**RADIO, TELEVISION AND ELECTRONICS WORKS**

**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:

1. Workshop Safety Rules and Regulations;
2. Basic Electricity;
3. Electronic Tools and Instruments;
4. Electronic Devices and Circuits;
5. Electronic Communication Systems;
6. Workshop Practice and Maintenance;
7. Entrepreneurship in Radio, Television and Electronics Works.

**3.** **EXAMINATION SCHEME**

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

**PAPER 1:** will consist of forty multiple-choice objective 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 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 paper is taken for materials procurement and relevant preparations.

Alternative to Practical Work:

Alternatively, in the event that materials for the actual practical test cannot be acquired the Council may consider testing theoretically, candidates’ level of acquisition of the practical skills prescribed in the syllabus. For this alternative test, there will be two compulsory questions to be answered in 2 hours 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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| **TOPIC** | **NOTES** |
| **1. Workshop Safety Rules and Regulations**   * 1. Sources and Prevention of Hazards   2. Safety Checks in Servicing Radio Receiver   3. Safety Precautions in Television Workshop   **2. Basic Electricity**  2.1 Structure of matter  2.2 Conductors, insulators and semiconductors  2.3 Current, voltage and resistance  2.4 Electronic components  2.5 Resistors and Capacitors  2.6 Kirchhoff’s Current and Voltage Laws  2.7 Diodes and Transistors  2.8 Battery  2.9 Ohm’s law  2.10 Electric power  2.11 Direct and Alternating Current  2.12 Alternating waveform  **3. Electronic Tools and Instruments**  3.1 Electronic hand tools  3.2 Electronic measuring instruments  3.3 Fault Finding Equipment  **4. Electronics Devices and Circuits**  4.1 Meaning of Electronics and Electronic circuit  4.2 Concept of emission and photoelectric devices  4.3 Semiconductors devices  4.4 Power Supply Unit  4.5 Amplifiers  4.6 Resistive, Inductive, Capacitive (RLC) circuits  4.7 Feedback  4.8 Oscillators and Multivibrators  **5. Electronic Communication Systems**  5.1 Electronic Communication Systems  5.2 Electromagnetic spectrum  5.3 Transducer  5.4 Modulation and demodulation  5.5 Radio transmitter and receiver  5.6 Selectivity and sensitivity  5.7 Resonant circuit  5.8 Satellite Communication Systems  5.9 Television Transmitter  5.10 Image and Sound Reproduction in TV receiver  5.11 Monochrome Television Receiver  5.12 Principles of operation of Colour Television  Receiver  5.13 Principle of Colour Signal, Transmission and  Reception  **6. Workshop Practice and Maintenance**  6.1 Soldering and Desoldering in Electronic  Circuits  6.2 Electronic Repairs  6.3 Fault finding and repairs in radio receiver  6.4 Electronic Measuring Instruments  6.5 Diagnosis and Repair of Black and White TV  Receiver  6.6 Diagnose and Repair of a Colour Television  Receiver  **7. Entrepreneurship in Radio, Television and**  **Electronic Works**  7.1 Business Management and Finance  7.2 Customer Relations  7.3 Business Opportunities in Radio, TV and  Electronics works | Concept of safety  Sources of hazards  Treatments should include electric shock, damp or wet floor, wrong handling of tools, improper workshop dressing, horse play in the workshop  Preparation of work areas  Capacitor discharges  Working on power lines and live circuits  Handling of tools  Power supplies in T.V.  Picture tube  High voltage section  Component rating  Definition and structure of matter  Atomic structure  Qualitative treatment only - definition and uses  Definition, units and symbols of voltage, current and resistance  Laws of attraction and repulsion of charges  Identification of components by name, type, graphical symbol, value and rating  Treatments should include resistors, capacitors, inductors, diodes, transformers, transistors, integrated circuit etc  Graphical symbols, types, values and ratings  Colour code of resistors and capacitors  Comparison between meter measured and colour code values  Testing of capacitors  Concepts, definitions and calculations  Types, graphical symbols and structure  Treatments should include testing for diodes and transistor configuration (CC,CE and CB)  Graphical symbol of a battery( primary cell and secondary cell) and types  Testing of battery  Treatments should include difference between wet and dry cells  Definition  Symbols and relationship between voltage, current and resistance.  Resistors in series and parallel  Definition, measurement and calculation  Definitions, difference, uses and measurement of d.c. and a.c.  Definition and calculation  Treatments should include r.m.s., peak, and average values, frequency and period in an a.c. waveform  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  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  Identification of faulty meter  Identification, uses and operation  Treatments should include oscilloscope, signal tracer, digital frequency counter, logic probe, TV analyzer  Definition  Definition and application  Treatments should include types of emission e.g. Thermionic, photoelectric, field and secondary  Semiconductor theory and types  Semiconductor diodes  Treatment should include rectification, principles of operation, characteristics and application  Principle and operation, schematic diagram  Rectification and types  Filters  Construction of stabilized low d.c. power supply unit  Operation, construction and uses of Class A, B, C and AB amplifiers  Quantitative treatments only  Concept of feedback  Differences between types and their advantages  Effect of a positive feedback on amplifiers, bandwidth, noise, gain and distortion  Principle and types of oscillator  Construction of a typical oscillator circuit  Types of multivibrator  Treatments to include astable, bistable and monostable  Definition and types  Block diagram, operation and function of each stage  Noise  Definition and classification  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  Definition, types and functions  Treatments should include loudspeaker, microphone, video camera, video display unit(cathode ray tube(CRT),Liquid Crystal Display(LCD))  Definition, principle of operation and types of modulation  AM and FM waveforms and envelopes  Percentage of modulation – modulation index and modulation factor  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  Definition  Concept and function of tuner in radio receiver  Identification of tuner stage in radio receiver  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  Elements and types  Transmission and reception  Antenna  Working principle  Block diagram  Stages  Principle of scanning  Video signals  Principle of FM detection  Concept of Television  Function and operation  Application of television system  Block diagram and function of each stage  Processing of picture and sound signal  Primary colours in television  Colour television systems and standards – PAL, SECAM and NTSC  Colour signal components  Techniques and precautions  Types of solder  Types of flux – amber resin and NaCl solutions  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  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  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  Symptoms of faults  Fault clearing at each stage  Static and dynamic colour convergence comparison  Colour bar generator and signal testing  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 |

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