1. **PREAMBLE**

   This examination syllabus evolved from the Senior Secondary School curriculum for Trade Subjects. It is intended to give candidates insight into the world of Radio, Television and Electronics Works; improve their attitude towards the maintenance and repairs of radio, television and electronic equipment and enable them to appreciate the relationship between science and technology.

2. **OBJECTIVE**

   The objective of the syllabus is to test the candidates’ knowledge and understanding of the following:
   (i) Workshop Safety Rules and Regulations;
   (ii) Basic Electricity;
   (iii) Electronic Tools and Instruments;
   (iv) Electronic Devices and Circuits;
   (v) Electronic Communication Systems;
   (vi) Workshop Practice and Maintenance;
   (vii) Entrepreneurship in Radio, Television and Electronics Works.

3. **EXAMINATION SCHEME**

   This will be three papers, Papers 1, 2 and 3, all of which are to be taken. Papers 1 and 2 shall be composite paper to be taken at one sitting.

   **PAPERS 1:** Will consist of forty multiple choice questions, all of which are to be answered in 45 minutes for 40 marks.

   **PAPER 2:** Will consist of six short-structured questions. Candidates will be required to answer any four of them in 1 hour for 60 marks.

   **PAPER 3** Will be a practical test of 2 hour duration. It will consist of three skill-based questions out of which candidates will answer two for 90 marks.

   A list of materials for the test shall be made available to schools not less than two weeks before the taking of the paper for procurement and relevant preparations for the test to be made.
Alternatively, the Council may consider testing candidates’ familiarity with the practical work prescribed in their syllabus in the event that the materials for the actual practical test cannot be acquired. For this test, two compulsory essay
questions will be set. Candidates will be given 2 hours to answer them for 100 marks.

**Industrial Attachment:**

This should be done by the candidates during the long vacation between their SS II and SS III course. It will be supervised and assessed by their subject teachers. It will carry 10 marks.

## 4. Detailed Syllabus

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<td>1.1 Sources and Prevention of Hazards</td>
<td>Concept of safety&lt;br&gt;Sources of hazards&lt;br&gt;Treatments should include electric shock, damp or wet floor, wrong handling of tools, improper workshop dressing, horse play in the workshop</td>
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<td>1.2 Safety Checks in Servicing Radio Receiver</td>
<td>Preparation of work areas&lt;br&gt;Capacitor discharges&lt;br&gt;Working on power lines and live circuits&lt;br&gt;Handling of tools</td>
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<td>1.3 Safety Precautions in Television Workshop</td>
<td>Power supplies in T.V.&lt;br&gt;Picture tube&lt;br&gt;High voltage section&lt;br&gt;Component rating</td>
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<td><strong>2. Basic Electricity</strong></td>
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<tr>
<td>2.1 Structure of matter</td>
<td>Definition and structure of matter&lt;br&gt;Atomic structure&lt;br&gt;Qualitative treatment only - definition and uses</td>
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<td>2.2 Conductors, insulators and semiconductors</td>
<td>Definition, units and symbols of voltage, current and resistance&lt;br&gt;Laws of attraction and repulsion of charges</td>
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<td>2.3 Current, voltage and resistance</td>
<td>Identification of components by name, type, graphical symbol, value and rating&lt;br&gt;Treatments should include resistors, capacitors,</td>
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<td>2.4 Electronic components</td>
<td>inductors, diodes, transformers, transistors, integrated circuit etc</td>
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<td>2.5 Resistors and Capacitors</td>
<td>Graphical symbols, types, values and ratings, Colour code of resistors and capacitors, Comparison between meter measured and colour code values, Testing of capacitors</td>
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<td>2.6 Kirchhoff’s Current and Voltage Laws</td>
<td>Types, graphical symbols and structure, Treatments should include testing for diodes and transistor configuration (CC, CE and CB)</td>
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<td>2.7 Diodes and Transistors</td>
<td>Graphical symbol of a battery (primary cell and secondary cell) and types, Testing of battery</td>
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<td>2.8 Battery</td>
<td>Treatments should include difference between wet and dry cells</td>
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<td>2.9 Ohm’s law</td>
<td>Definition, Resistors in series and parallel, Symbols and relationship between voltage, current and resistance</td>
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<td>2.10 Electric power</td>
<td>Definitions, difference, uses and measurement of d.c. and a.c.</td>
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<td>2.11 Direct and Alternating Current</td>
<td>Definition and calculation, Treatments should include r.m.s., peak, and average values, frequency and period in an a.c. waveform</td>
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<td>2.12 Alternating waveform</td>
<td>Types and uses, Treatments should include screw drivers, diagonal cutters, soldering gun, soldering iron, lead sucker or de- soldering tools, pocket knife, stripper and soldering wick</td>
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<tr>
<td>3. Electronic Tools and Instruments</td>
<td>Identification, uses and operation, Treatments should include voltmeter, ammeter, ohmmeter, multi meter, Basic a.c. and d.c. circuit, measurements of voltage, current and resistance, Ohmmeter for testing semiconductor devices</td>
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<td>3.3</td>
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<td>4.1</td>
<td>Meaning of Electronics and Electronic circuit</td>
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<td>Concept of emission and photoelectric devices</td>
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<td>4.6</td>
<td>Resistive, Inductive, Capacitive (RLC) circuits</td>
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<td>5.1</td>
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<td>5.2</td>
<td>Electronic Communication Systems</td>
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| 5.2 Electromagnetic spectrum | Propagation of radio waves  
Radio frequency band- VLF, LF, MF, HF, VHF, UHF,SHF and EHF  
Application of frequency range in electronic communication – frequency spectrum to be intensified |
|-------------------------------|---------------------------------------------------------------|
| 5.3 Transducer                | Definition, types and functions  
Treatments should include loudspeaker, microphone, video camera, video display unit(cathode ray tube(CRT),Liquid Crystal Display(LCD)) |
| 5.4 Modulation and demodulation | Definition, principle of operation and types of modulation  
AM and FM waveforms and envelopes  
Percentage of modulation – modulation index and modulation factor |
| 5.5 Radio transmitter and receiver | Meaning and function of carrier wave in radio communication.  
Definition and types of demodulation  
Function(s) and operation  
Block diagram and function of each stage  
Types of radio receivers – Tuned Radio Receiver(TRF), super heterodyne receivers(FM and AM)  
Advantages and disadvantages of each |
| 5.6 Selectivity and sensitivity | Definition  
Concept and function of tuner in radio receiver  
Identification of tuner stage in radio receiver |
| 5.7 Resonant circuit | Definition, types of resonance (series and parallel)  
Concept of bandwidth and bandwidth ranges  
Calculation involving frequency ranges to determine bandwidth  
Treatments should include derivation of the formula for resonant frequency |
| 5.8 Satellite Communication Systems | Elements and types  
Transmission and reception  
Antenna |
| 5.9 Television Transmitter | Working principle  
Block diagram  
Stages  
Principle of scanning |
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| 5.10 Image and Sound Reproduction in TV receiver | Video signals  
Principle of FM detection  
Concept of Television  
Function and operation  
Application of television system |
| 5.11 Monochrome Television Receiver | Block diagram and function of each stage  
Processing of picture and sound signal |
| 5.12 Principles of operation of Colour Television Receiver | Primary colours in television  
Colour television systems and standards – PAL, SECAM and NTSC  
Colour signal components |
| 5.13 Principle of Colour Signal, Transmission and Reception | Techniques and precautions  
Types of solder  
Types of flux – amber resin and NaCl solutions |

6. Workshop Practice and Maintenance

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</table>
| 6.1 Soldering and Desoldering in Electronic Circuits | Dismantling and reassembling of power supply unit in a radio set  
Dismantling and reassembling RF, IF detector  
Stages in a radio receiver set  
AF amplifier circuit  
Installation and maintenance of a car radio set |
| 6.2 Electronic Repairs | Diagnose fault by using fault finding pieces of equipment and logical trouble shooting procedure  
Components responsible for faults  
Remedies for the faults  
Alignment of RF and IF stages of a radio set using the necessary equipment and tools |
| 6.3 Fault finding and repairs in radio receiver | Use of multimeter  
Treatments should include measurement of the correct value of current, voltage and resistance in active and passive electronic components and circuits  
Procedure for TV repairs  
Use of service information manual and circuit diagram  
Identification of symptoms and repair of faults  
Fault clearing instruments |
| 6.4 Electronic Measuring Instruments | Symptoms of faults  
Fault clearing at each stage  
Static and dynamic colour convergence comparison |
### 6.6 Diagnose and Repair of a Colour Television Receiver

**Colour bar generator and signal testing**

### 7. Entrepreneurship in Radio, Television and Electronic Works

#### 7.1 Business Management and Finance

- Accounting practices
- Cost benefit analysis
- Purchasing method
- Business records (Accounting ledger, Repair order form, Inventory sheet)
- Sources of capital e.g. Banks and Credit Unions
- Daily appearance at work
- Customer psychology
- Working relations
- Telephone courtesy
- Business Opportunities in Radio and TV Work
- Satellite installation
- Electronic specialist
- Radio and TV consultant
- Radio and TV technician
- Sales and Service Craft man
- Antenna and TV installation work

#### 7.2 Customer Relations

- Business Opportunities in Radio, TV and Electronics works
- Business Opportunities in Radio and TV Works
- Satellite installation
- Electronic specialist
- Radio and TV consultant
- Radio and TV technician
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#### 7.3 Business Opportunities in Radio, TV and Electronics works

- Business Opportunities in Radio and TV Work
- Satellite installation
- Electronic specialist
- Radio and TV consultant
- Radio and TV technician
- Sales and Service Craft man
- Antenna and TV installation work

### 5. LIST OF FACILITIES AND MAJOR EQUIPMENT/MATERIALS REQUIRED

1. Screw drivers
2. Diagonal cutters
3. Soldering gun, iron and lead
4. Desoldering tools
5. Pocket knife
6. Stripper
7. Semiconductor diodes
8. Digital and analog multimeters
9. Loudspeaker, microphone
10. Cathode Ray Tube/LCD
11. Nose pliers
12. Old electronics panel
13. Resistors, capacitors, inductors, transistors
14. Vero board/breadboard
15. D.C. power supplies
16. Transformers
(17) Radio and television sets
(18) Oscilloscope
(19) Signal generator
(20) Magnifying glass
(21) Pattern generator (TV)