**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 matter2.2 Conductors, insulators and semiconductors2.3 Current, voltage and resistance2.4 Electronic components2.5 Resistors and Capacitors2.6 Kirchhoff’s Current and Voltage Laws2.7 Diodes and Transistors2.8 Battery2.9 Ohm’s law2.10 Electric power2.11 Direct and Alternating Current2.12 Alternating waveform**3. Electronic Tools and Instruments**3.1 Electronic hand tools3.2 Electronic measuring instruments3.3 Fault Finding Equipment**4. Electronics Devices and Circuits**4.1 Meaning of Electronics and Electronic circuit4.2 Concept of emission and photoelectric devices4.3 Semiconductors devices4.4 Power Supply Unit4.5 Amplifiers4.6 Resistive, Inductive, Capacitive (RLC) circuits4.7 Feedback4.8 Oscillators and Multivibrators**5. Electronic Communication Systems**5.1 Electronic Communication Systems5.2 Electromagnetic spectrum5.3 Transducer5.4 Modulation and demodulation5.5 Radio transmitter and receiver5.6 Selectivity and sensitivity5.7 Resonant circuit5.8 Satellite Communication Systems5.9 Television Transmitter5.10 Image and Sound Reproduction in TV receiver5.11 Monochrome Television Receiver5.12 Principles of operation of Colour Television  Receiver5.13 Principle of Colour Signal, Transmission and  Reception**6. Workshop Practice and Maintenance**6.1 Soldering and Desoldering in Electronic  Circuits6.2 Electronic Repairs6.3 Fault finding and repairs in radio receiver6.4 Electronic Measuring Instruments6.5 Diagnosis and Repair of Black and White TV  Receiver6.6 Diagnose and Repair of a Colour Television  Receiver**7. Entrepreneurship in Radio, Television and**     **Electronic Works**7.1 Business Management and Finance7.2 Customer Relations7.3 Business Opportunities in Radio, TV and Electronics works | Concept of safetySources of hazardsTreatments should include electric shock, damp or wet floor, wrong handling of tools, improper workshop dressing, horse play in the workshopPreparation of work areasCapacitor dischargesWorking on power lines and live circuitsHandling of toolsPower supplies in T.V.Picture tubeHigh voltage sectionComponent ratingDefinition and structure of matterAtomic structureQualitative treatment only - definition and usesDefinition, units and symbols of voltage, current and resistanceLaws of attraction and repulsion of chargesIdentification of components by name, type, graphical symbol, value and ratingTreatments should include resistors, capacitors, inductors, diodes, transformers, transistors, integrated circuit etcGraphical symbols, types, values and ratingsColour code of resistors and capacitorsComparison between meter measured and colour code valuesTesting of capacitorsConcepts, definitions and calculationsTypes, graphical symbols and structureTreatments should include testing for diodes and transistor configuration (CC,CE and CB)Graphical symbol of a battery( primary cell and secondary cell) and typesTesting of batteryTreatments should include difference between wet and dry cellsDefinitionSymbols and relationship between voltage, current and resistance. Resistors in series and parallelDefinition, measurement and calculationDefinitions, difference, uses and measurement of d.c. and a.c.Definition and calculationTreatments should include r.m.s., peak, and average values, frequency and period in an a.c. waveformTypes and usesTreatments should include screw drivers, diagonal cutters, soldering gun, soldering iron, lead sucker or de- soldering tools, pocket knife, stripper and soldering wickIdentification, uses and operationTreatments should include voltmeter, ammeter, ohmmeter, multi meterBasic a.c. and d.c. circuit, measurements of voltage, current and resistanceOhmmeter for testing semiconductor devicesIdentification of faulty meterIdentification, uses and operationTreatments should include oscilloscope, signal tracer, digital frequency counter, logic probe, TV analyzerDefinitionDefinition and applicationTreatments should include types of emission e.g. Thermionic, photoelectric, field and secondarySemiconductor theory and typesSemiconductor diodesTreatment should include rectification, principles of operation, characteristics and applicationPrinciple and operation, schematic diagramRectification and typesFiltersConstruction of stabilized low d.c. power supply unitOperation, construction and uses of Class A, B, C and AB amplifiersQuantitative treatments onlyConcept of feedbackDifferences between types and their advantagesEffect of a positive feedback on amplifiers, bandwidth, noise, gain and distortionPrinciple and types of oscillatorConstruction of a typical oscillator circuitTypes of multivibratorTreatments to include astable, bistable and monostableDefinition and typesBlock diagram, operation and function of each stageNoiseDefinition and classificationPropagation of radio wavesRadio frequency band- VLF, LF, MF, HF, VHF, UHF,SHF and EHFApplication of frequency range in electronic communication – frequency spectrum to be intensifiedDefinition, types and functionsTreatments should include loudspeaker, microphone, video camera, video display unit(cathode ray tube(CRT),Liquid Crystal Display(LCD))Definition, principle of operation and types of modulationAM and FM waveforms and envelopesPercentage of modulation – modulation index and modulation factorMeaning and function of carrier wave in radio communication.Definition and types of demodulationFunction(s) and operationBlock diagram and function of each stageTypes of radio receivers – Tuned Radio Receiver(TRF), super heterodyne receivers(FM and AM)Advantages and disadvantages of eachDefinitionConcept and function of tuner in radio receiverIdentification of tuner stage in radio receiverDefinition, types of resonance ( series and parallel)Concept of bandwidth and bandwidth rangesCalculation involving frequency ranges to determine bandwidthTreatments should include derivation of the formula for resonant frequencyElements and typesTransmission and reception AntennaWorking principleBlock diagram Stages Principle of scanningVideo signalsPrinciple of FM detectionConcept of Television Function and operationApplication of television systemBlock diagram and function of each stageProcessing of picture and sound signalPrimary colours in televisionColour television systems and standards – PAL, SECAM and NTSCColour signal componentsTechniques and precautionsTypes of solderTypes of flux – amber resin and NaCl solutionsDismantling and reassembling of power supply unit in a radio setDismantling and reassembling RF, IF detector Stages in a radio receiver setAF amplifier circuitInstallation and maintenance of a car radio setDiagnose fault by using fault finding pieces of equipment and logical trouble shooting procedureComponents responsible for faultsRemedies for the faultsAlignment of RF and IF stages of a radio set using the necessary equipment and toolsUse of multimeterTreatments should include measurement of the correct value of current, voltage and resistance in active and passive electronic components and circuitsProcedure for TV repairsUse of service information manual and circuit diagramIdentification of symptoms and repair of faultsFault clearing instrumentsSymptoms of faultsFault clearing at each stage Static and dynamic colour convergence comparisonColour bar generator and signal testingAccounting practicesCost benefit analysisPurchasing methodBusiness records(Accounting ledger, Repair order form, Inventory sheet)Sources of capital e.g. Banks and Credit UnionsDaily appearance at workCustomer psychologyWorking relationsTelephone courtesyBusiness Opportunities in Radio and TV WorkSatellite installationElectronic specialistRadio and TV consultantRadio and TV technicianSales and Service Craft manAntenna 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)