i) General Trouble shooting procedure and safety
- ii) Switch Mode Power Supply.
- iii) Troubles due to luminance channel.
- iv) Troubles due to the chroma band pass amplifier,
- v) Burst channel reference oscillator and colour killer.
- vi) Colour demodulator and PAL switch.
- vii) RGB matrix and o/p amplifier.
- viii) Beam limiter, high voltage supplied and focus.
- ix) Colour picture tube misconvergence.

### 5. ALIGNMENT PROCEDURE of B/W and colour Television receiver.

6. Circuit Study –  
Following B/W and Colour TV circuits to be discussed  
B/W TV –
  1. Daewoo Kit  
ICs – upc 1366, upc 1353, upc 1031.
 Colour TV –
  1. Fonda Kits – (Toshiba TV Circuit)  
ICs – CD7680, CD7698P, M220D0105F (System Control IC)  
STR 5314.
  2. Fonda Kit (Sanyo circuit – I<sup>2</sup>C bus technology)  
ICs – 51R4-3800 (System Control), 24C16 (Memory IC),  
LA7681, LC 75342, LA 4277, LA7840, 7805.
  
7. CD/MP3 and DVD Player  
CD / MP3 Player –
  - I. Compact disk structure.
  - II. Constant linear velocity (CLV) recording system.
  - III. Advantage of Digital Storage
  - IV. CD Encoding Process block diagram
  - V. Block diagram of CD Player
  - VI. Optional Pickup unit Components
  - VII. Idea about servo system and their purpose only  
(No theory question on block diagram & circuit  
explanation to be asked)
    - a. Tracking servo
    - b. Carriage Servo
    - c. Spindle Servo
  - VIII. Different motors used in CD player & their functions  
only.
    - a. Tray or loading motor (Carriage Motor)
    - b. Slide or sled or feed motor
    - c. Spindle or Disc or Turn table Motor
  - IX. Different sensors used in CD player.
  - X. Different types of CDs
  - XI. Various parts of CD Mechanism & their function
  - XII. Various functions carried out by system control  
processors.
 DVD Player –
  - I. Introduction to DVD Players.
  - II. Comparison between CD ROM and DVD ROM
  - III. Different types of DVD ROM.
 Home Theater System –
  - I. Introduction to home Theater System
  - II. Installation of Home Theater System.
 Advanced TV Technology Systems –
  - I. Video Projector
  - II. Plasma TV
  - III. LCD TV
  - IV. Projection TV

8. CD/MP3 and DVD player servicing
  - I. Test Equipment and Tools safety precautions.
  - II. Adjustment, cleaning, lubricants and maintenance of electrical and mechanical parts.
  - III. Troubleshooting
    - a. General Troubleshooting Procedure.
    - b. Troubleshooting due to Power Supply.
    - c. Troubleshooting due to Pickup Unit.
    - d. Troubleshooting due to Carriage Motor.
    - e. Troubleshooting due to Feed Motor.
    - f. Troubleshooting due to Spindle Motor.
    - g. Troubleshooting due to Sensors.
    - h. Troubleshooting due to Tracking Servo.
    - i. Troubleshooting due to Carriage Servo.
    - j. Troubleshooting due to Spindle Servo.

### **Practical - III Television and Video Equipment Servicing**

1. Study of Home Theater System.
2. Assemble Emergency Light.
3. Study of Closed Circuit TV.
4. Study of Satellite TV System.
5. Assemble DTH System.
6. Use of Video Projectors.
7. Study of Plasma TV.
8. Study of LCD TV.
9. Study of Projection TV.
10. Study of Video Game.
11. Study of CRO.
12. Measurements of Voltage & Current using CRO
13. Study of Black & White Pattern Generator
14. Use of Colour bar Generator
15. Study & faults in different section in CD & DVD Player Like  
Power supply, Mechanism, Mother board, and front Panel Board, RF Converter etc.

### **List of Tools & Equipments :-**

Sr. No.	Description of Equipments	No. of Required
1.	Multimeter (low sensitivity)	8
2.	Multimeter (High sensitivity)/ C.D.M.M.	2
3.	Oscilloscope (10 MHz)	1
4.	Digital Multimeter	1
5.	Frequency counter	1
6.	Wobbuloscope	1
7.	Colour bar pattern Gen.	1
8.	B/W Television Receiver	3
9.	Colour Television Receiver	3
10.	Video CD Player	1
11.	D.V.D. Player	1
12.	Set of tools (screw driver, plier, cutter, solder iron, Disordering pump etc.)	1

Note: - See list of experiments of other material.

## Reference Books, Video Cassette etc.

1. Modern Television Practice by Gulati
2. Television Electronics by Milton Kiver,  
Milton Kaufman.

### Video Cassette (Optional)

1. Power supply.
2. What's is an Op-amp
3. Active devoices
4. Know your Oscilloscope.
5. Colour picture tube part I and II
6. Know your B and W picture tube.
7. Colour T.V. Servicing.
8. Logic circuits.
9. Counter.
10. Shift resistors.

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