

*NVC IN RADIO, TV AND GSM SERVICING (DRAFT)*

**NATIONAL BOARD FOR TECHNICAL EDUCATION**

**NATIONAL VOCATIONAL CERTIFICATE**

**IN**

**RADIO, TV AND GSM SERVICING**

**CURRICULUM AND COURSE SPECIFICATIONS**

*2007*

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*PLOT 'B' BIDA ROAD, P.M.B. 2239, KADUNA - NIGERIA*

## ***NVC IN RADIO, TV AND GSM SERVICING (DRAFT)***

### **PROGRAMME STRUCTURE AND NOMENCLATURE**

The Programme which will lead to the attainment of the National Vocational Certificate in Radio, TV and GSM Servicing will be taken in flexible modular curricula. The programme shall have a cogent and flexible structure and content that will equip the trainee with a unit of acquired skills.

### **INDUSTRIAL EXPERIENCE**

The students will be required to be attached to relevant organization for a period of three months in each part for supervised and graded industrial work attachment to enable them have the relevant experience in the profession. Hence, term three of each part is dedicated for the attachment.

### **METHODS OF ASSESSMENT**

Assessment for the programme shall be:-

- a) Based on evidence of a practical attainment as presented by the student
- b) Conform with the learning outcome as stipulated in the curriculum
- c) Enable the student take an assessment examination under supervised conditions and assessed by external assessors to ensure a justifiable judgment on quality and quantity of the desired standard that expected to have been achieved.

### **PRACTICAL CONTENT**

The NVC programme curriculum prescribes 80% practical content 15% Theoretical studies and 5% General studies components.

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### **GOAL AND OBJECTIVES**

The National Vocational Certificate in Radio, TV and GSM Servicing is designed to produce craftsmen who will possess adequate practical skills and knowledge in the servicing of radio, television and GSM electronics gadgets.

### **OBJECTIVES OF THE PROGRAMME:**

- a. Equip the students with adequate training in electronics servicing.
- b. Prepare and produce craftsmen who will be competent in carrying out installation, maintenance and repairs of satellite dishes, wireless phones, radio and television.

### **1.0 Entry requirements for National Vocational Certificate in Radio, TV and GSM Servicing.**

The general entry requirements for the NVC Programme are:-

- a. Basic Education products
- b. Post-Secondary students who are unable to gain access to higher education or IEIs, who may have less than 5 credits
- c. Those out of school for a long time.

### **2.0 Curriculum**

The curriculum of NVC programme consists of four main components. These are:

- i. General Studies
- ii. Foundation Studies
- iii. Professional Courses
- iv. Students Industrial Work Experience (SIWES)

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The General Education component shall include courses in: - Communication Skills, Entrepreneurship and ICT.

- 1.1 The General Education component shall account for not more than 5% of the total hours for the programme.
- 1.2 Foundation Courses include courses in Basic Electricity/Electronics, Technical Drawing, Physics and Chemistry. The number of hours will vary from with the programme.
- 1.3 Professional Courses are courses which give the students the theory and practical skills he or she needs to practice the field. These account for 85% of the total contact/hours.

### **2.0 Curriculum Structure**

The structure of the NVC programme consists of six terms of classroom and workshop activities, and three term of industrial attachment.

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**CURRICULUM TABLE FOR NATIONAL VOCATIONAL CERTIFICATE (NVC) IN RTV GSM REPAIRS**

**PART I**

<i>TERM I</i>					<i>TERM II</i>					<i>TER M III</i>
<b>Course Code</b>	<b>Course Title</b>	<b>L</b>	<b>P</b>	<b>TWH</b>	<b>Course Code</b>	<b>Course Title</b>	<b>L</b>	<b>P</b>	<b>TWH</b>	<b>Industrial Attachment (3 months)</b>
CSK 111	Communication Skills I	1	-	1	CSK 121	Communication Skills II	1	-	1	
VMT 111	Mathematics I	1	-	1	VMT 121	Mathematics II	1	-	1	
VPH 111	Physics I	1	2	3	VPH 121	Physics II	1	2	3	
VCH 111	Chemistry I	1	2	3	VCH 121	Chemistry II	1	2	3	
VBE 111	Basic Electricity/Electronics I	1	3	4	VBE 121	Basic Electricity/Electronics II	1	3	4	
VTD 111	Technical Drawing I	-	3	3	VTD 121	Technical Drawing II	-	3	3	
VRG 111	Electronics Amplifiers I	2	3	5	VRG 121	Electronics Amplifiers II	2	3	5	
VRG 112	Electronics Circuit & Symbols I	2	3	5	VRG 122	Electronics Circuit & Symbols	2	3	5	
<b>TOTAL CONTACT HOURS</b>		<b>9</b>	<b>16</b>	<b>25</b>	<b>TOTAL CONTACT HRS</b>		<b>9</b>	<b>16</b>	<b>25</b>	

**PART II**

<i>TERM I</i>					<i>TERM II</i>					<i>TER M III</i>
<b>Course Code</b>	<b>Course Title</b>	<b>L</b>	<b>P</b>	<b>TWH</b>	<b>Course Code</b>	<b>Course Title</b>	<b>L</b>	<b>P</b>	<b>TWH</b>	<b>Industrial Attachment (3 months)</b>
CSK 211	Communication Skills III	1	-	1	CSK 221	Communication Skills IV	1	-	1	
VMT 211	Mathematics III	1	-	1	VMT 221	Mathematics IV	1	-	1	
VPH 211	Physics III	1	2	3	VPH 221	Physics IV	1	2	3	
VCH 211	Chemistry III	1	2	3	VCH 221	Chemistry IV	1	2	3	
VTD 211	Technical Drawing III	-	3	3	VTD 221	Technical Drawing IV	-	3	3	
ICT 211	Info. & Comm. Tech. I	1	-	1	ICT 221	Info. & Comm. Tech. II	1	-	1	
ENT 211	Entrepreneurship I	1	-	1	ENT 221	Entrepreneurship II	1	-	1	
VRG 211	Radio Communications I	2	6	8	VRG 221	Radio Communications II	2	6	8	
VRG212	Television System I	2	6	8	VRG222	Television System II	2	6	8	
<b>TOTAL CONTACT HOURS</b>		<b>10</b>	<b>19</b>	<b>29</b>	<b>TOTAL CONTACT HRS</b>		<b>10</b>	<b>19</b>	<b>29</b>	

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**PART III**

<i>TERM I</i>					<i>TERM II</i>					<i>TER M III</i>
<b>Course Code</b>	<b>Course Title</b>	<b>L</b>	<b>P</b>	<b>TWH</b>	<b>Course Code</b>	<b>Course Title</b>	<b>L</b>	<b>P</b>	<b>TWH</b>	<b>Industrial Attachment (3 months)</b>
CSK 311	Communication Skills V	1	-	1	CSK 321	Communication Skills VI	1	-	1	
VMT 311	Mathematics V	1	-	1	VMT 321	Mathematics VI	1	-	1	
VTD 311	Technical Drawing V	-	3	3	VTD 321	Technical Drawing VI	-	3	3	
VRG 311	Satellite System I	2	6	8	VRG 321	Satellite System II	2	6	8	
VRG 312	Mobile Phones Repairs I	-	6	6	VRG 322	Mobile Phones Repairs II	2	6	8	
VRG 313	Project	-	6	6	VRG 323	Project	-	6	6	
	<b>TOTAL CONTACT HOURS</b>	<b>6</b>	<b>21</b>	<b>27</b>			<b>6</b>	<b>21</b>	<b>27</b>	

***NVC IN RADIO, TV AND GSM SERVICING (DRAFT)***

**Programme:** RTV AND GSM SERVICING

**Module:** Basic Electricity/Electronics

**Code:** VBE 111/121

**Duration:** **Hours/Week: 4**                      **Theory: 1HR**                      **Practical: 3 HRS**

**Goal:** The module is designed to provide the trainees with basic knowledge and practical skills in electricity/electronics.

**General Objectives:**

On completion of this module, the trainees should be able to:

- 1.0 Understand the structure of matter and its relevance to electricity
- 2.0 Understand the sources of electromotive force
- 3.0 Know the constructional features of resistors, capacitors, inductors, and their values using colour codes.
- 4.0 Understand basic circuit laws and their applications
- 5.0 Understand the principles of AC and DC quantities (current, voltage and impedance)
- 6.0 Understand the principles of magnetism and electromagnetism
- 7.0 Understand the basic principles of common electronics devices (diodes, transistors, IC's, including thermal devices
- 8.0 Understand the operation, uses and limitations of electrical measuring instruments.

**NVC IN RADIO, TV AND GSM SERVICING (DRAFT)**

<b>PROGRAMME:</b> RTV AND GSM SERVICING						
<b>COURSE:</b> Basic Electricity/Electronics			<b>COURSE CODE:</b> VBE 111 - 121		<b>CONTACT HOURS:</b> 4 HRS/WEEK	
<b>GOAL:</b> The module is designed to provide the trainees with basic knowledge and practical skills of electricity/electronics.						
<b>COURSE SPECIFICATION: Theoretical Contents: 1HR/WK</b>				<b>Practical Contents: 3HRS/WK</b>		
<b>General Objective:</b> 1.0: Understand the structure of Matter and its relevance to electricity <b>PART I, TERM 1</b>						
<b>WEEK</b>	<b>Specific Learning Objective</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>	<b>Specific Learning Objective</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>
1-2	1.1 Define: (a) Molecule (b) Electron (c) Atom (d) Electric charge (e) Electric current (f) Coulomb  1.2 Explain the differences between positive and negative charges 1.3 Distinguish between insulators, conductors and semiconductors	<ul style="list-style-type: none"> <li>▪ With aid of diagrams explain atom, electron, proton, molecule, electric charge, electric current, Coulomb.</li> <li>▪ Give full explanation of the difference between +ve and -ve charge.</li> <li>▪ Describe how electricity flows.</li> <li>▪ Explain insulator and conductors with sample</li> </ul>	Diagrams Chalkboard			



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<b>General Objective: 2.0:</b> Understand the sources of electromotive force		<b>PART I, TERM 1</b>				
<b>WEEK</b>	<b>Specific Learning Objective</b>	<b>Teachers’/Students’ Activities</b>	<b>Learning Resources</b>	<b>Specific Learning Objective</b>	<b>Teachers’/Students’ Activities</b>	<b>Learning Resources</b>
<b>3-5</b>	2.1 Define (a) Electric power (b) Energy  2.2 Distinguish between e.m.f. and potential difference (p.d) 2.3 Explain the following: (a) Primary cells (b) Secondary cells  2.4 Test for the condition of a cell or battery 2.5 Determine the equivalent of cells connected in: (a) Series (b) Parallel (c) Series - Parallel 2.6 Explain the effects of internal resistance on battery voltage output.	<ul style="list-style-type: none"> <li>▪ Explain electric power and energy stating their unit, symbol and formula. Work problems based on Power and Energy</li> <li>▪ Distinguish the differences between emf and p.d.</li> <li>▪ Show primary and secondary cells and describe their construction.</li> <li>▪ Use instruments and visual observation to show how to test cell condition.</li> <li>▪ Show how cells can be connected in series, and series-parallel. Advantages of cells in series or</li> </ul>	Wet and dry batteries Hydrometer Voltmeter	Connect batteries in : series, parallel and series – parallel  Test the condition of each connection above using multimeter.	Guide students to connect batteries in: series, parallel and series-parallel.	Wet and dry batteries Hydrometer Voltmeter

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		<p>parallel connections. e.g. voltage in series and in parallel</p> <ul style="list-style-type: none"><li>▪ Explain with calculations how resistance affects battery voltage.</li></ul>				
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	<p><b>General Objective: 3.0:</b> Know the constructional features of resistors, capacitors, inductors and their values using colour codes.</p>					<p><b>PART I, TERM 1</b></p>
WEEK	Specific Learning Objective	Teachers'/Students' Activities	Learning Resources	Specific Learning Objective	Teachers'/Students' Activities	Learning Resources
<b>6-9</b>	<p>3.1 Explain the various types and sizes of the following:</p> <p>i) Resistors ii) Capacitors</p>	<ul style="list-style-type: none"> <li>▪ Guide students to identify different types of resistors, capacitors and</li> </ul>	<p>Assorted resistors, capacitors, and inductors,</p>	<p>Demonstrate by experiment resistors in Series and in Parallel</p>	<p>Guide students to perform experiment to determine effect of capacitors</p>	<p>Assorted capacitors and resistors. Multimeters</p>

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	<p>iii) Inductors</p> <p>3.2 Explain the functions of the following types of resistors:</p> <p>i) Wire wound resistor</p> <p>ii) Variable resistor</p> <p>iii) Fixed resistors</p> <p>3.3 Describe the constructional details of the following:</p> <p>i) Resistors</p> <p>ii) Capacitors</p> <p>iii) Inductors</p> <p>3.4 Explain power ratings of resistors and capacitors</p> <p>3.5 Explain colour coding of</p> <p>(i) resistors</p> <p>(ii) capacitors</p> <p>3.6 Using colour coding, calculate the values of various resistors and capacitors.</p>	<p>inductors.</p> <p>Guide students to:</p> <ul style="list-style-type: none"> <li>▪ Describe on the chalkboard the constructional detail of the three.</li> <li>▪ Explain power rating of resistor.</li> <li>▪ Show how to identify the power rating of each resistor.</li> <li>▪ Explain the application of resistor in a circuit.</li> <li>▪ Explain the maximum working voltage of a capacitor.</li> </ul>	<p>Wire wound resistors and rheostat.</p> <p>Multimeters.</p>	<p>Demonstrate by experiments the effect of connecting capacitors in series and in parallel</p> <p>Demonstrate by experiment Ohms law: <math>R = V/I</math></p> <p>Use materials like charcoal, etc to fabricate carbon resistors.</p> <p>Use meter to determine the value of the resistor and indicate with colours.</p>	<p>connected in series and parallel.</p> <p>Guide students to fabricate carbon resistors.</p>	<p>Charcoal</p> <p>Copper wire</p>
	<p><b>General Objective: 4.0:</b> Understand basic circuit laws and their applications <b>PART I, TERM 1</b></p>					
WEEK	Specific Learning Objective	Teachers'/Students' Activities	Learning Resources	Specific Learning Objective	Teachers'/Students' Activities	Learning Resources
10-12	<p>4.1 Define Ohm's Law</p> <p>4.2 Using Ohm's Law, determine the values of resistance voltage and current.</p>	<p>Guide students to:</p> <ul style="list-style-type: none"> <li>▪ Work out some calculations on Ohm's law</li> <li>▪ Connect resistors</li> </ul>	<p>Assorted resistors, capacitors, and inductors, Wire wound</p>	<p>Demonstrate by experiment – Kirchoff's laws</p> <p>Demonstrate by experiment the</p>	<p>Guide students to carryout the experiment above.</p>	<p>Training Modules or Kits</p>

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	<p>4.3 Determine using Ohm’s law the current flowing in a circuit of resistors connected in series, parallel and series-parallel.</p> <p>4.4 Determine the equivalent options connected in series and parallel.</p> <p>4.5 Calculate the inductance and capacitance connected in series and parallel.</p> <p>4.6 Define Kirchoff’s Laws:          i) current law          ii) voltage law          Solve simple problems on 4.7 (I &amp;ii) above</p> <p>4.7 Solve simple problems using superposition theorem.</p>	<p>in series, parallel and series-parallel and perform calculations.</p> <ul style="list-style-type: none"> <li>▪ Connect capacitor in series, parallel and in series-parallel.</li> <li>▪ Work samples of Capacitors and inductor in series parallel.</li> <li>▪ Define the laws. Use vector diagram to explain the current law e.g. <math>I_1 + I_2 + I_5 = I_3 + I_4</math></li> <li>▪ Define the voltage laws. Draw a simple circuit to illustrate the law,</li> <li>▪ State the laws. Draw a simple circuit to illustrate the law</li> <li>▪ Superposition theorem. Use simple circuit to illustrate the theorem.</li> </ul>	<p>resistors and rheostat. Multimeters.</p>	<p>Superposition theorem.</p>		
<b>COURSE SPECIFICATION: Theoretical Content: 1 HR/WK</b>				<b>Practical Content: 3HRS/WK</b>		

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		<b>PART I, TERM II</b>				
<b>General Objective: 5.0:</b> Understand the principles of AC & DC quantities.						
<b>WEEK</b>	<b>Specific Learning Objective</b>	<b>Teachers Activities</b>	<b>Learning Resources</b>	<b>Specific Learning Objective</b>	<b>Teachers Activities</b>	<b>Learning Resources</b>
<b>1-2</b>	5.1 Define AC quantities (peak value, mean value etc) 5.2 Distinguish between AC and DC quantities 5.3 Solve simple problems using the above values. 5.4 Describe R,L,C in AC circuit. 5.5 Use simple circuit to calculate inductive and capacitive reactance $X_L = 2\pi fL$ (Inductive Reactance) $X_C = 1/2 (\pi f c)$ (capacitive Reactance)	<ul style="list-style-type: none"> <li>▪ Draw diagrams to explain AC variables like RMS, mean value, etc.</li> <li>▪ Work some samples on how to calculate the variables above</li> <li>▪ State the effect of AC on R, L, C in parallel i.e. voltage and current relationships</li> <li>▪ State the effect on a resistor in AC circuit.</li> <li>▪ State the meaning and effect inductive and capacitive reactance and carry out some calculation on <math>X_L</math>, <math>X_C</math>, (like <math>X_C</math> above)</li> </ul>		Demonstrate by experiment self induction. Natural induction of a coil R & L in series AC circuit, R&C in series AC circuit R & L in parallel AC circuit and R&C in parallel AC circuit Demonstrate by experiment series resonance in Ac and Parallel resonance in AC circuits. Plot graphs for both series and parallel resonance. Determine the Q-factors	Guide students to design and construct simple series and parallel circuits involving R, C and L in AC circuits. Guide students to wind a coil on a former to determine self induction and natural induction;	Rewinding wires transformer Multimeter and assorted resistors, capacitors, and inductors.

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<b>General Objective: 6.0:</b> Understand the principles of Magnetism and Electromagnetism <b>PART I, TERM II</b>						
<b>WEEK</b>	<b>Specific Learning Objective</b>	<b>Teachers’/Students’ Activities</b>	<b>Learning Resources</b>	<b>Specific Learning Objective</b>	<b>Teachers’/Students’ Activities</b>	<b>Learning Resources</b>
<b>3-5</b>	6.1 Explain the concept of magnetism Explain: i) temporary and permanent magnet ii) Magnetic field iii) Magnetic poles iv) Law of attraction and repulsion 6.2 Explain the effect of fields as applied to electromagnetism 6.3 Explain the principles of a transformer 6.4 Explain types of losses in transformer 6.5 Calculate transformer efficiency and losses	Guide students to: <ul style="list-style-type: none"> <li>▪ Define magnet and explain temporary, permanent and natural magnet.</li> <li>▪ Define laws of magnet, show diagram where necessary.</li> <li>▪ Show and explain magnetic fields.</li> <li>▪ Explain fully mode of winding of transformer.                Explain <math display="block">\frac{V_p}{N_p} = \frac{V_s}{N_s}</math> </li> <li>▪ Show lamination and</li> </ul>	Bar Magnets. Horse-shoe magnets. Different types of transformers with laminations.	Demonstrate how to: Wind wires on a former to have a solenoid to create electromagnetic fields by plunging in and out a bar magnet.  Wind a simple single phase double wound transformer.	Guide students to construct solenoid. Plunge a bar magnet in and out of a solenoid to create electromagnetic fields.	Bar Magnets. Horse-shoe magnets. Different types of transformers with laminations.

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		<p>explain reasons for lamination.</p> <ul style="list-style-type: none"><li>▪ List and explain iron and copper loss and how to reduce them</li><li>▪ Explain efficiency and some sample on efficiency</li><li>▪ Demonstrate how to construct double wound transformer.</li><li>▪ Explain fully different type of transformers e.g. power, isolation auto transformer etc.</li><li>▪ Make available for inspection a number of examples</li></ul>				
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<b>General Objective: 7.0:</b> Understand the principles of common electronics devices (diodes, transistors, ICs, etc). <b>PART I, TERM II</b>						
<b>WEEK</b>	<b>Specific Learning Objective</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>	<b>Specific Learning Objective</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>
<b>10-12</b>	7.1 Explain the basic concepts of: i) Electronic emission ii) Semi conductor 7.2 Explain the principle of operation of thernionic diode 7.3 Explain the principle of operation of semi-conductor diode. 7.4 Explain the principle of operation of a transistor. 7.5 Explain types of transistors and use of heat sink. 7.6 Show the effect of load on gain of a transistor. 7.7 Describe the operation of photo-electric device like photocell etc. 7.8 Explain IC. 7.9 Describe the principles of operation of an Oscilloscope	Test various types of diodes and transistors  Use meter to identify the base(s) emitter (E) and collector ©  Describe the construction and application of special solid state devices: i. Zener diode ii. Tunnel diode iii. Light Emitting diode iv. Unijunction v. FET vi. Thyresistor	Different types of diodes, transistor ICs, etc. Oscilloscope.	Demonstrate by experiment the characteristic of the following: i. diode ii. transistor iii. zener diode iv. tunnel diode v. light emitting diode, etc.	Guide students to carry out experiment to determine the characteristic of thesemiconductor diodes and transistor.  Guide students to test the built circuits using Oscilloscope.	Solid state devices. Experiment modules.

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<b>General Objective: 8.0:</b> Understand the operation, uses and limitations of electrical measuring instruments. <b>PART I, TERM II</b>						
<b>WEEK</b>	<b>Specific Learning Objective</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>	<b>Specific Learning Objective</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>
6-9	8.1 Explain the principles of operation of a multi-meter. 8.2 Explain the principles of operation of digital multi-meter and analogue multi-meter. 8.3 Describe the use of analogue metre to measure voltage, current and resistance in AC/DC circuits. 8.4 Explain the limitations of (8.3) above. 8.5 Describe the principles of operation of an Oscilloscope.	Guide students to: <ul style="list-style-type: none"> <li>▪ describe the parts, operation and uses of multimeter.</li> <li>▪ demonstrate how to use the instrument in measuring current voltage and resistance both on AC and DC</li> <li>▪ use the multimeter to test diode, transistors etc.</li> </ul>	Analogue and digital meters Oscilloscope	Dismantle a multimeter to explain the functional parts. Dismantle both analogue and digital meter to explain their differences Use both analogue and digital meters to test different circuits.  Demonstrate how to operate Oscilloscope.	Guide students to dismantle both analogue and digital multimeters.  Guide students to test a built circuit using Oscilloscope.	Analogue and digital meters Oscilloscope
<b>ASSESSMENT: Theory -20% : Practical – 80%</b>						

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**Programme:** RTV AND GSM SERVICING

**Module:** Electronics Circuits and Symbols

**Code:** VRG 112/122

**Duration:** **Contact Hours/Week: 5Hrs. Theory: 2Hr. Practical: 3 Hrs.**

**Goal:** This module will provide the trainees the knowledge and practical skills of constructing simple electronics circuits

**General Objectives**

On completion of this module, the trainee should be able to:

- 1.0 Know the basic principles of simple electronic circuits
- 2.0 Understand the block and basic diagrams in circuit development
- 3.0 Understand the electronics signs and symbols
- 4.0 Know the fundamentals of logic circuits
- 6.0 Understand the principles and construction of power supply unit.

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<b>PROGRAMME: RTV, ELECTRONICS AND GSM SERVICING</b>						
<b>COURSE: Electronics Circuit and Symbol</b>			<b>COURSE CODE: VRG 112/122</b>		<b>CONTACT HOURS/WEEK: 5 Hrs.</b>	
<b>GOAL: This module will provide the trainee the knowledge and practical skills of constructing simple electronics circuits.</b>						
<b>COURSE SPECIFICATION: Theoretical Contents: 2 Hr/Wk.</b>				<b>Practical Contents: 3 Hrs/Wk.</b>		
<b>General Objective: 1.0: Know the basic principles of simple electronic circuits. PART I, TERM I</b>						
<b>WEEK</b>	<b>Specific Learning Objective</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>	<b>Specific Learning Objective</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>
<b>1-5</b>	1.1 Explain the difference between series and parallel circuit. 1.2 Calculate the total resistance in a series d.c. circuit. 1.3 Calculate the voltage drop across each resistor of a single loop circuit (series) 1.4 Calculate the current in each branch of a multi-loop (parallel) circuit of a parallel circuit. 1.5 Calculate impedance in an a.c. circuit. 1.6 Explain the meaning of resonance in series and parallel circuits. 1.7 Define: <ul style="list-style-type: none"> <li>i) Q-factor</li> <li>ii) Bandwidth.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Define an electric circuit.</li> <li>▪ Illustrate single-loop circuit and multiple loop circuit</li> <li>▪ Guide students to solve simple problems on simple single loop (series) and multiple-loop (parallel) circuit consisting of e.m.f and resistors.</li> <li>▪ Solve problem</li> </ul>		Construct circuits to show the current and voltage relationship in inductive and capacitive circuits.  Carryout an experiment fo show the relationship between voltage current in an inductive circuit.  Carryout an experiment to show the relationship between voltage current in an capacitive circuit.  R.L.C.  Demonstrate the principle of resonance using simple tuned circuit.	Guide students to carryout the experiment.	Training modules or discrete components such as <ul style="list-style-type: none"> <li>- capacitors</li> <li>- inductors</li> <li>- resistors</li> <li>-transistors</li> <li>- Avometer</li> <li>Variable power supply</li> </ul>

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		<p>concerning p.d across resistors and capacitors.</p> <ul style="list-style-type: none"><li>▪ Guide students to solve some calculation</li><li>▪ Carry out experiment to show the effect of resistor in series and in parallel.</li><li>▪ Show how to calculate the current in each branch.</li><li>▪ Guide students to calculate voltage and current in series and parallel cells.</li><li>▪ Calculate voltage &amp; current in series and parallel circuit.</li><li>▪ Define power factor (p.f) and</li></ul>				
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		<p>show its effect on phasor diagrams with some worked examples.</p> <ul style="list-style-type: none"><li>▪ Define impedance, state the symbols, unit and formula</li><li>▪ Calculate impedance</li><li>▪ Draw and explain resonance in series and parallel and simple calculations.</li><li>▪ Define Q-factor, Bandwidth and resonant frequency. State the relationships among the three.</li><li>▪ Solve some problems on the three.</li></ul>				
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**NVC IN RADIO, TV AND GSM SERVICING (DRAFT)**

<b>General Objective: 2.0: Understand the block and basic diagrams in circuit development. PART I, TERM I</b>						
<b>WEEK</b>	<b>Specific Learning Objective</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>	<b>Specific Learning Objective</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>
<b>6-10</b>	2.1 Describe different types of diagram used in electronics circuits. 2.2 Explain the purpose of block and flow diagrams. 2.3 Explain symbols used in preparation of block and flow diagrams used in electronics circuits. 2.4 Explain different types of electronics symbols (e.g logic)	<ul style="list-style-type: none"> <li>▪ Guide students to know how blocks and flow diagrams can be used to describe flow of information.</li> <li>▪ Draw different types of symbols used and sequence of arrangements when drawing block, flow logic.</li> <li>▪ Explain the difference between flow diagrams and block diagrams used for example to illustrate the difference.</li> <li>▪ Explain methods to be</li> </ul>	Drawing instruments.	Describe drafting procedure for preparing block diagram.  Demonstrate the use of different types of electronics symbols (e.g logic) in circuits.	Guide students to draw block and schematic diagrams.  Guide students to interpret various types of diagrams	Drawing instruments.

*NVC IN RADIO, TV AND GSM SERVICING (DRAFT)*

		<p>used to prepare good diagrams</p> <ul style="list-style-type: none"><li>▪ Draw logic symbols and their functions using truth table</li><li>▪ Draw block diagrams for common electronic systems e.g. Radio, TV.</li><li>▪ Draw flow diagram for producing typical items in an industry.</li></ul>				
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***NVC IN RADIO, TV AND GSM SERVICING (DRAFT)***

		<b>General Objective: 3.0: Understand the electronics signs and symbols</b>					<b>PART I, TERM I</b>
<b>WEEK</b>	<b>Specific Learning Objective</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>	<b>Specific Learning Objective</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>	
<b>11-12</b>	3.1 Explain the use of electronic symbols in schematic diagrams. 3.2 Explain electronic symbols through circuit application e.g. in simple amplifier. 3.3 Explain the purpose of schematic diagram. 3.4 Identify basic circuit which makes up a complete electronic device. 3.5 Explain how to trace a diagram of popular circuits e.g. single-stage, common –emitter amplifier, 2-stage CE amplifier supply units receiver, circuit, etc. 3.6 Explain symmetry and balance in drawing schematic drawings.	Guide students to: <ul style="list-style-type: none"> <li>▪ Explain why standard symbols are used in circuits.</li> <li>▪ identify as many components as possible and explain their functions.</li> <li>▪ sketch the exact physical resemblance of common components.</li> </ul>	Drawing instruments.	Demonstrate the sketches of physical structures of common components e.g. resistors, capacitors, transformers, diodes, transistors, switches etc.  Demonstrate symbol placement and space arrangement for maximum legibility.  Demonstrate how to convert a bread-board circuit into a proper schematic diagram.	Guide students to make sketches of the components.  Guide students to carry out components arrangement on bread-board.  Guide students to convert a bread-board circuit into a proper schematic diagram.	Drawing instruments. Pliers Longnose Chemical	

**NVC IN RADIO, TV AND GSM SERVICING (DRAFT)**

COURSE SPECIFICATION: Theoretical Content: 2 HR/WK				Practical Content: 3HRS/WK		
General Objective 4.0: Know the fundamentals of logic circuits.				PART I, TERM II		
WEEK	Specific Learning Outcome	Teachers'/Students' Activities	Learning Resources	Specific Learning Objective	Teachers'/Students' Activities	Learning Resources
1-6	4.1 Explain the use of binary number in electronic circuits. 4.2 Explain simple logic gates such as: (i) AND (ii) OR (iii) NOT (iv) NOR 4.3 Draw the symbols above in 5.2 4.4 State Boolean postulates. 4.5 Define the combination in logic gates: NAND, NOR.	<ul style="list-style-type: none"> <li>▪ Guide students to convert decimal numbers to binary..</li> <li>▪ Guide students to connect diodes, transistor etc to illustrate the following gates: AND, OR and NOT gates</li> <li>▪ Guide student to write the truth tables for AND, OR and NOT gates</li> </ul>	Logic module trainer kit	Construct simple circuits using logic gates.	Guide students to connect logic gates to illustrate the following functions: NAND, OR and NOR Write the truth tables for NAND and NOR gates	Logic module or trainer kit

**NVC IN RADIO, TV AND GSM SERVICING (DRAFT)**

	<b>General Objective 5.0: Understand the Principles of Construction and Operation of Power Supply.</b>			<b>PART I, TERM II</b>		
<b>WEEK</b>	<b>Specific Learning Outcome</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>	<b>Specific Learning Objective</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>
<b>7-12</b>	<p>5.1 Describe the principle of operation of a power supply unit.</p> <p>5.2 Explain the waveform at various points of power supply.</p> <p>5.3 Identify half wave and full wave rectification.</p> <p>5.4 Differentiate between half and full wave rectifiers and state their advantages and disadvantages.</p> <p>5.6 Explain the effect of capacitors and inductors in a power supply.</p>	<ul style="list-style-type: none"> <li>▪ Introduce a power supply unit to the students.</li> <li>▪ Show with the aid of a schematic diagram the place of a power supply in a electronic circuit.</li> <li>▪ Illustrate the concept of half-wave and full-wave rectification.</li> <li>▪ Distinguish between half-wave and full-</li> </ul>	<p>Power supply unit</p> <p>Oscilloscope</p>	<p>Construct and test stabilized power supply unit.</p>	<p>Guide students to construct and test a stabilized low-voltage power supply unit.</p> <p>Supervise the construction of a stabilized low-voltage power supply unit.</p>	<p>Bread-board.</p> <p>Assorted resistors, capacitors.</p> <p>Zenner diode</p> <p>Oscilloscope</p> <p>Multimeter</p> <p>transformer.</p>

***NVC IN RADIO, TV AND GSM SERVICING (DRAFT)***

		<p>wave rectifier circuits, stressing the advantages and disadvantages.</p> <ul style="list-style-type: none"> <li>▪ Illustrate the use of capacitors and inductors in power supply unit. Discuss their effect on the output of a power supply.</li> <li>▪ Explain the waveforms of various stages of a power supply</li> </ul>				
	<p>5.7 Explain the difference between voltage regulator and stabilizer.</p> <p>5.8 Explain Switching mode power supply. Cover theory of operation, and evaluate performance using a circuit diagram.</p> <p>5.8 Distinguish between power supply with transformer and power supply without transformer.</p>	<ul style="list-style-type: none"> <li>▪ Explain the function of a regulator and a stabilizer in a power supply unit.</li> <li>▪ Showt power supply: (i) with transformer and (ii) without a transformer.</li> </ul>				
<p><b><i>ASSESSMENT: Theory -20% : Practical – 80%</i></b></p>						

*NVC IN RADIO, TV AND GSM SERVICING (DRAFT)*

**Programme:** RTV AND GSM SERVICING

**Module:** Electronics Amplifiers

**Code:** VRG 111/121

**Duration:** **Contact Hours/Week:** 5 Hrs. **Theory:** 2Hrs. **Practical:** 3 Hrs.

**Goal:** The module is intended to provide the trainees with the basic knowledge and practical skills in amplifier circuits.

**General Objectives:**

On completion of this module, the trainees should be able to:

- 1.0 Understand the principles of amplifiers and their operations
- 2.0 Understand the principles of feed back circuits
- 3.0 Understand the principles of operational amplifiers

**NVC IN RADIO, TV AND GSM SERVICING (DRAFT)**

<b>PROGRAMME: RTV AND GSM SERVICING</b>						
<b>COURSE: Electronics Amplifier</b>			<b>COURSE CODE: VRG 111/121</b>	<b>CONTACT HOURS: 5 HRS/WK</b>		
<b>GOAL:</b> The module is intended to provide the trainees with the basic knowledge and practical skills in amplifier circuits.				<b>PART I, TERM I</b>		
<b>COURSE SPECIFICATION: Theoretical Contents: 2HRS/WK</b>				<b>Practical Contents: 3HRS/WK</b>		
<b>General Objective 1.0:</b> Understand the principles of amplifiers and their operations						
<b>WEEK</b>	<b>Specific Learning Outcome:</b>	<b>Teachers’/Students’ Activities</b>	<b>Learning Resources</b>	<b>Specific Learning Objective</b>	<b>Teachers’/Students’ Activities</b>	<b>Learning Resources</b>
<b>1-12</b>	1.1 Describe the operation of various classes of amplifier e.g. Class A, AB, Class B, Class C. 1.2 Explain the meaning of frequency response of amplifier. 1.3 Distinguish between power and voltage amplifiers. 1.4 Explain the operation of AF Amplifiers a. Explain the operation of Tuned amplifier b. Explain the operation of single stage and push pull amplifier c. Cascades	Guide students to: - explain the operation of various classes of Amplifier. - explain the meaning of frequency response of amplifier. - distinguish between power and voltage amplifier. - explain the operation of Tuned amplifier push-pull and cascade.	Radio sets Oscilloscope Signal generator	.Carry out an experiments to determine the frequency response of the various type of amplifier in 1.1 – 1.4 above.	Guide students to construct and test the frequency response of the various types of amplifiers.	.Oscilloscope Signal generator Soldering iron

**NVC IN RADIO, TV AND GSM SERVICING (DRAFT)**

	amplifiers					
<b>COURSE SPECIFICATION: Theoretical Contents: 2HRS/WK</b>				<b>Practical Contents: 3HRS/WK</b>		
<b>General Objective: 2.0</b> Understand the principles of feedback circuit				<b>PART I, TERM II</b>		
<b>WEEK</b>	<b>Specific Learning Outcome:</b>	<b>Teachers’/Students’ Activities</b>	<b>Learning Resources</b>	<b>Specific Learning Objective</b>	<b>Teachers’/Students’ Activities</b>	<b>Learning Resources</b>
<b>1-6</b>	<p>2.1 Explain the principle of feed back amplifiers.</p> <p>2.2 Explain the types of feedback amplifiers – Negative and Positive.</p> <p>2.3 Describe the characteristic of feed back amplifier.</p> <p>2.4 Explain the concept of Oscillation and positive feed back.</p> <p>2.5 Explain the operation of the following Oscillators:</p> <ul style="list-style-type: none"> <li>- L.C. Oscillator</li> <li>- Harley oscillator</li> <li>- Colpitt oscillator</li> <li>- Tuned anode</li> <li>- R.C. oscillator</li> <li>- Multivibrators and timers</li> </ul> <p>2.6 Identify the frequency of an Oscillators as the channel frequency of a TV or Radio stations.</p>	<p>Guide students to explain the concept of scillation using stone in water medium, using fork, string and wired instrument.</p> <p>Demonstrate using switches and electric bulbs to operation of a bistable multivibrator and observe the output from the scope.</p> <p>Illustrate the circuit diagram of various multivibrators and explain why they are so-called. Provide example of Radio and TV tuners.</p> <p>State the applications of multivibrators.</p>	<p>Electronics trainer kits.</p> <p>Discreet components</p> <p>Signal generator</p> <p>Oscilloscope.</p>	<p>Construct and test the following oscillators:</p> <ul style="list-style-type: none"> <li>- L.C. Oscillator</li> <li>- Harley oscillator</li> <li>- Colpitt oscillator</li> <li>- Tuned anode</li> <li>- R.C. oscillator</li> <li>- Multivibrator</li> <li>- Timers</li> </ul> <p>Construct and test the frequency response of the following types of amplifiers:</p> <ul style="list-style-type: none"> <li>a. Class A, AB, Class B, Class C.</li> <li>b. Tuned amplifier</li> <li>c. Cascade amplifier.</li> </ul>	<p>Guide students to construct and test the oscillators.</p> <p>Illustrate the circuit diagram of various multivibrators and explain why they are so called.</p>	<p>Electronic trainer kits</p> <p>Discreet components</p> <p>Signal generator</p>

***NVC IN RADIO, TV AND GSM SERVICING (DRAFT)***

<b>General Objective: 3.0 Understand the principles of operational amplifier PART I, TERM II</b>						
<b>WEEK</b>	<b>Specific Learning Outcome:</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>	<b>Specific Learning Objective</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>
<b>7-12</b>	3.1 Explain operational amplifier and its characteristics. 3.2 Explain the types and applications of operational amplifier.	Guide students to explain the characteristics, types and applications of operational amplifiers.	Charts	Construct and test the performance of various types of operational amplifiers.	Guide students to construct and test various types of operational amplifiers.	Oscilloscope Signal Generator Lead sucker Multimeter
<b>ASSESSMENT: Theory -20% : Practical – 80%</b>						



***NVC IN RADIO, TV AND GSM SERVICING (DRAFT)***

**Programme:** RTV AND GSM SERVICING

**Module:** Radio Communication

**Code:** 211/221

**Duration:** **Contact Hours/Week:** 8Hrs. **Theory:** 2Hrs. **Practical:** 6Hrs.

**Goal:** The module is intended to provide the trainees with the basic knowledge and practical skills in Radio Transmission and Reception.

**General Objectives:**

On completion of this module, the trainees should be able to:

- 1.0 Understand the basic principles of radio transmission
- 2.0 Understand the principles of operation of radio receiver
- 3.0 Know how to trace faults and repair them in radio receiver

**NVC IN RADIO, TV AND GSM SERVICING (DRAFT)**

<b>PROGRAMME: RTV AND GSM SERVICING</b>						
<b>COURSE: Radio Communication.</b>			<b>COURSE CODE: VRG: 211/221</b>		<b>CONTACT HOURS: 8 HRS/WK</b>	
<b>GOAL: The module is intended to provide the trainee with the basic knowledge and practical skills in Radio Transmission and Reception .</b>						
<b>COURSE SPECIFICATION: Theoretical Contents: 2HRS/WK</b>				<b>Practical Contents: 6HRS/WK</b>		
<b>General Objective 1.0: Understand the basic principles of radio transmission PART II, TERM I</b>						
<b>WEEK</b>	<b>Specific Learning Outcome:</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>	<b>Specific Learning Objective</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>
<b>1-12</b>	<p>1.1 Explain the basic principles of radio transmission. (AM and FM)</p> <p>1.2 Explain with aid of diagram simple block diagram, the function and operation of a radio, transmitter. (AM and FM)</p> <p>1.3 Explain the principles of AM &amp; FM modulation in radio transmission.</p> <p>1.4 Explain the principles of transmitting and receiving antenna..</p>	<ul style="list-style-type: none"> <li>▪ Show diagram electromagnetic waves.</li> <li>▪ Guide students to calculate frequency and wavelength.</li> <li>▪ Present block diagram and use it to explain the function and operation of radio transmitter.</li> <li>▪ Organize a visit to radio transmitting station.</li> </ul>	<p>Different circuit diagrams.</p> <p>Radio sets</p> <p>Oscilloscope</p> <p>Signal generator</p>	<p>1.1 Construct a simple AM &amp; FM transmitter to show the transmission of radio signal.</p> <p>1.2 Carry out experiments on AM &amp; FM modulation.</p> <p>1.3 Construct a simple transmitting antenna.</p>	<p>Guide students to construct and test a simple AM &amp; FM transmitter.</p> <p>Guide students to construct a simple transmitting antenna.</p>	<p>AM/FM Modules</p> <p>Soldering iron</p> <p>Strip board</p> <p>Lead.</p> <p>Radio receiver</p> <p>Oscilloscope</p> <p>Microphone</p> <p>Signal generator.</p>

***NVC IN RADIO, TV AND GSM SERVICING (DRAFT)***

<b>COURSE SPECIFICATION: Theoretical Contents: 2HRS/WK</b>				<b>Practical Contents: 6HRS/WK</b>		
<b>General Objective 2.0: Understand the principles of operation of a radio receiver. PART II, TERM II</b>						
<b>1-4</b>	<p>2.1 Explain the principles of operation of the following stages of AM radio receiver:</p> <ul style="list-style-type: none"> <li>a. Tuner</li> <li>b. IF amplifier</li> <li>c. Detector</li> <li>d. AF amplifier</li> <li>e. Power supply</li> <li>f. A.F.C.</li> </ul> <p>2.2 Explain the principles of operation of the following stages in FM radio Receiver:</p> <ul style="list-style-type: none"> <li>a. Frequency Discriminator (detector)</li> <li>c. IF amplifier</li> <li>c. A.F.C.</li> </ul> <p>2.3 Compare and contrast AM &amp; FM receivers.</p> <p>2.4 Explain the uses of the following equipment in fault finding:</p> <ul style="list-style-type: none"> <li>a. Pattern generator</li> <li>b. Digital/analogue multimedia.</li> <li>c. Loop antenna</li> <li>d. Frequency counter</li> </ul> <p>2.5 Explain the difference between Domestic receiver</p>	<ul style="list-style-type: none"> <li>▪ Familiarize students to block and schematic diagrams of AM receiver.</li> <li>▪ Familiarize students to block and schematic diagram of FM receiver.</li> <li>▪ Show the following equipment.                             <ul style="list-style-type: none"> <li>- Pattern generator</li> <li>- Digital/analogue multimeter</li> <li>- Loop antenna</li> <li>- Frequency counter</li> </ul> </li> <li>▪ Familiarize students on safety in the electronics workshop.</li> <li>▪ Guide students to identify the similarities and differences between</li> </ul>	<p>Block and schematic diagrams in different AM and FM receivers.</p>	<p>2.1 Familiarization of students to physical layout of AM &amp; FM radio receiver.</p> <p>2.2 Demonstrate the uses of the following equipment and tools to measure current, voltage, resistance and waveforms:</p> <ul style="list-style-type: none"> <li>-Pattern generator</li> <li>- Digital/analogue multimeter</li> <li>- Loop antenna</li> <li>- Frequency counter</li> </ul> <p>2.3 Demonstrate alignment of the following sections of AM and FM receivers</p> <ul style="list-style-type: none"> <li>- R.F</li> <li>- Mixer</li> <li>- I.F</li> <li>- Discriminator</li> </ul>	<p>Guide students to identify different sections of AM &amp; FM radio receivers. Guide students to measure current, voltage resistance and waveforms, using the following:</p> <ul style="list-style-type: none"> <li>- Pattern generator</li> <li>- Digital/analogue multimeter, etc.</li> </ul> <p>Guide students to carry out the following fault finding and repair procedures</p> <ul style="list-style-type: none"> <li>- Physical observation.</li> <li>- Signal tracing</li> <li>- d.c voltage measurement</li> <li>- removing of component.</li> <li>- testing of components.</li> <li>- replacement of components.</li> <li>- final testing.</li> </ul> <p>Guide students to</p>	<p>AM &amp; FM radio sets</p> <p>Schematic diagrams of AM &amp; FM receiver.</p> <p>All the equipment mentioned in (2.2) and circuit modules.</p> <p>Soldering iron.</p> <p>Lead Sucker</p> <p>Screw drivers</p> <p>Pliers/long nose.</p>

***NVC IN RADIO, TV AND GSM SERVICING (DRAFT)***

	and Communication receiver. 2.6 Explain workshop safety precaution in Electronics workshop.	communication and domestic receiver.			carry out the alignment of the following sections: - local oscillator : - RF.Amplifier, etc.	
<b>General Objectives : 3.0 Know how to carry out fault finding and repairs in radio receivers PART II, TERM II</b>						
5-12	3.1 Explain types of faults in AM/FM radio receiver, e.g. open and short circuits. 3.2 Explain the following methods of fault finding and repairs in AM and FM radio receivers: - Physical observation - Signal tracing - d.c voltage measurement - removing of faulty components. - Testing of components. - Replacement of components - Final testing. - Symptoms analysis.	Guide students to explain open and short circuit. Guide students to explain the methods of fault finding and repairs.	Chalkboard Chalk	3.1 Carry out fault finding and repairs procedures in the following stages of AM and FM radio receivers. - Tune - IF amplifier - Detector - AF - Power supply - AFC - Frequency - Discriminator	Guide students to demonstrate the following fault finding and repair procedures in the various sections of AM and FM receivers: - Physical observation - Signal tracing - d.c voltage measurement - removing of faulty components. - Testing of components. - Replacement of components - Final testing. - System analysis	Radio transmitting modules or assorted equipment and instruments such as AM/FM receivers. Multitester – digital/analogue frequency counter. Soldering Iron
<b>ASSESSMENT: Theory -20% : Practical – 80%</b>						

*NVC IN RADIO, TV AND GSM SERVICING (DRAFT)*

**Programme:** RTV AND GSM SERVICING

**Module:** Television System

**Code:** VRG 212/222

**Duration:** **Contact Hours/Week:** 8Hrs. **Theory:** 2Hrs. **Practical:** 6 Hrs.

**Goal:** The module is intended to provide the trainees with the basic knowledge and practical skills to diagnose and repair faults in common types found in various sections or stages in a Black & White/Coloured television.

**General Objectives:**

On completion of this module, the trainees should be able to:

- 1.0 Understand the principles of transmission of TV signals
- 2.0 Understand the principles of operation of black and white TV receiver
- 3.0 Understand the principle of colour television receiver
- 4.0 Understand the principles of closed circuit TV.

**NVC IN RADIO, TV AND GSM SERVICING (DRAFT)**

<b>PROGRAMME: RTV AND GSM SERVICING</b>						
<b>COURSE: Television System</b>			<b>COURSE CODE: VRG 212/222</b>		<b>CONTACT HOURS:/WEEK 8 HRS</b>	
<b>GOAL: The module is intended to provide the trainees with the basic knowledge and practical skills to diagnose and repair faults in common types found in various sections or stages in a Black &amp; White/Coloured television.</b>						
<b>COURSE SPECIFICATION: Theoretical Contents: 2 HRS</b>				<b>Practical Contents: 6 HRS</b>		
<b>General Objective 1.0: Understand the Principles of transmission of TV signal</b>				<b>PART II, TERM I</b>		
<b>WEEK</b>	<b>Specific Learning Objective</b>	<b>Teachers’/Students’ Activities</b>	<b>Learning Resources</b>	<b>Specific Learning Objective</b>	<b>Teachers’/Students’ Activities</b>	<b>Learning Resources</b>
<b>1-5</b>	1.1 Explain the following TV standards. - NTSC - PAL - SECAM 1.2 Explain the principles of scanning and interlace scanning 1.3 Explain the operation of the following types of TV camera: - Plumbicon - Vidicom - Digital camera Explain the principles of operation of TV transmitter.	<ul style="list-style-type: none"> <li>▪ Show the characteristic table of TV standards.</li> <li>▪ Show how an image is converted into electrical signal.</li> <li>▪ Show students the TV cameras.</li> <li>▪ Show block diagrams of a TV transmitter.</li> </ul>	<ul style="list-style-type: none"> <li>- Charts</li> <li>- Diagrams</li> <li>- CDs</li> <li>- TV Cameras:               <ul style="list-style-type: none"> <li>- Plumbicon</li> <li>- Vidicon</li> <li>- Digital Camera.</li> </ul> </li> </ul>	1.1 Identify the different parts of TV Camera: - Plumbicon - Vidicom - Digital camera 1.2 Service faults in TV cameras.	Guide students to identify different parts of a TV camera.  Organise a trip to a TV station.	TV Camera Serving manual

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	<b>General Objective 2.0: Understand the Principles of Operation of black and white TV receiver</b>			<b>PART II, TERM I</b>		
<b>WEEK</b>	<b>Specific Learning Objective</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>	<b>Specific Learning Objective</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>

***NVC IN RADIO, TV AND GSM SERVICING (DRAFT)***

<p><b>6-12</b></p>	<p>2.1 Demonstrate appropriate safety precautions when handling CRT and associated circuits.</p> <p>2.2 Describe the principles of operation of the following stages in black and white TV receivers:</p> <ol style="list-style-type: none"> <li>Power supply unit</li> <li>Tuner</li> <li>IF amplifier stages</li> <li>Video detector</li> <li>Video amplifier</li> <li>CRT circuit</li> <li>Sync stages:             <ul style="list-style-type: none"> <li>- Vertical and</li> <li>- Horizontal deflection circuits</li> </ul> </li> <li>Sound stage</li> </ol> <p>2.3 Describe the operation of type of tuners:</p> <ul style="list-style-type: none"> <li>- Mechanical tuner</li> <li>- Electronic tuner</li> </ul> <p>2.4 Explain types of faults in black &amp; white TV receiver.</p>	<ul style="list-style-type: none"> <li>▪ Use a typical schematic diagram of a Black and White television receiver, and isolate the mentioned stages and describe the operational principles of these stages.</li> <li>▪ Show students the two types of tuners.</li> <li>▪ Guide students to identifying conditions associated with open and short circuits.</li> </ul>	<p>Oscilloscope TV sets Schematic diagram of black &amp; white TV. Two types of tuners. Mechanical. Electronic.</p>	<ol style="list-style-type: none"> <li>1.1 Identify different sections/controls of black &amp; white TV receiver.</li> <li>1.2 Observe safety precautions when working on the power supply unit</li> <li>1.3 Diagnose and clear faults of the common types found in the following sections in a black &amp; white TV:             <ol style="list-style-type: none"> <li>Power supply</li> <li>Tuner</li> <li>I.F</li> <li>video detector</li> <li>CRT circuit</li> <li>Sound stage</li> <li>Sync circuits</li> </ol> </li> <li>1.4 Demonstrate adjustments of vertical, horizontal and CRT stages in black &amp; white TV receiver.</li> </ol>	<p>Guide students to diagnose and rectify faults in black and white TV based on the following methods:</p> <ul style="list-style-type: none"> <li>- Visual inspection.</li> <li>- Signal tracing.</li> <li>- d.c. voltage measurement.</li> <li>- Component testing.</li> <li>- Replacement.</li> </ul> <p>Guide students to carry out adjustment of controls in the vertical, horizontal and CRT stages in black &amp; white TV.</p>	<ul style="list-style-type: none"> <li>- Pattern generator</li> <li>- Oscilloscope</li> <li>- TV sets</li> <li>- Different circuit diagrams</li> <li>- Schematic diagram</li> <li>- Frequency counter</li> <li>- TV receiver module</li> <li>- Lead sucker</li> <li>- Soldering Iron</li> <li>- Various electronics components</li> </ul>
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**NVC IN RADIO, TV AND GSM SERVICING (DRAFT)**

<b>COURSE SPECIFICATION: Theoretical Contents: 2 HRS</b>				<b>Practical Contents: 6 HRS</b>		
<b>General Objective 3.0: Understand the principle of Colour Television receiver.</b>				<b>PART II, TERM II</b>		
	<b>Specific Learning Outcome:</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>	<b>Specific Learning Objectives</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>
<b>1-7</b>	<p>3.1 Explain the principles of operation of the following sections in colour TV:</p> <ul style="list-style-type: none"> <li>- Power supply</li> <li>- Tuner</li> <li>- IF amp</li> <li>- Video detector</li> <li>- Chroma Section -               <ul style="list-style-type: none"> <li>Colour killer</li> <li>Colour band</li> <li>Pass amp.</li> <li>Burst gate amp.</li> <li>Chrominance amp.</li> </ul> </li> </ul> <p>3.2 Explain the principles of Sync section of a colour TV receiver: Vertical and Horizontal CRT.</p> <p>3.3 Explain the principles of video amplifier of colour TV receiver.</p>	<p>Guide students to identify different sections of block diagram of colour TV receiver.</p>	<p>Pattern generator Oscilloscope TV sets/module Different circuit diagrams. Schematic diagram. Maintenance manual.</p>	<p>3.1 Identify different sections/controls in colour TV receiver.</p> <p>3.2 Observe safety precautions when handling e.h.t section</p> <p>3.3 Demonstrate fault finding and repairs in the following sections:</p> <ul style="list-style-type: none"> <li>- Tuner</li> <li>- IF</li> <li>- Video detector</li> <li>- Chroma section</li> <li>- Power supply etc.</li> </ul> <p>3.4 Carry out adjustment of</p> <ul style="list-style-type: none"> <li>- CRT</li> <li>- Chroma section</li> <li>- Delayline</li> <li>- Vertical &amp; Horizontal section.</li> <li>- Power supply</li> <li>- Sound section</li> </ul> <p>3.5 Perform final safety</p>	<p>Guide students to diagnose and rectify faults in colour TV based on the following methods:</p> <ul style="list-style-type: none"> <li>- Visual inspection</li> <li>- Signal tracing</li> <li>- d.c voltage measurement</li> <li>- Component testing</li> <li>-replacement</li> </ul>	<p>Pattern generator Oscilloscope TV sets Different circuit diagrams. Colour charts</p>

**NVC IN RADIO, TV AND GSM SERVICING (DRAFT)**

				check after repairs and before collection.		
<b>General objective 4.0: Understand the principles of camera and closed circuit TV.</b>				<b>PART II, TERM II</b>		
	<b>Specific Learning Outcome:</b>	<b>Teachers’/Students’ Activities</b>	<b>Learning Resources</b>	<b>Specific Learning Objectives</b>	<b>Teachers’/Students’ Activities</b>	<b>Learning Resources</b>
8-12	<p>4.1 Explain the basic principle of CCTV</p> <p>4.2 Explain the principle of operation.</p> <p>a CCTV Camera</p> <p>b CCTV Monitor</p> <p>4.3 Explain the relative differences among the following</p> <p>a CCTV</p> <p>b TV receiver</p> <p>c CCTV Camera</p> <p>d Video Camera</p> <p>4.4 Explain the method of transmitting TV signal through cable.</p> <p>4.5 Explain the purpose and operations of video switches, control system, DC &amp; AC motors in CCTV.</p>	<ul style="list-style-type: none"> <li>▪ Use block diagram to explain CCTV camera and monitor.</li> <li>▪ List the different applications of CCTV such as – Security for</li> <li>- Teaching, learning etc.</li> <li>▪ Use Block diagram to describe CCTV monitor.</li> <li>▪ Describe different four types of cables. <ul style="list-style-type: none"> <li>- Indoor cable</li> <li>- outdoor cable</li> <li>- unbalanced cable</li> <li>- balanced cable</li> </ul> </li> </ul> <p>Describe the</p>	<ul style="list-style-type: none"> <li>▪ Chart on block diagram of CCTV system, CCTV camera, CCTV monitor.</li> <li>▪ Types of CCTV cables.</li> <li>▪ Block and schematic diagram of the video</li> <li>▪ Switch control system, AC/DC motors.</li> </ul>	<p>4.1 Demonstrate schedule maintenance programme for CCTV facilities:</p> <ul style="list-style-type: none"> <li>- CCTV camera</li> <li>- CCTV monitor</li> <li>- Pin and Tilt units</li> <li>- Scanners</li> <li>- Lighten facilities</li> <li>- Video types</li> <li>- Cables and connectors</li> <li>- Consults etc.</li> </ul> <p>4.2 Demonstrate fault finding and reapirs in:</p> <ul style="list-style-type: none"> <li>a CCTV camera</li> <li>b CCTV monitor</li> <li>c CCTV cable</li> </ul> <p>4.3 Demonstrate preventive maintenance of:</p> <ul style="list-style-type: none"> <li>- Video switches</li> <li>- AC/DC motors</li> <li>- Control systems</li> </ul>	<p>Demonstrate and guide students to carryout schedules maintenance of CCTV facilities. Demonstrate the following fault finding and repair methods on the CCTV facilities:</p> <ul style="list-style-type: none"> <li>a. Physical inspection</li> <li>b. Signal tracing</li> <li>d. DC voltage Measurements</li> <li>d Component testing</li> <li>e. Replacement of component</li> </ul> <p>Demonstrate and guide students in preventive maintenance of switches AC/DC motors.</p>	<ul style="list-style-type: none"> <li>- Soldering Iron.</li> <li>- Digital and analogue multimeter.</li> <li>Pattern generator</li> <li>Signal tracer.</li> <li>Probe and logic tester.</li> <li>Oscilloscope.</li> <li>Schematic diagram.</li> </ul>

*NVC IN RADIO, TV AND GSM SERVICING (DRAFT)*

		operations of the control systems.				
<b><i>ASSESSMENT: Theory -20% : Practical – 80%</i></b>						

***NVC IN RADIO, TV AND GSM SERVICING (DRAFT)***

**Programme:** RTV AND GSM SERVICING

**Module:** Satellite system

**Code:** VRG 311/321

**Duration:** **Contact Hours/Week:** 8Hrs. **Theory:** 2Hr. **Practical:** 6Hrs.

**Goal:** The module is aimed at providing the trainees with the basic knowledge and skills in satellite transmission and reception.

**General Objectives:**

On completion of this module, the trainee should be able to:

- 1.0 Understand the basic principle of Satellite Transmission and Reception
- 2.0 Know the different types of Satellite Antennas and their applications.
- 3.0 Know Multi-Access techniques

***NVC IN RADIO, TV AND GSM SERVICING (DRAFT)***

<b>PROGRAMME: RTV AND GSM SERVICING</b>						
<b>COURSE: Satellite System</b>		<b>COURSE CODE: VRG311/321</b>		<b>CONTACT HOURS/WEEK: 8 Hrs.</b>		
<b>GOAL: The module is aimed at providing the trainee with the basic knowledge and practical skills in satellite transmission and reception.</b>						
<b>COURSE SPECIFICATION: Theoretical Contents: 2 Hrs.</b>			<b>Practical Contents: 6Hrs.</b>			
<b>General Objective 1.0: Understand the Basic Concept of Satellite Transmission and Reception. PART III, TERM I</b>						
<b>WEEK</b>	<b>Specific Learning Outcome:</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>	<b>Specific Learning Objective</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>

***NVC IN RADIO, TV AND GSM SERVICING (DRAFT)***

<p><b>1-12</b></p>	<p>1.1 Explain the basic principle of operation of satellite transmission and reception system.</p> <p>1.2 Explain the principle of operation of satellite transmitter.</p> <p>1.3 Explain the principle of operation of the following section of satellite receiver:</p> <ul style="list-style-type: none"> <li>a Dish/LNB</li> <li>b Power supply units</li> <li>c Frequency changer</li> <li>d Video crystal decoder.</li> <li>e MPU</li> <li>f Audio section</li> </ul> <p>1.4 Explain types of satellite dish and LNB</p>	<p>Use block diagram to describe the transmission and reception of Satellite signal.</p> <p>Use block diagram to describe the sections of satellite transmitter.</p> <p>Show how to calculate the focal point of any parabolic dish antenna using <math>F=2/D^2</math></p> <p>Use block diagram to describe the sections of satellite receiver.</p> <p>Organise visit to Nitel, NTA, etc. to see reception of satellite signal.</p>	<ul style="list-style-type: none"> <li>- Charts and diagrams.</li> <li>- Video types materials.</li> </ul>	<p>1.1 Demonstrate installation and alignment of Satalite Dish.</p> <p>1.2 Demonstrate fault finding and repairs in the following sections of Satelite receiver:</p> <ul style="list-style-type: none"> <li>- Frequency changer</li> <li>- MPU</li> <li>- Audio section</li> <li>- Video crystal decoder</li> <li>- Power supply unit</li> </ul>	<p>- Demonstrate and guide students to installation and alignment of Satellite Dish.</p>	<ul style="list-style-type: none"> <li>- Dish</li> <li>- Receiver</li> <li>- Cooxial</li> <li>- Cable</li> <li>- Pliers</li> <li>- Longnose side</li> <li>- Curter</li> <li>- Multimeter</li> <li>- Strength menter</li> <li>- Inclino-meter.</li> <li>- Logic probe/pulser</li> <li>- Digital</li> <li>- Multimeter</li> <li>- Schematic</li> <li>- Soldering Iron (15w)</li> </ul>
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***NVC IN RADIO, TV AND GSM SERVICING (DRAFT)***

<b>COURSE SPECIFICATION: Theoretical Contents: 2 Hrs.</b>				<b>Practical Contents: 6Hrs.</b>		
	<b>General Objective: 2.0: Know the different types of satellite antennas.</b>			<b>PART III, TERM II</b>		
<b>WEEK</b>	<b>Specific Learning Objective</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>	<b>Specific Learning Objective</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>
<b>1-6</b>	2.1 Describe basic tools and equipment used in satellite installation and repairs. 2.2 Mention different types of antennas used in communication 2.3 Explain the function of satellite antennas 2.4 State the applications of the antennas in 2.1 above.	Discuss different types of communication antennas.	Types of antennas	2.1 Observe safety precautions when installing the satellite antennas.		
	<b>General Objective: 3.0: Know the multi-access techniques</b>			<b>PART III, TERM II</b>		
	<b>Specific Learning Objective</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>	<b>Specific Learning Objective</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>
<b>7-12</b>	3.1 Explain briefly: <ul style="list-style-type: none"> <li>▪ Scheduled access</li> <li>▪ Random access</li> </ul> 3.2 Discuss the function of multi-access techniques 3.5 Explain different types of multi-access techniques and their applications.					
<b>ASSESSMENT: Theory -20% : Practical – 80%</b>						

*NVC IN RADIO, TV AND GSM SERVICING (DRAFT)*

**Programme:** RTV AND GSM SERVICING

**Module:** Mobile Communication and GSM

**Code:** VRG 312/322

**Duration:** **Contact Hours/Week:** 8 Hrs. **Theory:** 2Hr. **Practical:** 6Hrs.

**Goal:** The module is intended to provide the trainees with the basic knowledge and practical skills for servicing Mobile Phones

**General Objectives:**

On completion of this module, the trainee should be able to:

- 1.0 Understand the basic principles of Mobile communication system
- 2.0 Know the principles of operations of Mobile Phones.
- 3.0 Know the different types of Mobile Phones, their features and service providers in Nigeria
- 4.0 Know the essential components of Mobile Phones and their functions.



**NVC IN RADIO, TV AND GSM SERVICING (DRAFT)**

<b>PROGRAMME: RTV AND GSM SERVICING</b>						
<b>COURSE: Mobile Communication and GSM</b>			<b>COURSE CODE:VRG 312/322</b>		<b>CONTACT HOURS: 8</b>	
<b>GOAL: The module is intended to provide the trainee with basic knowledge and practical skills for servicing Mobile phones.</b>						
<b>COURSE SPECIFICATION: Theoretical Contents: 2Hrs</b>				<b>Practical Contents: 6Hrs</b>		
<b>General Objective: 1.0 Understand the basic principles of Mobile communication system.</b>				<b>PART III, TERM I</b>		
<b>WEEK</b>	<b>Specific Learning Objective</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>	<b>Specific Learning Objective</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>
<b>1-4</b>	1.1 Explain the principle of operation of Mobile Communication System  1.2 Explain the principle of operation of the following sections of Mobile Communication System: a) Phones b) Mobile Station c) Base station d) Mobile Switch sections 1.3 Explain the type of mobile phones: - GSM - Cellular - Radio Communication 1.4 Describe software and hardware components of GSM phone	Describe using block diagram the functions of the various sections of Mobile Communication System. Describe using schematic and block diagram the operation of the phone. Pictorial presentation of mobile phones. Guide students to identify different software codes.	- Charts - Diagrams - Schematic - Diagram - Mobile phones - Manual	Carry out group project on the following Mobile Communication System. - Phones - Mobile stations - Base station - Mobile switch station	1.1 Organise visit to service providers. 1.2 Guide student to identify component of Multimedia Interface. - Camera - Bluetooth - Infrared - Radio	Vehicle and funds to carry out the visit.

***NVC IN RADIO, TV AND GSM SERVICING (DRAFT)***

	Explain the principle of					
	<b>General Objective: 2.0 Know the Principles of operation of Mobile Phones</b>			<b>PART III, TERM I</b>		
<b>WEEK</b>	<b>Specific Learning Objective</b>	<b>Teachers' /Students' Activities</b>	<b>Learning Resources</b>	<b>Specific Learning Objective</b>	<b>Teachers'/Students' Activities</b>	<b>Learning Resources</b>
<b>5-12</b>	<p>2.1 Explain the functions of essential parts of Mobile phones:</p> <ul style="list-style-type: none"> <li>- CPU</li> <li>- SIM Card</li> <li>- Keyboard</li> <li>- Battery</li> <li>- Power Supply Unit</li> <li>- Ear Piece</li> <li>- Memory etc.</li> </ul> <p>2.2 Explain the principle of operation of the following section of Mobile phone:</p> <ul style="list-style-type: none"> <li>- CPU</li> <li>- Memory</li> <li>- Power Supply Unit</li> </ul> <p>2.2 Explain the software and hardware codes of GSM phones.</p> <p>2.3 Explain types of GSM phone and their features.</p>	<p>Guide students to identify parts of mobile phones.</p> <p>Guide students to explain the functions of CPU, Memory and Power Supply.</p>	<p>Mobile sets</p> <p>Charts</p>	<p>Explain the functions of different types of mobile phone accessories.</p> <p>Identify the main menu and submenu functions of different mobile phones e.g. phone book, message, call register,</p>	<p>2.1 Demonstrate the use of software device in fault finding and repairs of mobile phones.</p> <p>2.2 Demonstrate the use of cleaning aids.</p> <p>2.3 Demonstrate the use of software codes for fault finding and repairs of a mobile phone.</p> <p>2.4 Demonstrate fault finding and repairs of CPU, ROM &amp; RAM of mobile phone.</p> <p>2.5 Demonstrate fault finding and repairs of power supply and changing system of mobile</p>	<p>Demonstrate and guide student to use cleaning aids on mobile phones.</p> <p>Demonstrate and guide students to use software codes for fault finding and repairs.</p> <p>Demonstrate and guide student in fault finding and repair procedures.</p>

***NVC IN RADIO, TV AND GSM SERVICING (DRAFT)***

					phones. 2.6 Demonstrate fault finding & repairs of RF sections of mobile phones.	
<b>COURSE SPECIFICATION: Theoretical Contents: 2 Hrs.</b>				<b>Practical Contents: 6Hrs.</b>		
<b>General Objective: 3.0 Understand the essential components of GSM system and their functions      PART III, TERM II</b>						
<b>1-12</b>	<b>Specific Learning Outcome</b>	<b>Teachers'/Students' Activities</b>	<b>Resource</b>	<b>Specific Learning Outcome</b>	<b>Teachers'/Students' Activities</b>	<b>Resources</b>

***NVC IN RADIO, TV AND GSM SERVICING (DRAFT)***

	<p>3.1 Describe software and hardware components of GSM phones</p> <p>3.2 Explain the functions of the essential parts mobile phones:</p> <ul style="list-style-type: none"> <li>▪ CPU</li> <li>▪ SIM Card</li> <li>▪ Keyboard</li> <li>▪ Battery</li> <li>▪ Power Supply Unit</li> <li>▪ Earpiece</li> <li>▪ Memory, etc</li> </ul> <p>3.3 List and explain some essential websites for service providers and mobile phones manufacturers.</p>	<p>Guide students to describe:</p> <ul style="list-style-type: none"> <li>- GSM system</li> <li>- Hardware and software of GSM</li> </ul> <p>Guide students to identify the sections of mobile phone.</p>	<p>GSM manuals</p>	<p>3.1 Demonstrate the use of cleaning aids</p> <p>3.2 Observe safety precaution when carrying out repairs in GSM phones.</p> <p>3.3 Demonstrate the use of software codes for fault finding repairs of a mobile phone.</p> <p>3.4 Demonstrate fault finding repairs of CPU, ROM &amp; RAM of mobile phone</p> <p>3.5 Demonstrate fault finding &amp; repairs of power supply and charging system of a mobile phones.</p> <p>3.6 Demonstrate fault finding &amp; repairs of RF sections of mobile phones.</p> <p>3.7 Demonstrate the use of software device in fault finding and repairs of mobile phones.</p> <p>3.8 Demonstrate the fault finding and repair of multimedia interface; e.g. camera, blue tooth, infrared, radio etc.</p>	<p>Show and guide students to identify sections of mobile phones.</p> <p>Demonstrate and guide student to use cleaning aids on mobile phone.</p> <p>Demonstrate and guide students to use software codes for fault finding and repairs.</p> <p>Demonstrate and guide student in fault finding and repair procedures.</p>	<p>Various mobile phones.</p> <p>Multimeter</p> <p>Soldering</p> <p>Iron</p> <p>Lead sucker</p> <p>Screw drivers</p> <p>Accessories</p> <p>Manuals</p> <p>Software</p> <p>gadgets</p>
<p><b><i>ASSESSMENT: Theory -20% : Practical – 80%</i></b></p>						

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**LIST OF TRAINING TOOLS AND EQUIPMENT FOR A CLASS OF 25 STUDENTS (IN 5 GROUPS):**

**LIST OF TOOLS**

1.	Set of Screwdrivers – flats,(large, medium and small), asterics, allen key, star	<b>5 sets</b>
2.	Set of spanners – flat and box.	<b>5 sets</b>
3.	Soldering iron	<b>25 pieces</b>
4.	Soldering iron stand	<b>25 pieces</b>
5.	Lead sucker	<b>25 pieces</b>
6.	Long nose pliers	<b>25 pieces</b>
7.	Pair of pliers	<b>25 pieces</b>
8.	Side cutters	<b>25 pieces</b>

**LIST OF EQUIPMENT**

1.	Work station (Whaler) Machine (1.C extractor)	<b>5 nos.</b>
2.	Multimeter – Digital	<b>25 nos.</b>
3.	– Analogue	<b>25 nos.</b>
4.	Booster/Meter	<b>25 nos</b>
5.	White light	<b>25 nos</b>
6.	Assorted phone panels	<b>25 nos</b>
7.	Magnifying glass	<b>25 nos</b>
8.	Computer (Desk or Laptop)	<b>5nos</b>
9.	Tonado (Software box)	<b>5 nos</b>
10.	Television Training Module	<b>5 nos</b>
11.	Radio Training Module	<b>5 nos</b>
12.	Probe/logic pulsar	<b>25 nos</b>
13.	Transformer Training Module	<b>5 nos</b>
14.	Oscilloscope	<b>5 nos</b>
15.	Pattern generator	<b>5nos</b>

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<b>16.</b>	Frequency Counter	<b>5nos</b>
<b>17.</b>	Variable Power Supply	<b>5nos</b>
<b>18.</b>	Picture Tube Tester	<b>5nos</b>
<b>19.</b>	Isolation transformers	<b>25nos</b>
<b>20.</b>	Vectorscope	<b>5nos</b>
<b>21.</b>	Signal strength meter	<b>5 nos</b>
<b>22.</b>	Signal generator	<b>5 nos</b>
<b>23.</b>	Black and White TV	<b>5 nos</b>
<b>24.</b>	Coloured TV	<b>5 nos</b>
<b>25.</b>	TV Training modules	<b>5 nos</b>
<b>26.</b>	Radio sets	<b>5 nos</b>
<b>27.</b>	Video cassette recorder	<b>5 nos</b>
<b>28.</b>	Video CD machine	<b>5 nos</b>

**CONSUMMABLES**

1. Flexible Wire
2. Soldering lead
3. Fluid or paste for removing and fixing ICs.
4. Screws
5. Surface cleaning liquid
6. Bread-board

**NOTE:**

**Consumables are to be provided in sufficient quantity.**



***NVC IN RADIO, TV AND GSM SERVICING (DRAFT)***

**PARTICIPANTS' LIST AT THE CURRICULUM CRITIQUE WORKSHOP FOR RTV AND GSM SERVICING.**

<b>S/No.</b>	<b>Name</b>	<b>Full Address</b>
1.	Rev. Dr. (Mrs) B.O.Owoade	Agape Solomon's Academy, 36, Oseni Liadi St., Okota, Lagos
2.	Zubairu Yahaya	FRCN, Kaduna
3.	Ojerinde Oladapo	GSM Engineers, Maharaja Hotel Opp. Murtala Mohammed Square, Kaduna.
4.	Dr. Bashir Bukar	Department of Education(Tech.), Kaduna Polytechnic
5.	Engr. Dr. Nuru A Yakubu, OON	Executive Secretary, NBTE Kaduna
6.	Dr. M S Abubakar	Director of Programmes NBTE, Kaduna
7.	Mal. Lawan Abdulkarim	Ag. HOD Technical Collges Division, NBTE, Kaduna
8.	Engr. A D K Muhammad	D O VEI/IEI, NBTE Kaduna
9.	Husaini H. Muhammad	NBTE, Kaduna
10.	Abdu Isa Kofarmata	NBTE, Kaduna