THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

# STUDENTS' ITEM RESPONSE ANALYSIS REPORT ON THE FORM TWO NATIONAL ASSESSMENT (FTNA) 2023

# ELECTRONICS AND COMMUNICATION ENGINEERING

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# 081 ELECTRONICS AND COMMUNICATION ENGINEERING

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## FOREWORD

This report represents Students' Item Response Analysis (SIRA) on Form Two National Assessment in Electronics and Communication Engineering subject which was conducted in November 2023. The report aims to provide feedback to all educational stakeholders on the factors that contributed to the student's performance in Electronics and Communication Engineering subject.

The Form Two National Assessment (FTNA) is a formative evaluation, which intends to monitor students learning outcomes and provide feedback that teacher, students and other educational stakeholders can use to improve teaching and learning process. This analysis justifies the student's performance in the Electronics and Communication Engineering subject. The students who attained high scores demonstrated their ability to understand the demand of the question, knowledge, skills and competence in the subject matter, as well as mastery of calculation skills. However, students who scored low marks faced difficulties in responding to the question due to their insufficient knowledge of the tested concept.

In addition, this report will help to identify the student strength and weakness to improve learning before siting for the Certificate of Secondary Education Examination (CSEE). It will help teachers to identify the challenging areas and take appropriate measures during the teaching and learning process.

The National Examinations Council of Tanzania (NECTA) expects that the feedback provided in this report will highlight the challenges for which education stake holders should take proper measures to improve the teaching and learning of Electronics and Communication Engineering subject. Consequently, students will acquire knowledge, skills and competence indicated in the syllabus for better performance in the future assessments and examinations.
The Council appreciate the contributions of all those who participated in preparing this report.

Dr. Said A. Mohamed
**EXECUTIVE SECRETARY**

## LIST OF SYMBOLS AND ABBREVIATIONS

| | |
|---|---|
| *mA* | Milliampere |
| *mV* | Millivolt |
| % | Percentage |
| *μ* | Micro |
| *μF* | Micro-Farad |
| *C* | Capacitor |
| *f* | Frequency |
| *FTNA* | Form Two National Assessment |
| *H* | Henry |
| *Hz* | Hertz |
| *ISO* | International Standard Organization |
| *k*Ω | Kilo-Ohm |
| *L* | Inductance |
| *R* | Resistor |
| *P* | Power |
| *SIRA* | Students Items Response Analysis |
| *V* | Volt |
| *W* | Watt |
| *I* | Current |
| Ω | Ohm |

## 1.0 INTRODUCTION

This report represents a detailed analysis of items responses to each question in the Electronics and Communication Engineering in the Form Two National Assessment (FTNA) 2023. The paper was comprised of three sections named A, B, and C. Section A consisted of question 1 and 2. Question 1 had ten (10) multiple choice items. These items were formulated from topics of *Electronics Drawing, Semiconductor Devices, Drawing Techniques, Electronic Components, Semiconductors, Semiconductor Devices and Safety Management and Rules* as well as *Electronics Workshop Practice II.* Question 2 consisted of five (5) matching items set from the topic of *Electronics Drawing*. The students were required to answer all items from this section. Each item carried 1 mark, making a total of fifteen (15) marks.

Section B consisted of seven (7) short answers questions set from the topic of *Electronics Engineering Occupational Information, Drawing Techniques, Electronic Components, Introduction to Measurements and Instrumentation, Introduction on Electricity and Safety Management and Rules.* The students were required to answer all questions in this section. Each question carried ten (10) marks, making a total of seventy (70) marks. Section C consisted of one structured question set from the topic of *Introduction on Electricity* carrying fifteen (15) marks.

A total of 307 students sat for the Electronics and Communication Engineering paper in 2023. Among them, 239 (77.85%) students passed while 68 (22.15%) failed. In 2022, a total of 338 student sat for the assessment, of which 253 (74.85%) students passed, and 85 (25.15%) failed. Thus, the performance has increased by 3.0 per cent in 2023. The students' performance in the year 2022 and 2023 are summarized in Table 1.

**Table 1:** Students' Performance for Years 2022 and 2023

| Year | 2023 | 2022 |
|---|---|---|
| Total number of Students | 307 | 338 |
| Passed (%) | 77.85 | 74.85 |
| Failed (%) | 22.15 | 25.15 |

In this analysis the students who scored 30 percent or above of the marks allocated to the respective questions are considered to have passed the assessment. The performance is rated as good, average or weak if the percentage lies from 65-100, 30-64 and 0-29 respectively, as shown in Table 2.

**Table 2:** Grade Ranges of the Students' Performance

| **Range in %** | **0 - 29** | **30 - 64** | **65 - 100** |
|---|---|---|---|
| Remark on performance | Weak | Average | Good |

## 2.0 ANALYSIS OF STUDENTS' RESPONES TO EACH QUESTION

A detailed analysis and general evaluation of the students' responses to each question is represented in this section to indicate students' strength and challenges faced in responding to each question. The analysis on each question is as follows:

### 2.1 SECTION A: OBJECTIVE QUESTIONS

Section A consists of 10 multiple-choice items, each item carrying 1 mark, totaling to ten (10) marks. Additionally, there was a matching item question with five (5) items each carrying one (01) mark, totaling to five (5) marks.

#### 2.1.1 Question 1: Multiple Choice Items

The items were set from the topics of *Introduction to Measurements and Instrumentation, Electronics Drawing, Semiconductor Devices, Drawing Techniques, Electronics Components, Semiconductors, Semiconductor Devices, Electronics Workshop Practice II* and *Safety*

*Management and Rules*. The students were required to select the correct answer from the given four alternatives by writing the letter of the most correct answer in the box provided.

The question was attempted by 307 (100%) students of which 32 (10.42%) scored from 0 to 2 marks, 176 (57.33%) scored from 3 to 6 marks and 99 (32.25%) scored from 7 to 10 marks. General performance of the students in this question was good since 275 (89.58%) students scored average and above. The students' overall performance in this question is summarized in Figure 1

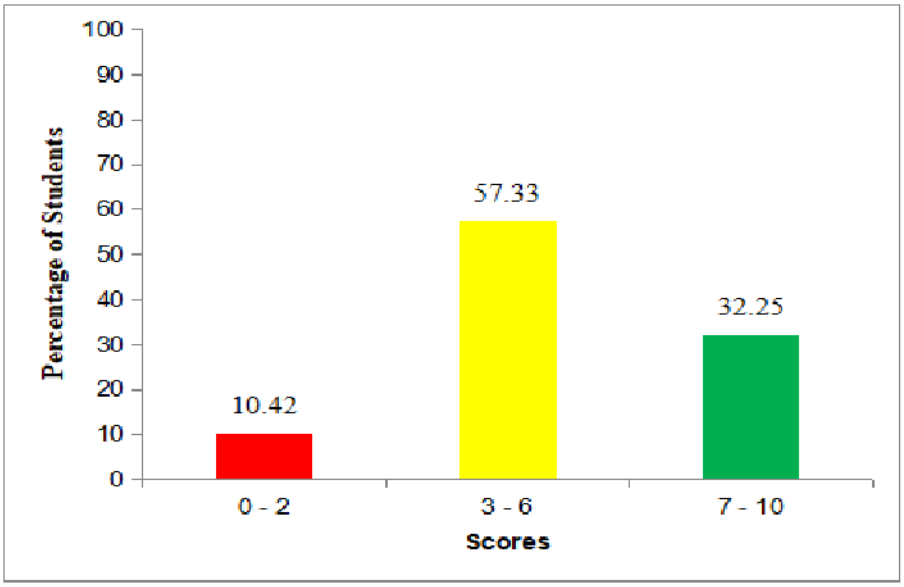



**Figure 1:** *The Students' Performance in Question 1*

The analysis of the students' response to this question shows that most of the students' managed to choose the correct answer in all items set from the topics of *Introduction to Measurements and Instrumentation, Electronics Drawing, Semiconductor Devices, Drawing Techniques, Electronics Components, Semiconductors* and *Safety Management and Rules.*

Analysis of student response to each item of question 1 is as follows:

Item (i) was based on the topic of Electronics Workshop Practice II. It required students to determine the marked symbol which would turn the rotary switch of multimeter to measure the resistance in a circuit. It tested students' ability to differentiate symbols used by multimeter to measure different electrical quantities. The question was as follows:

*You are required to use a multi-meter to measure the ability of a resistor to oppose the electrical current in its path. At which marked symbol will you turn the rotary switch before switching on the power supply?*

*A V B W C Ω D A*

Most of the students opted for alternative *C,* Ω which was the correct response. The students who opted for this response had sufficient knowledge of how to use multimeters to measure electrical quantities. Those who opted for alternative *A, V* and *D, A* failed to realize that the question basically concern on measuring resistance and not voltage or current. Those who opted for alternative *B*, *W* were not familiar with the multimeter selection knob/rotary switch marks.

Item (ii) was set from the topic of Electronics Drawing. It tested the students' ability to identify names of logic symbols. The question was:

Which *component are you going to fix on the printed circuit board which is represented by Figure 1?*


*A OR gate B NOR gate C AND gate D NOT gate*

Most of the students opted for alternative *B, NOR gate*, which was the correct response. These students had enough knowledge of specifying different types of logic gates. Those who opted for alterative *A*, *OR-gate* and *D, NOT-gate* failed to realize that NOR gate is a combination of OR gate and NOT gate. Those who opted for alternative *C, AND gate* had insufficient knowledge about logic gates.

Item (iii) was based on the topic Semiconductor Devices. It tested the students' ability to identify the factor on which the emitted colors of LEDs depend on. The question was:
LEDs *are used to emit an amazing light with different colours. Identify the factor on which the emitted colours of light depend.*

*A Amount of reflected light.* *B Type of impurity material added.*
*C Amount of forward current.* *D Type of semiconductor material.*

Most of the students opted for alternative *D*, *Type of semiconductor material*, which was the correct response. The students who opted for the correct alternative had sufficient knowledge of semiconductor devices. Those who opted for alternative *B, Type of impurity material added* failed to differentiate dopants from semiconductor materials. Those who opted for alternative *A*, *Amount of reflected light* related the word light from the question with the word light used in the alternative. Those who opted for alternative *C, Amount of forward current* had insufficient knowledge about semiconductor material.

Item (iv) was set from the topic of Drawing techniques. It tested the students' ability to state the application of different lines used in drawing. The question was:

*You* are *required to draw a boarder for drawing sheet preparation. Which line will you use for a visible outline of your boarder?*

*A* *Continuous thin line* *B* *Short dashed line*
*C* *Long chain line* *D* *Continuous thick line*

Most of the students opted for alternative *D*, *Continuous thick line* which was the correct response. The students who managed to select the correct answer had enough knowledge on preparing drawing sheet and function of different types of lines. Those who opted for alternative *A, Continuous thin line*, failed to determine where to use thin or thick lines for drawing sheet preparation. Those who opted for alternative B, *Short dashed lines* failed to understand that these lines may delineate the boundaries of specific components or structures.

Those who opted for other alternatives had insufficient knowledge of drawing sheet preparation.

Item (v) was based on the topic of Electronics Components. It required the students to provide a reason why in transformer the number of turns in secondary winding is greater than in the primary winding. It tested a student to state the applications of transformers in different places. The question was:

*Why* does *the industry use a transformer with number of turns in the secondary winding which supplies voltage that is greater than the number of turns in the primary winding?*

*A To step down the voltage.* *B To step up the voltage.*
*C To change D.C to A.C voltage.* *D To change A.C to D.C voltage.*

Average number of students opted for alternative *B, To step up the voltage*, which was the correct response. The students who opted for the correct answer had sufficient knowledge and skills in applications of transformer in electric circuit. Those who opted for alternative *A, To step down the voltage* failed to realize that when the number of turns in secondary windings is greater than in primary, the transformer is used to step up voltage. Those who opted for alternative C, *To change D.C to A.C voltage* and D, *To change A.C to D.C voltage* failed to distinguish the function of a transformer from that of rectifier and an inverter.

Item (vi) was based on the topic of Semiconductors. It required the students to determine the condition under which an atom is considered as positively charged. It tested students' knowledge on how charges of atoms are formed. The question was:

*In what condition do scientists consider an atom to behave as positively charged?*

*A When it gains electrons* *B When it is full charged*
*C When it losses electron* *D When it forms a covalent bond*

Average number of students opted for alternative *C*, *When it losses electron,* which was the correct response. The students who opted for the correct answer had enough knowledge on doping to intrinsic semiconductor materials. Those who opted for alternative *A*, *When it gains electrons*, failed to realize that gaining of electrons increases number of electrons, hence negatively charged of an atom. Those who opted for alternative B, *When it is fully charged* did not realise that atoms do not become "fully charged" in the sense of acquiring a net electric charge but as a stable state under normal conditions. Atoms typically have a balanced number of positively charged protons in the nucleus and negatively charged electrons in orbit around the nucleus, resulting in an overall neutral charge. Those who opted for alternative D, *When it forms a covalent bond* had insufficient knowledge of intrisic semiconductor material because when an atom forms a covalent bond, it shares one or more pairs of electrons with another atom to achieve a stable electron configuration and do not behave positive charged.

Item (vii) was based on the topic Semiconductor Devices. It demanded the students to identify the regions required for the three terminals of Field Effect Transistor (FET). It tested students' knowledge on how three terminals of FET are formed. The question was:

*The Field Effect Transistor (FET) requires three terminals for its operation and the manufacturing company must consider this fact. Identify the regions which should be prepared by the manufacture in order to have the three terminals.*

| | | | |
|---|---|---|---|
| *A* | *Source, drain and base* | *B* | *Drain, gate and emitter* |
| *C* | *Source, drain and gate* | *D* | *Source, collector and gate* |

Most of the students opted for alternative *C, Source, drain and gate*, which was the correct response. The students who managed to choose the correct answer had enough knowledge of semiconductor devices. However, there were some students who selected alternative A, *Source, drain and base.* They confused it with the first two terms in

the alternative which relate to the first two terms of the correct response. Those who opted for alternatives *B*, *Drain, gate and emitter* and *D*, *Source, collector and gate* confused between terminals found in BJT and FET.

Item (viii) was developed from the topic of Introduction on Measurement and Instrumentation. It required the students to state why internal resistance of the voltmeter must be very high during measurements. The item tested students' ability to explain the function of high resistance in a voltmeter. The question was:
*Why an internal resistance of the voltmeter must be very high during measurements?*

*A* *In order to have high voltage range.*
*B* *To ensure maximum current of the meter.*
*C* *To provide maximum loading effect.*
*D* *To have more current supplied by the source.*

Average number of students opted for alternative *D, To have more current supplied by the source,* which was the correct response. The students who opted for the alternative D, *To have more current supplied by the source* had sufficient knowledge on principles of operation of voltmeter. Those who opted for alternative *A*, *In order to have high voltage range,* related the statement *high voltage range* in the alternative with the statement *resistance of the voltmeter must be very high* in the question. Those who opted for other alternatives had insufficient knowledge about the operation of the voltmeter in measurements.

Item (ix) was based on the topic of Electronic Components. It required the students to state the principle of operation of active electronics components. It tested students' ability to classify active components from passive components. The question was:

*Why some of the electronic components like diode and transistor are categorized as active* components*?*

*A They posses high internal resistance for its function.*
*B They require an external source for its operation.*
*C They can store potential energy in the form of charge.*
*D They do not require external source for its function.*

Students who opted for alternative *B, They require an external source for its operation,* which was the correct answer, had sufficient knowledge of passive and active electronics components. Those who opted for alternative *D, They do not require external source for its function* failed to differentiate passive from active electronics components.Those who opted for alternative C, *They can store potential energy in the form of charge* did not understand that component used to store charge is capacitor but not potential energy in the form of charge. Those who opted for alternative A, *They posses high internal resistance for its function* confused with biasing conditions of those devices.

Item (x) was based on the topic of Safety Management and Rules. It required the students to identify mandatory safety sign used in any working environment. It tested students' mastery of safety signs in the work shop. The question was:
*How can you identify the mandatory safety signs used in any working environment?*
*A They are circular in shape with white text on a blue background.*
*B They are rectangular in shape with white on a green background.*
*C They are triangular in shape with red text on the white background.*
*D They are circular in shape with green text on red background.*

Most of the students opted for alternative *A, They are circular in shape with white text on a blue background*, which was the correct response. The students who opted for the correct answer demonstrated to have enough knowledge on safety management and rules in working places. Those who opted for alternative *D*, *They are circular in shape with green text on red background*, did not know the color of the background. Those who chose other alternatives had insufficient

knowledge in safety management and rules hence they failed to differentiate the mandatory safety signs from prohibited safety signs.

### 2.1.2 Question 2: Matching Items

The question comprised of five items numbered (i)-(v) constructed from the topic of *Electronics Drawing.* Each item carried 1 mark, making a total of 5 marks.

The students were given five applications of the technical drawing in List A, and were required to match each item with a corresponding type of technical drawing in List B, which comprised of seven (7) types of drawing. The question intended to test the ability of students to identify type of drawing with its corresponding application. The question was:

Match *the applications of the drawings in List A with the corresponding types of drawings in List B by writing the letter of the correct response in the table provided.*

| ***List A*** | ***List B*** |
|---|---|
| *(i) It shows units of function within a system.* | *A A component assembly drawing* |
| *(ii) It represents a complete integrated circuit package.* | *B Cabling diagram* |
| *(iii) It shows components which are connected together.* | *C Schematic diagram* |
| *(iv) It shows how cables are routed among units in a system.* | *D Logic diagram* |
| *(v) It shows how the components will be arranged on a printed circuit board.* | *E Block diagram* |
| | *F Mechanical drawing* |
| | *G Printed circuit drawing* |

This question was attempted by 307 (100%) students. Out of those who attempted 151 (49.18%) scored from 0 to 1 mark, 127 (41.37%) scored from 2 to 3 marks and 29 (9.45%) scored from 4 to 5 marks. A total of 156 (50.81%) students scored average and above and 151 (49.18%) students scored below average. Thus, general performance of the students in this question was average since 50.81% students

scored average and above. The overall students' performance in this question is summarized in Figure 2.

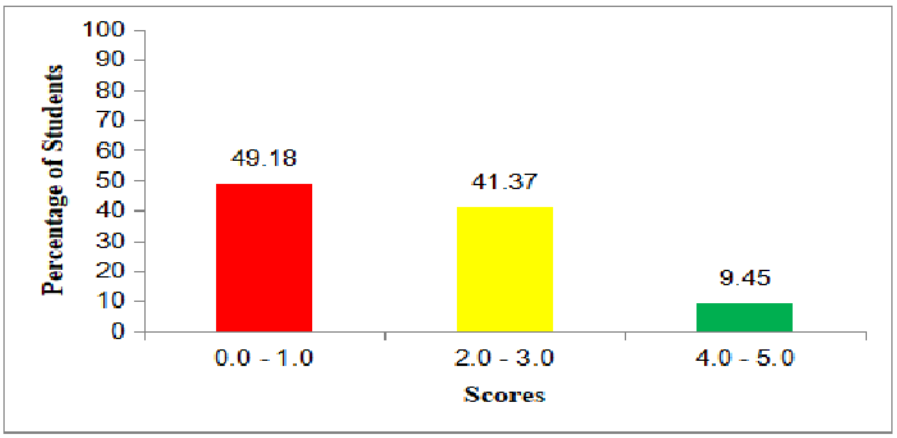



**Figure 2:** *The Students' Performance in Question 2*

The analysis of the student's responses to this question shows that an average number of the students that is 156 (50.82%) matched correctly the applications of the drawings with their corresponding types of drawing. These students had appropriate knowledge of types of drawings and their applications as applied in electronics drawing. However, 151 (49.19%) students failed to match the correct items.

Analysis of student response to each item of question 2 is as follows:
In item (i), most of the students opted for alternative *E, Block diagram,* which was the correct answer. The students who matched correctly this item, indicated to have adequate knowledge on electronics drawing. Some students matched it with alternative *D*, *Logic diagram*, as they failed to realize correctly the uses of block diagram and logic diagram as applied in electronic drawing. Those who matched with other alternatives had insufficient knowledge of electronics drawing.

In item (ii), most of the students opted for alternative *D, Logic diagram,* which was the correct answer. The students, who selected alternative *D*, had enough knowledge on application of electronics drawing. Some of the students incorrectly matched with alternative *G, printed circuit drawing* were attracted by the word printed circuit

which appeared in both items. This shows that they were just guessing the answer. Those selected other alternatives had inadequate knowledge on electronics drawing.

In item (iii), an average number of students opted for alternative *C, Schematic diagram,* which was the correct answer. The students, who selected alternative *C,* had enough knowledge on how electronic component symbols are interconnected. Some students incorrectly matched this item by selecting alternative A*, Component assembly drawing*. They wrongly related the statement *component assembly drawing* in List B *with components which are connected together* in List A. Those who selected other alternatives had insufficient knowledge on electronics drawing.

In item (iv) most of the students opted for alternative *B, Cabling diagram,* which was the correct answer. The students who correctly selected this item had sufficient knowledge on application of electronics drawing. However, some students incorrectly opted for alternative *A*, *a component assembly drawing*. These students confused by the *statement cable routed among units* in a system with *a component assembly* drawing. Those who selected other alternatives had inadequate knowledge on tested subject matter.

In item (v), an average number of the students opted for alternative *A, A component assembly drawing,* which was the correct answer. Those who correctly matched them had sufficient knowledge on electronics drawing. Some students wrongly selected alternative *G*, *Printed circuit drawing,* by relating term *printed circuit drawing* in list B with *printed circuit board in* list A, without considering the meaning as used in electronics drawing. Those who selected other alternatives had insufficient knowledge in subject matter.

## 2.2 SECTION B: SHORT ANSWER QUESTIONS

Section B consisted of seven (7) compulsory questions (question 3 to 9). Students had to answer the questions by filling in the blank space. Ten (10) marks were awarded for each question, for a total of seventy

(70) marks. Students' response to each question in section B is given as follows.

### 2.2.1 Question 3: Electronics Engineering Occupational Information

The question required students to give five reasons why electronics engineers shift from analog to digital electronics. It tested students' reasoning capacity related to issues which made shifting from analogue to digital. The question was:
*Why electronics engineers shift from analog to digital technology? Give five reasons.*

This question was attempted by 307 (100%) students. Out of those who attempted 129 (42.02%) students scored from 0 to 2.5, 119 (38.76%) scored from 3 to 6.5 marks and 59 (19.22%) scored from 7 to 10 marks. The overall students' performance in this question is summarized in Figure 3.

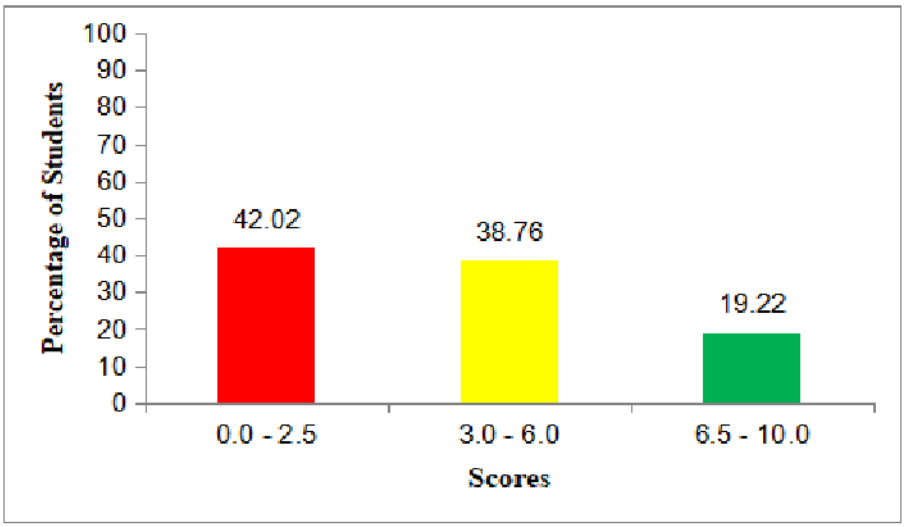
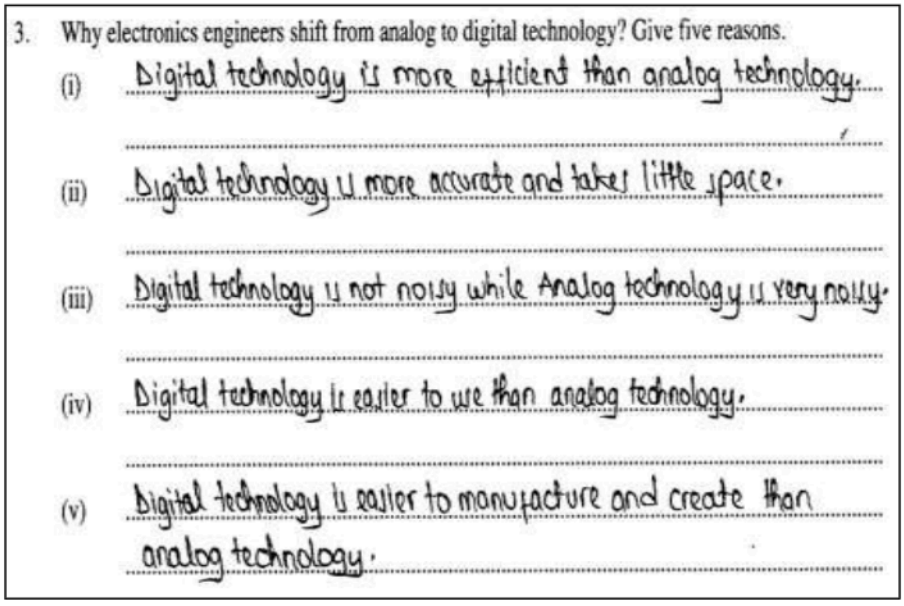



**Figure 3:** *The Students' Performance in Question 3*

The general performance of this question was average since 57.98 per cent of the students scored average or above. The performance suggests that majority of the students had sufficient knowledge and skills on electronics engineering occupational information, since they

were able to give five reasons of electronics engineers to shift from analog to digital electronics. Extract 1.1 is a sample of correct response from a student who correctly listed five reasons for electronics engineers to shift from analog to digital technology.


3. Why electronics engineers shift from analog to digital technology? Give five reasons.

(i) Digital technology is more efficient than analog technology.

(ii) Digital technology is more accurate and takes little space.

(iii) Digital technology is not noisy while Analog technology is very noisy.

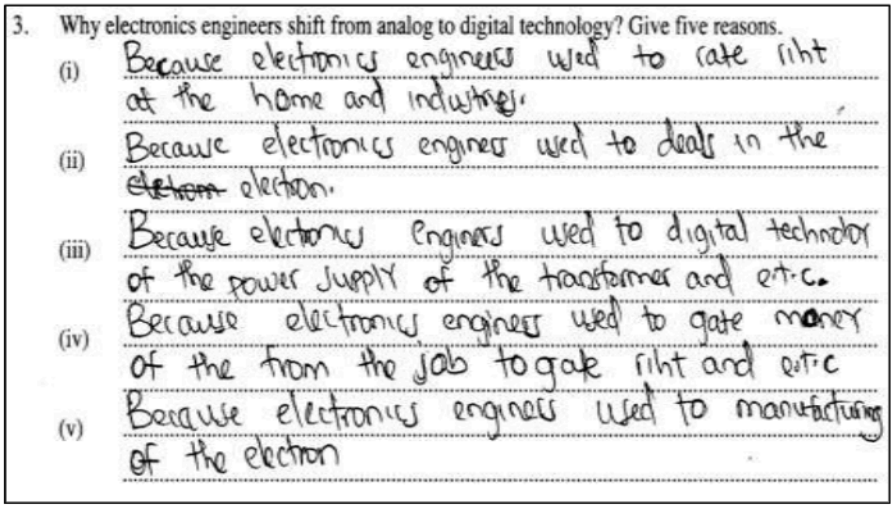
(iv) Digital technology is easier to use than analog technology.

(v) Digital technology is easier to manufacture and create than analog technology.

**Extract 1.1:** A sample of correct responses to Question 3

Extract 1.1 indicates that a student correctly outlined five reasons demanded in the question. On the other hand, 129 (42.02%) students failed to list five reasons for electronics engineers to shift from analog to digital technology, which suggest that they had inadequate knowledge on electronics engineering occupational information. Some of the students thought that because many people in the world use digital devices could be the reasons to shift from analogue to digital instead of considering the technical features of digital devices. Some students wrote vice versa that digital technology is the factor which leads to rise of science and technology instead of science and technology is the factor which leads to rise of digital technology. One student gave the differences between analogue and digital technology instead of reasons; example of such response is "Because the analogue deals with continuous varying signal, while digital technology deals with discrete signals". Extract 1.2 shows an

example of wrong responses provided by a student who gave incorrect answer.


3. Why electronics engineers shift from analog to digital technology? Give five reasons.

(i) Because electronics engineers used to cate liht at the home and industries.

(ii) Because electronics engineers used to deals in the ~~electron~~ electron.

(iii) Because electronics engineers used to digital technology of the power supply of the transformer and e.t.c.

(iv) Because electronics engineers used to gate money of the from the job to gate liht and e.t.c

(v) Because electronics engineers used to manufacturing of the electron

**Extract 1.2:** A sample of incorrect responses to Question 3

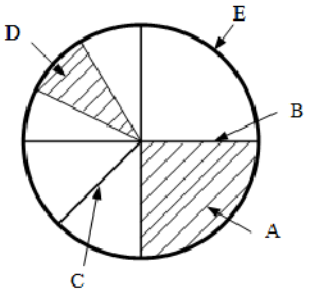
In Extract 1.2, a student failed to give the required reason for electronics engineers to shift from analog to digital electronics. For example, in part 3 (v), one of the students responded *because electronics engineers use to manufacturing of the electron.* This shows that a student had insufficient knowledge about analog and digital technology. Also the student had language barrier problem as s/he failed to represent his/her response accordingly.

### 2.2.2 Question 4: Drawing Techniques

The question consisted of two parts (a) and (b). The question intended to measure the ability of students to use the knowledge acquired from drawing techniques topic to identify parts of a circles and draw an inscribed pentagon in a circle using compass and rules. The question was:

*(a) Identify the* names *of the labelled parts of a circle in the figure as applied in drawing techniques.*

*(b) Draw an inscribed pentagon in a circle of 80 mm diameter using compass and rulers.*




The question was attempted by 307 (100%) students. Out of those who attempted, 90 (29.32%) scored from 0 to 2.5 marks, 176 (57.33%) scored from 3 to 6.5 marks and 41 (13.35%) scored from 7 to 10 marks. The overall students' performance in this question is summarized in Figure 4.

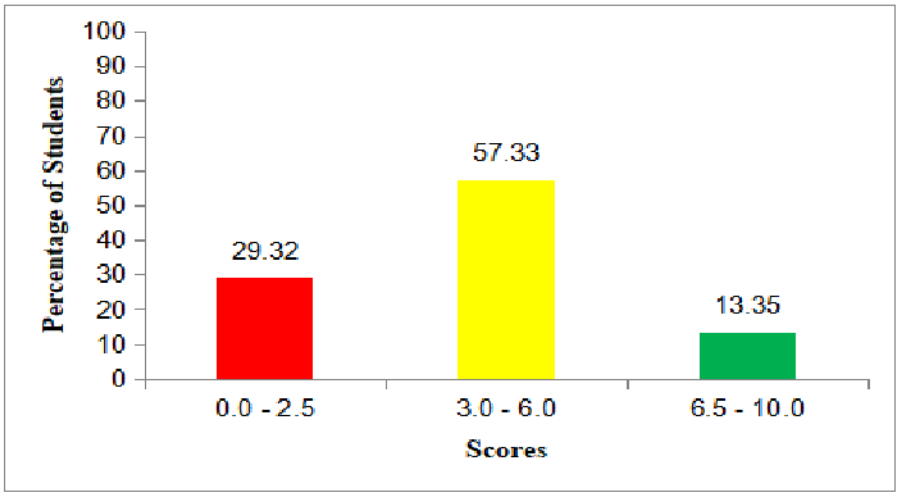
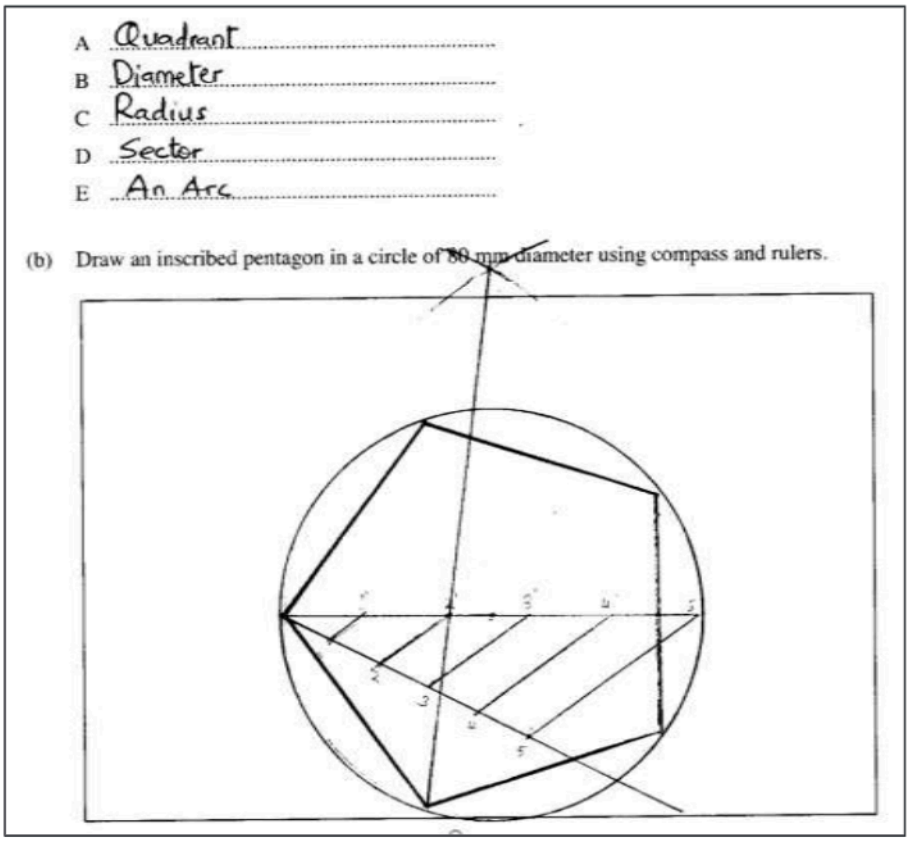



**Figure 4:** *The Students' Performance in Question 4*

The general performance of this question was good since 70.68 per cent of the students scored average or above marks. This reveals that the majority of the students had sufficient knowledge and skills on drawing techniques. Extract 2.1 shows a sample of correct responses from a student who correctly identified the required names in part (a) and well-drawn inscribed pentagon in part (b).



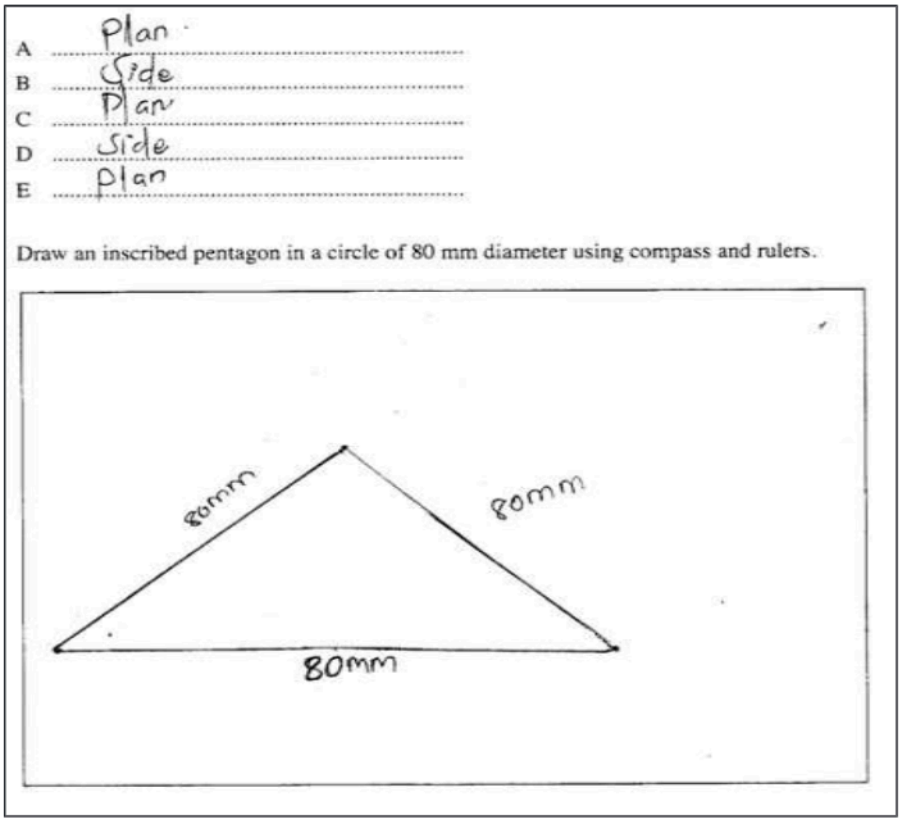

**Extract 2.1:** A sample of correct responses to Question 4

In Extract 2.1 part (a), a student correctly identified the names of the labeled parts of a circle in a given figure as applied in construction of different types of geometric plane figures. In Extract 2.1 part (b), a student drew an inscribed pentagon in a circle of 80 mm using compass and rulers.

On the contrary, 90 (29.32%) students failed to identify the name of the labeled parts of a circle and draw the inscribed pentagon. Some of the students wrongly labelled A as a chord instead of a quadrant, some named as segment, and some as a sector. Some of the students labelled *B diameter* as semi-circle, some wrongly labelled diameter as straight line. Also some students wrongly labelled *C radius* as potions, one among students labelled radius as a schematic diagram, some labelled it as a semi quarter. Some of the students labelled *D sector* as an arc, some labelled it as a thicker line/ thin line, some

labelled as a first angle projection. Some students labelled circumference as a segment, and others labelled it as a chord.

In part (b), students either wrongly drew a pentagon with an equal length of sides or drew un-connected sides and outside the circle without taking into account that the pentagon is inscribed in a circle. Some students drew a rectangle inside a circle which is opposite to the needs of a question. Extract 2.2 part (a) and (b), are the samples of incorrect responses from a student who incorrectly identified the names of the labeled parts of a circle and wrongly drew the inscribed pentagon.




**Extract 2.2:** A sample of incorrect responses to Question 4

Extract 2.2 shows a sample of incorrect responses from one of the students. The student incorrectly named parts of the circle as *plan* and *side* which are commonly used in orthographic views. Also the

student failed to differentiate between the pentagon and triangle, indicating lack of knowledge on different types of plane figures.

### 2.2.3 Question 5: Electronic Components

This question comprised of two parts (a) and (b); which required the students to state the factor to be considered when choosing a capacitor in part (a) and to calculate total capacitance in series and parallel combinations in part (b). The question tested student basic knowledge on capacitors and ability to use formula to calculate series and parallel circuit combinations. The question was:

*(a)* *Briefly explain two factors you would consider when choosing a capacitor.*

*(b)* *You are given two* capacitors *of 6 μF and 3 μF which are required in a construction of a series-parallel circuit. For better performance of your circuit, calculate the total capacitance when the two capacitors are connected in:*

*(i)* *Series combination.*

*(ii)* *Parallel combination*

This question was attempted by 307 (100%) students. Out of those who attempted 127 (41.37%) scored from 0 to 2.5 marks, 86 (28.01%) scored from 3 to 6.5 marks and 94 (30.62%) scored from 7 to 10 marks. Thus, general performance of the students in this question was average since 180 (58.63%) students scored average and above. The overall students' performance in this question is summarized in Figure 5.

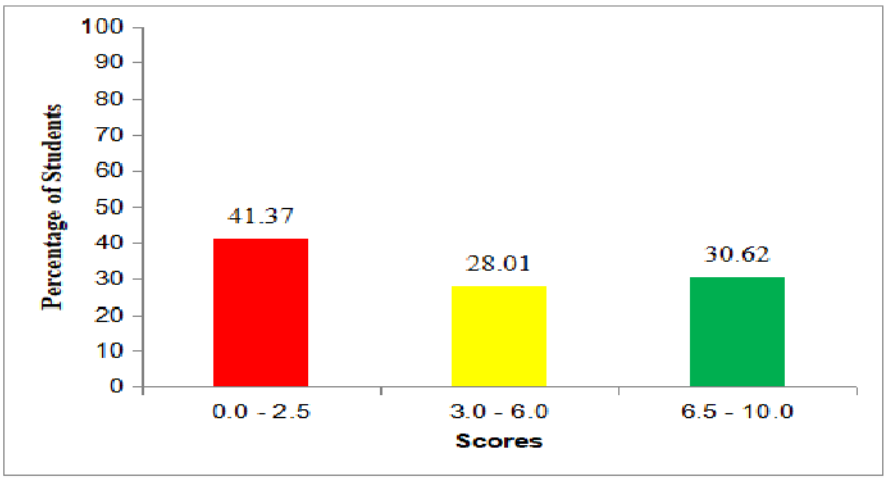
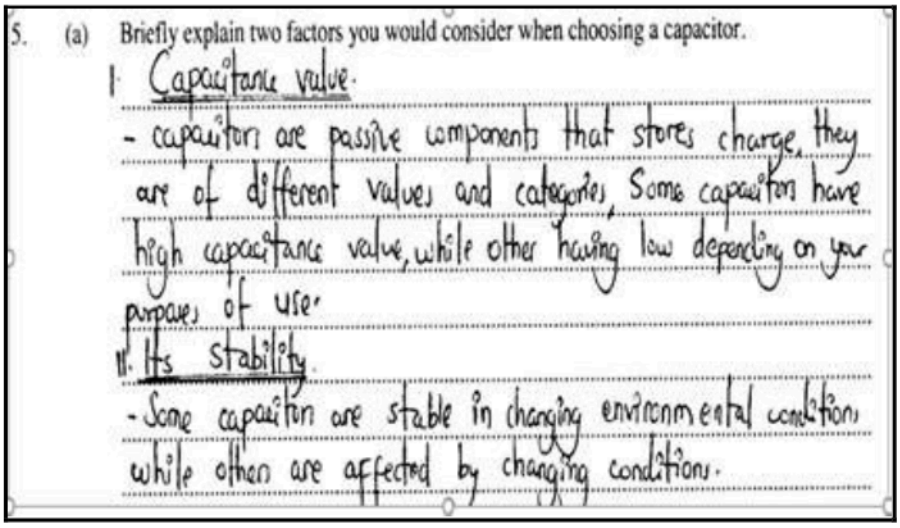



**Figure 5:** *The Students' Performance in Question 5*

Thus, general performance of the students in this question was average since 58.63 per cent of the students scored average or above. The students' performance reveals that, the majority of the students had sufficient knowledge and skills on electronic components. Extract 3.1 shows an example of good responses from one of the students.

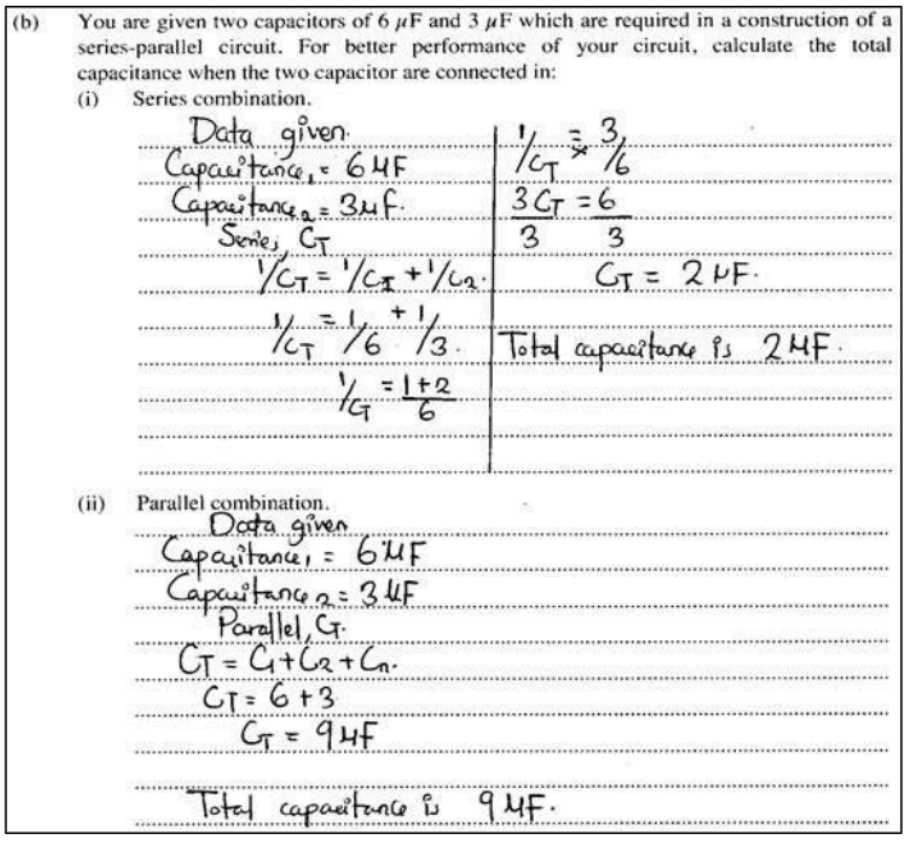

5. (a) Briefly explain two factors you would consider when choosing a capacitor.

I. Capacitance value.

- capacitors are passive components that stores charge, they are of different values and categories, Some capacitors have high capacitance value, while other having low depending on your purpose of use.

II. Its stability.

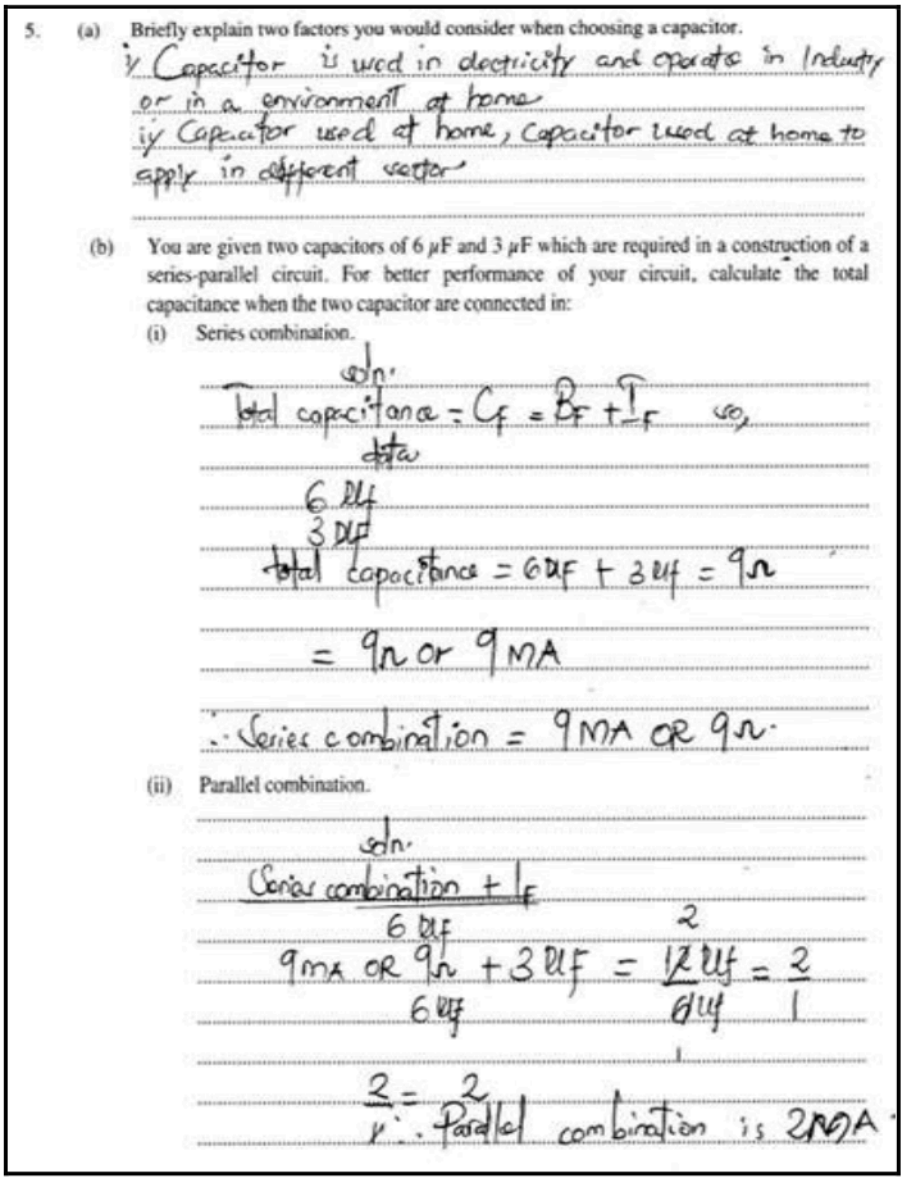
- Some capacitors are stable in changing environmental conditions while others are affected by changing conditions.




**Extract 3.1:** A sample of correct responses to Question 5

In Extract 3.1, a student correctly explained two factors to be considered when choosing a capacitor, and used the right formula to calculate total capacitance in series and parallel combination.

Although there were some students who couldn't explain the factors to be considered in choosing a capacitor instead they explained the various use of capacitors in part (a). Some students considered internal structure of a capacitor, for example they explained a "distance between capacitor plates" instead of capacitance of capacitor. One student explained the ability of capacitor to give charge to the electronic components. In part (b), students used incorrect formula to calculate capacitance, they used $C_T = C_1 + C_2$ to calculate series capacitance instead of $C_T = \frac{C_1 \times C_2}{C_1 \times C_2}$. They confused with formula to calculate series and parallel resistance of the resistors. Extract 3.2 shows an incorrect response from one of the students.


5. (a) Briefly explain two factors you would consider when choosing a capacitor.

i) Capacitor is used in electricity and operate in Industry or in a environment at home

ii) Capacitor used at home, Capacitor used at home to apply in different vector

(b) You are given two capacitors of 6 μF and 3 μF which are required in a construction of a series-parallel circuit. For better performance of your circuit, calculate the total capacitance when the two capacitor are connected in:

(i) Series combination.

sol.

Total capacitance = $C_T = C_F + C_F$ so,

data

6 μF

3 μF

total capacitance = 6μF + 3μf = 9Ω

= 9Ω or 9MA

∴ Series combination = 9MA OR 9Ω.

(ii) Parallel combination.

sol.

$\frac{\text{Series combination} + C_F}{6\,\mu F}$

$\frac{9MA \text{ OR } 9\Omega + 3\mu F}{6\,\mu F} = \frac{12\,\mu f}{6\,\mu f} = \frac{2}{1}$

$\frac{2}{1} = 2$

∴ Parallel combination is 2MA.

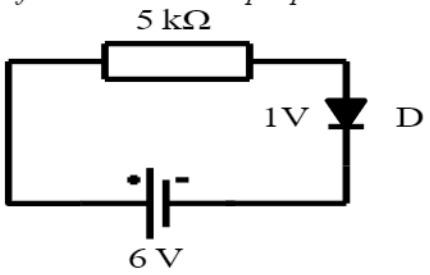
**Extract 3.2:** A sample of poor responses to Question 5

In Extract 3.2, a student failed to apply correct formula to calculate total capacitance in series and parallel combination.

### 2.2.4 Question 6: Introduction to Measurements and Instrumentation

This question consisted of parts (a), (b) and (c). The question tested the student's ability to use appropriate measuring instruments to measure current and voltage during fault tracing. The question was:

*The figure below is given for measurement purposes during practical session.*




*(a) How would you connect the following instruments to Figure 3 so as to measure current and voltage?*

*(i) An ammeter*

*(ii) A voltmeter*

*(b) Draw a circuit diagram to support your answers in (a)*

*(c) Use the data given in Figure 3 to calculate:*

*(i) The circuit currents.*

*(ii)Power taken from supply.*

This question was attempted by 307 (100%) students, out of them 132 (43.00%) scored from 0 to 2.5 marks, 130 (42.34%) scored from 3 to 6.5 marks and 45 (14.66%) scored from 7 to 10 marks. The overall students' performance is summarized in Figure 6.

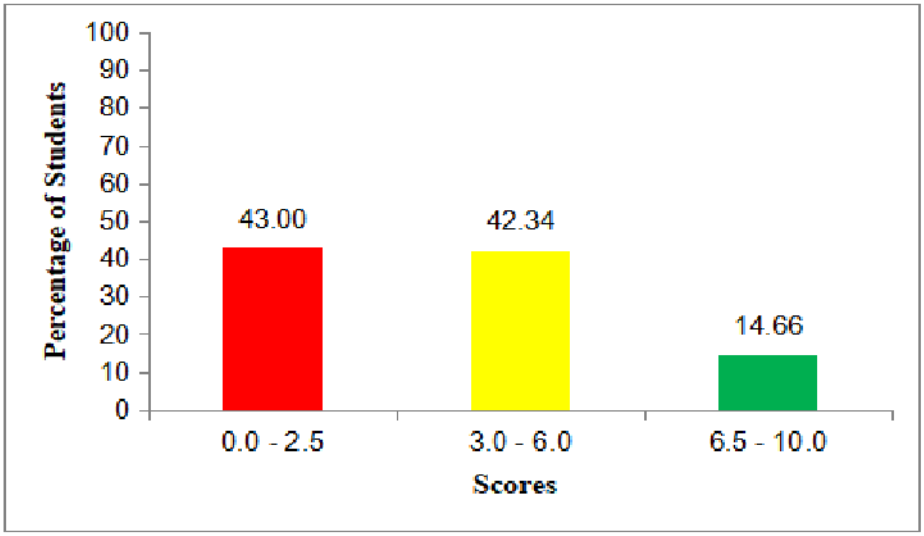
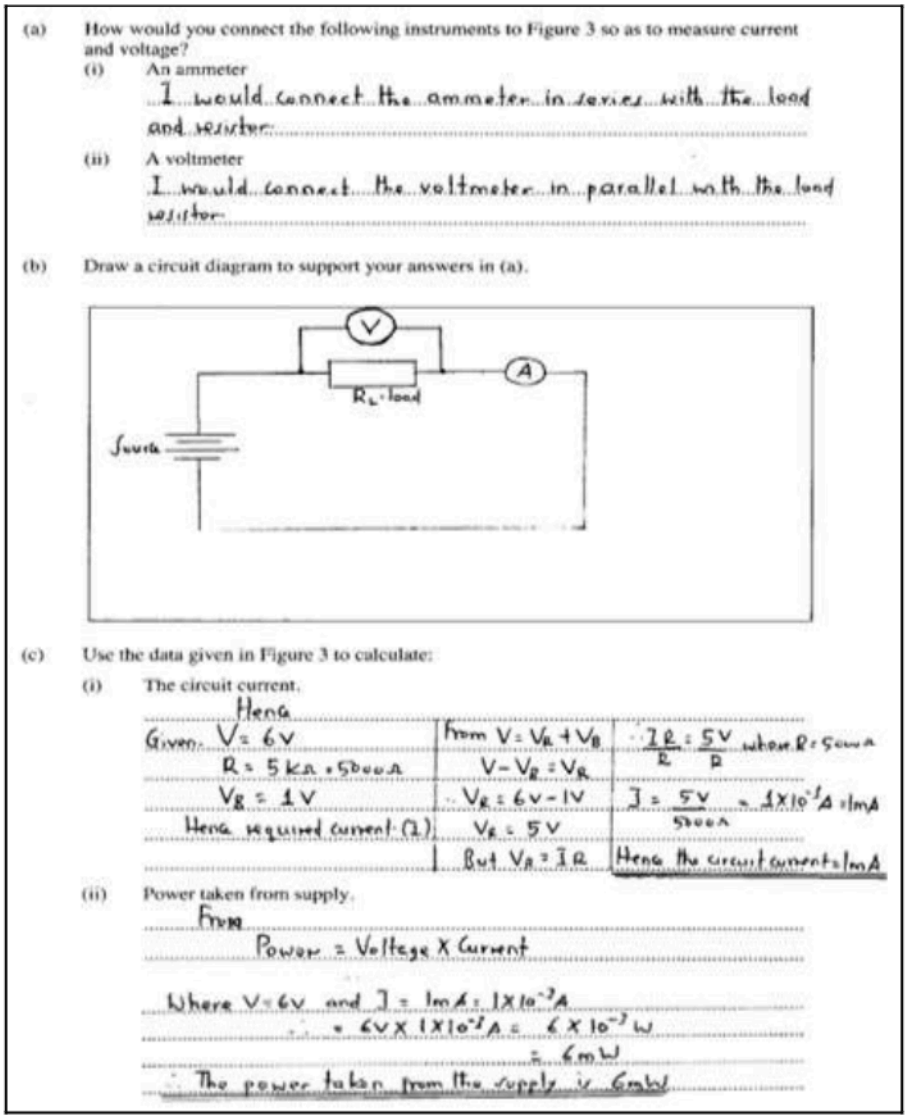



**Figure 6**: *The Students' Performance in Question 6*

The overall performance of this question was average since 175 (57.00%) scored average and above. This signifies that the students had a sufficient knowledge and skills on measurements and instrumentation. Extract 4.1 shows an example of good responses from a student who managed to answer clearly both parts of the question.




**Extract 4.1**: A sample of correct responses to Question 6

In Extract 4.1, a student correctly explained how to connect the ammeter and a voltmeter in a given circuit for measurement purposes and drew correctly a circuit to support the answer in (a). Also the student correctly determined the current flowing in the circuit and power taken from supply.

However, 132 (43.00%) students performed poorly in this question, which implies having inadequate knowledge and skills in measurements and instrumentation. In part (a) and (b) students failed to explain correctly the way the ammeter and voltmeter can be connected while measuring current and voltage. They also provided wrong illustration with interchanged instruments positions. In part (b), they drew voltmeter in a place of ammeter and ammeter in a place of voltmeter. In part (c) (i), the students interchanged formula to calculate current instead of using $I_t = \frac{Vt}{R}$, s/he wrote $Vt = \frac{It}{R}$. Some students used 6 V instead of 6V-1V thus getting wrong answer. In part (c) (ii), they used the wrong energy formula $P = \frac{W}{t}$ to find the power.

Extract 4.2 is an example of poor responses from a student who failed to explain how to connect an ammeter and voltmeter in the given circuit, to draw circuit diagram to support the answer in (a) and to calculate circuit current and power taken from supply.

(a) How would you connect the following instruments to Figure 3 so as to measure current and voltage?

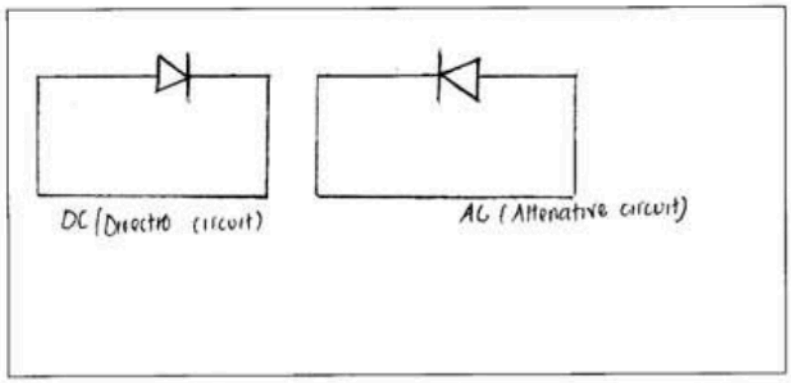
(i) An ammeter

- The provided the DC to AC voltage. DC (Direct current)

(ii) A voltmeter

- The inorder to high voltage range

(b) Draw a circuit diagram to support your answers in (a).




(c) Use the data given in Figure 3 to calculate:

(i) The circuit current.

Data:

$I_V$ = 6V and 1V

$I_C$ = x

$I_A$ = 5KΩ

form; $I_A = \frac{I_C}{T}$

$\frac{5K\Omega}{1} \times \frac{x}{7}$

$x = 35K\Omega V$

Resistance = 5KΩ P = 35W

Power = ?

P = VR

= 7 x 5 ∴ Power = 35W.

**Extract 4.2**: A sample of poor responses to Question 6

In Extract 4.2, a student incorrectly explained how to connect an ammeter and voltmeter to the given circuit. S/he failed to draw correct circuit diagram to support the answer in (a) and to apply the correct formula to calculate circuit current and power taken from the supply.

### 2.2.5 Question 7: Introduction on Electricity

This question consisted of three parts, (a), (b) and (c). The question intended to measure the students' competence in identifying the effect of a series or parallel connection upon the overall current and resistance of the circuit. The question was:

*One of the three identical lamps that are connected in series to 230 V supply is found to blow out.*

*(a) What will be the effect to the circuit after the lamp has been blown out?*

*(b) Estimate the voltage across it if the blown-out lamp is replaced with the new one.*

*(c) With the aid of a diagram, reconnect the identical lamps in (a) in such a way that, one lamp is connected in series with parallel combination of two lamps across the supply. Indicate the direction of circuit current.*

This question was attempted by 307 (100%) students. Out of those who attempted, 65 (21.17%) scored from 0 to 2.5 marks, 136 (44.30 %), scored from 3 to 6.5 marks and 106 (34.53%) scored from 7 to 10 marks. Students' performance in this question is summarized in Figure 7.

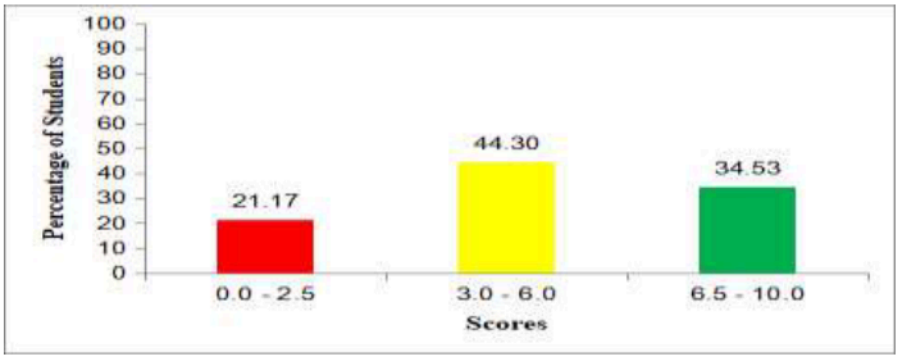
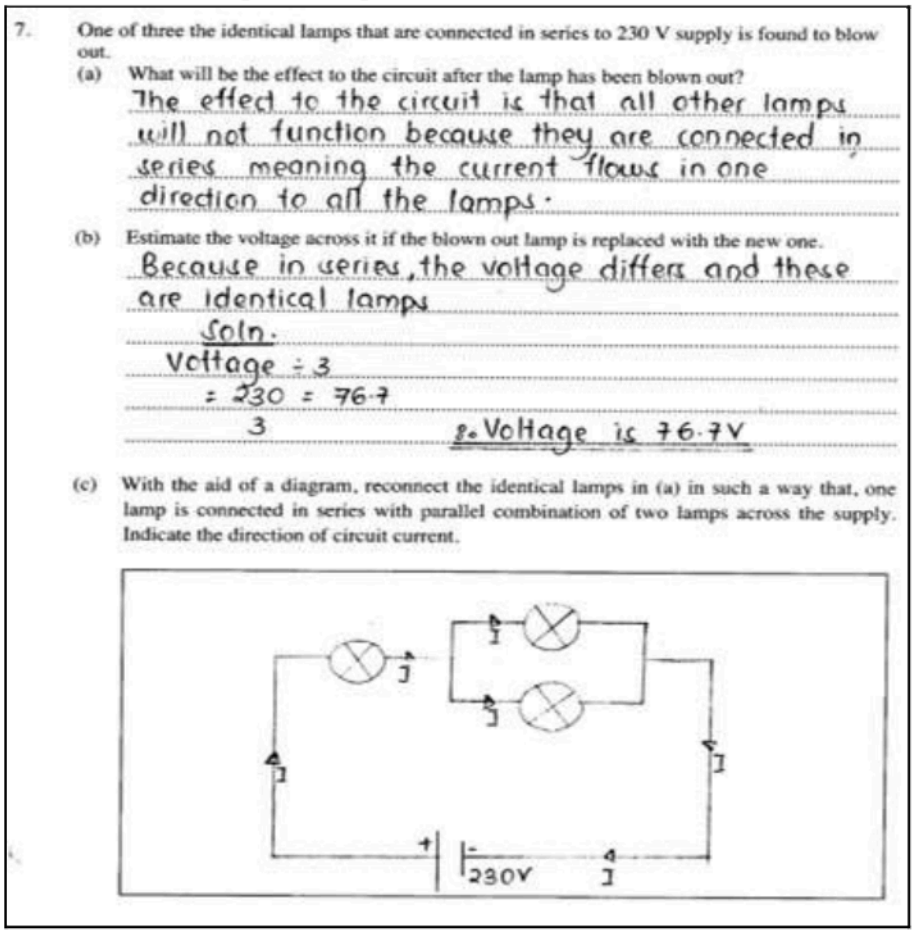



**Figure 7:** *The Students' Performance in Question 7*

The overall performance of this question was good since 78.83 per cent of the students scored average or above. In part (a), students realized that when one lamp blows, it will produce an open circuit

which result to no flow of current in the circuit and other lamps will not glow. In part (b) the students correctly calculated the voltage across the lamp when the blown-out lamp is replaced with the new one. In part (c), the students clearly drew the circuit of the lamp connection, one in series with parallel combination of two lamps across the supply. Extract 5.1 is an example of good response from a student who attempted the question.


7. One of three the identical lamps that are connected in series to 230 V supply is found to blow out.

(a) What will be the effect to the circuit after the lamp has been blown out?

The effect to the circuit is that all other lamps will not function because they are connected in series meaning the current flows in one direction to all the lamps.

(b) Estimate the voltage across it if the blown out lamp is replaced with the new one.

Because in series, the voltage differs and these are identical lamps

Soln.

Voltage ÷ 3

= 230 = 76.7

3

∴ Voltage is 76.7V

(c) With the aid of a diagram, reconnect the identical lamps in (a) in such a way that, one lamp is connected in series with parallel combination of two lamps across the supply. Indicate the direction of circuit current.



**Extract 5.1:** A sample of correct responses to Question 7

In Extract 5.1, a student demonstrated good knowledge and skills in series and parallel circuit connection.

However, few 65 (21.17%) students scored below average. This shows that they lacked knowledge of series parallel combination in electric circuit. For example, in part (a), a student explained that "the

circuit will use low current because one of the loads has been burnt out from the circuit". This shows that the student has in adequate knowledge in series circuit connection, since there will be no flow of current in a circuit. Another student explained that "the lamp will burn because of overloaded voltage". He/she gave an opposite answer to the intended answer since overload voltage, also known as overvoltage, occurs when the voltage in a circuit exceeds its intended or rated level. Several factors can cause overload voltage not because of burned lamp. In part (b) some the students used a series voltage formula. Total Voltage $= V1 + V2 + V3$, without dividing by number of lamps to find voltage instead of $V = \frac{\text{Total Voltage}}{\text{Number of lamp}}$, which lead to incorrect answer. In part (c), some students wrongly drew two lamps in series and parallel with one remaining lamp. Extract 5.2 shows an example of poor response from a student who failed to attempt all parts of the question.

7. One of three the identical lamps that are connected in series to 230 V supply is found to blow out.

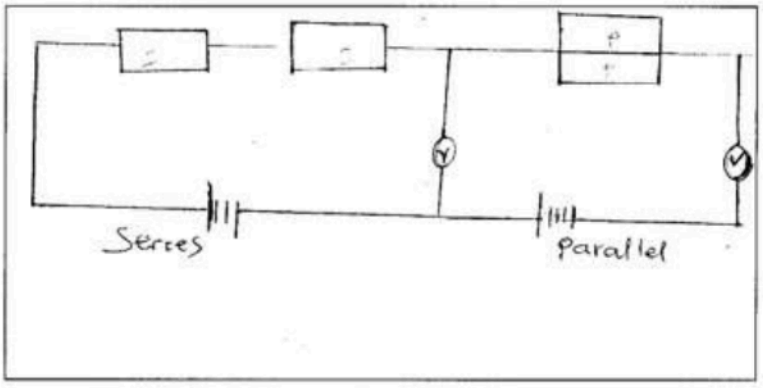
(a) What will be the effect to the circuit after the lamp has been blown out?

• This to affect the corcuit after the lamp is temperat use at that place or length of the plate.

(b) Estimate the voltage across it if the blown out lamp is replaced with the new one.

Because the out of the new one is the product the another electricity in the circuit because to remwal the usefull and enter the new product.

(c) With the aid of a diagram, reconnect the identical lamps in (a) in such a way that, one lamp is connected in series with parallel combination of two lamps across the supply. Indicate the direction of circuit current.




**Extract 5.2:** A sample of incorrect responses to Question 7

In Extract 5.2 a student explained that the temperature increases instead of circuit cutoff. In part (c) drew two blocks in series and two blocks one over the other. This shows that, student failed to understand the demand of the question, and lacked knowledge on electric components symbol which also led to draw incorrect diagram in part (c) of the question.

### 2.2.6 Question 8: Introduction to Measurement and Instrumentation

The question required students to provide five reasons why digital multimeter is preferred to analogue multimeter. It tested the students'

ability to reason the causes of using digital multimeter and not analogue multimeter. The question was:

*Why digital multi-meters are widely used in many electronics workshops? Give five reasons.*

The question was attempted by 307 (100%) students. Out of those who attempted, 150 (48.86%) scored from 0 to 2.5 marks, 128 (41.69%) scored from 3 to 6.5 marks and 29 (9.45%) scored from 7 to 10. The overall student's performance in this question is summarized Figure 8.

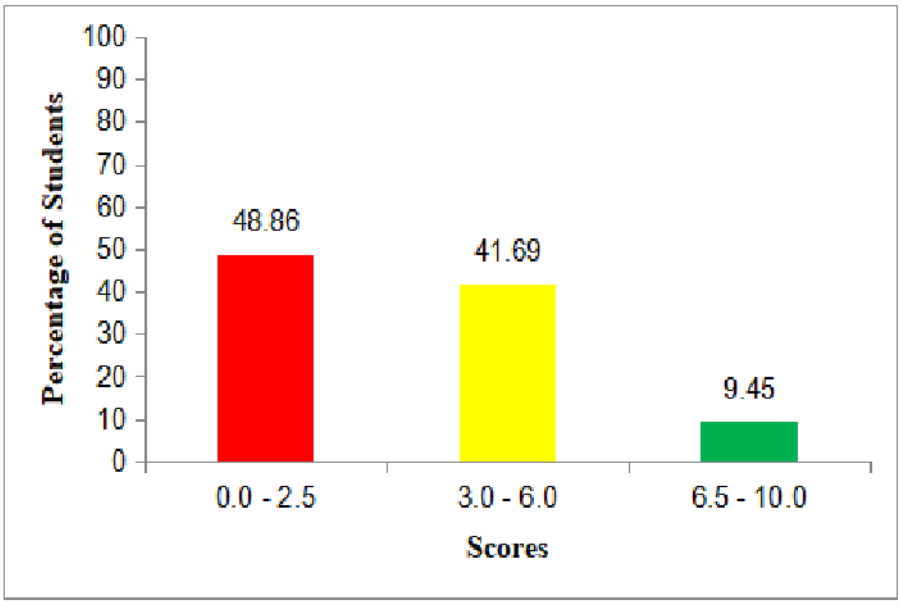
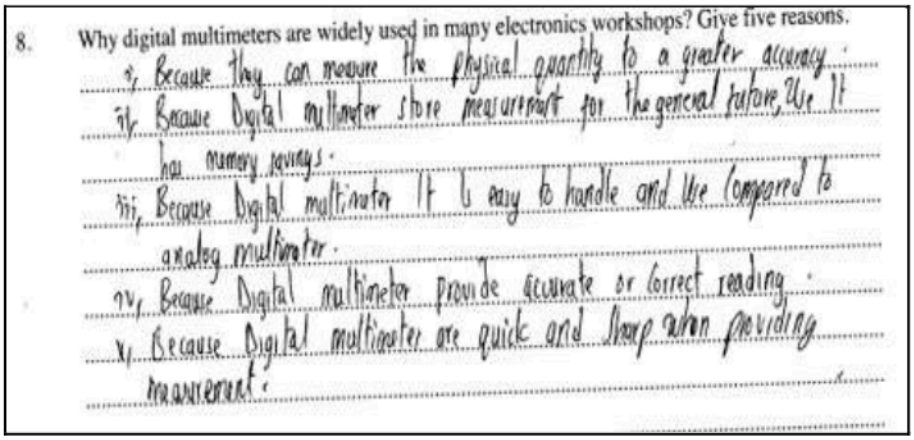



**Figure 8**: *The Students' Performance in Question 8*

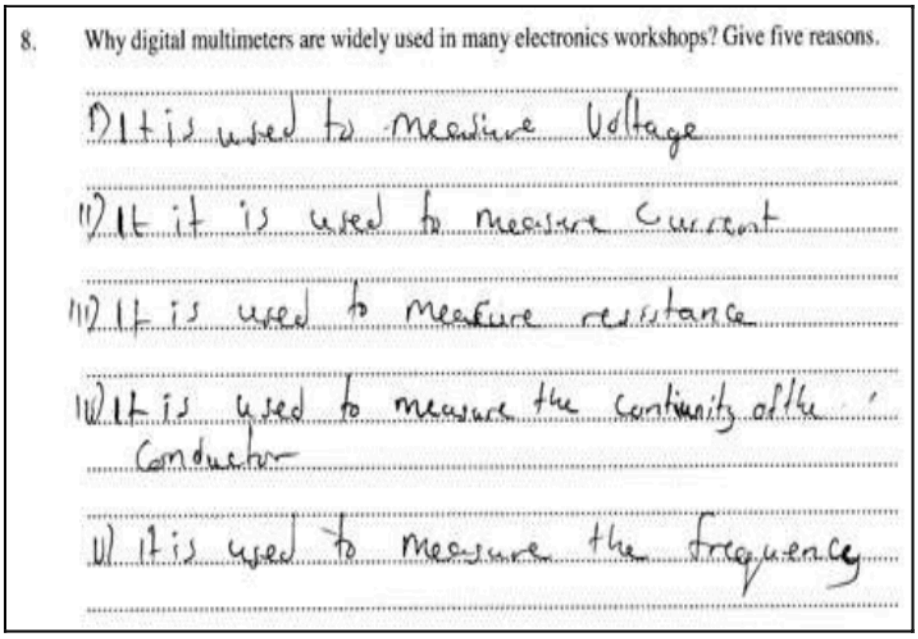
The performance of this question was average since 157 (51.14%) of the students scored average and above. This means that majority of the students had fair knowledge and skills on measurements and instrumentation. An example of a good response from a student is provided in Extract 6.1.


8. Why digital multimeters are widely used in many electronics workshops? Give five reasons.

i, Because they can measure the physical quantity to a greater accuracy.
ii, Because Digital multimeter store measurement for the general future use It has memory savings.
iii, Because Digital multimeter It is easy to handle and use compared to analog multimeter.
iv, Because Digital multimeter provide accurate or correct reading.
v, Because Digital multimeter are quick and sharp when providing measurement.

**Extract 6.1**: A sample of correct responses to Question 8

In Extract 6.1, a student correctly gave the required five reasons of which digital multimeter are widely used in many electronics workshops. Besides good performance, 150 (48.86%) students performed poorly. These students were not familiar with advantages of digital multimeters over analog multimeters. Some students explained the application of both types of meters like "they measure both current, voltage, and resistance''. Others said it is used to test short circuits, to test live cables, contrary to the need of a question asked. Extract 6.2, shows an example of poor responses from a student who failed to explain why digital multimeters a widely used in many electronics workshops.


8. Why digital multimeters are widely used in many electronics workshops? Give five reasons.

i) It is used to measure voltage

ii) It it is used to measure current

iii) It is used to measure resistance

iv) It is used to measure the continuity of the conductor

v) It is used to measure the frequency

**Extract 6.2**: A sample of incorrect responses to Question 8

In Extract 6.2, a student gave the uses of multimeter instead of the reasons why it is widely used in many electronics workshop. It shows that, the student misinterpreted the question.

### 2.2.7 Question 9: Safety Management and Rules

In this question, the students were required to outline five steps in sequence that would be followed to help unconscious victim of an electric shock. It tested a students' knowledge on appropriate steps to follow to help electric shock victims in a work shop. The question was:

*A student got an electric shock* and *is unconscious. Suggest the immediate five steps in sequence that you would follow in order to help the victim*.

This question was attempted by 307 (100%) students. Out of those who attempted 43 (14.01%) scored from 0 to 2.5 marks 117 (38.11%), scored from 3 to 6.5 marks and 147 (47.88%) scored from 7 to 10 marks. The overall student's performance in this question is summarized in Figure 9.

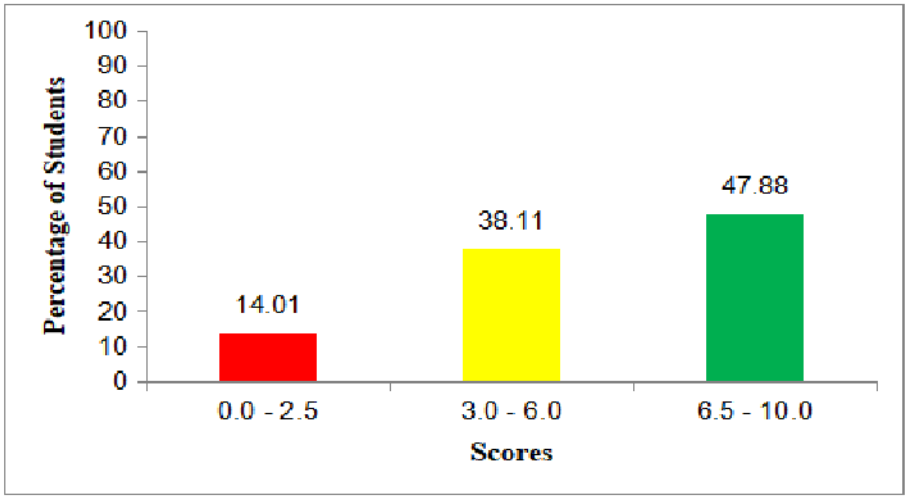
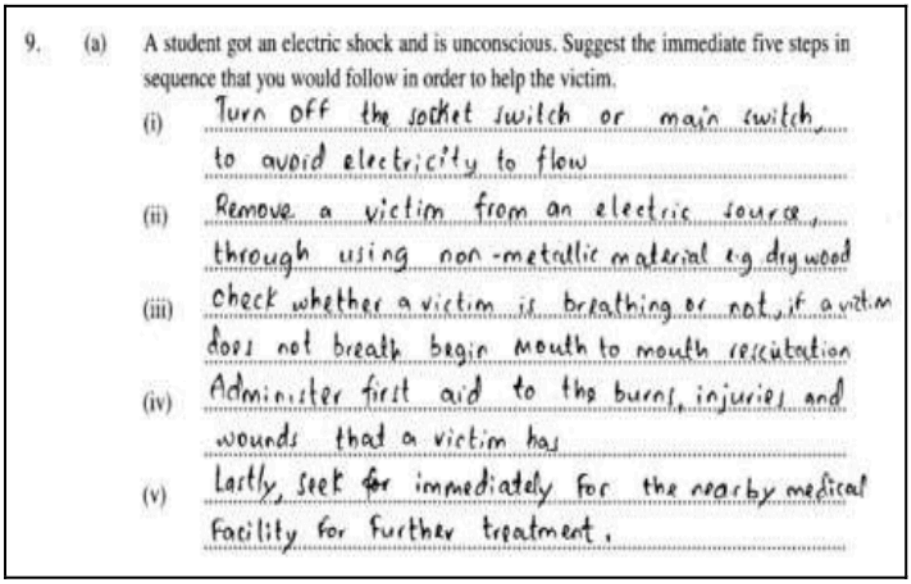



**Figure 9**: *The Students Performance in Question 9*

The overall students' performance of this question was good since 264 (85.99%) scored average and above. The students were knowledgeable about safety management and rules. Extract 7.1 shows the sample of good responses from a student who correctly outlined all five required steps as per question demand.



9. (a) A student got an electric shock and is unconscious. Suggest the immediate five steps in sequence that you would follow in order to help the victim.

(i) Turn off the socket switch or main switch to avoid electricity to flow

(ii) Remove a victim from an electric source through using non-metallic material e.g dry wood

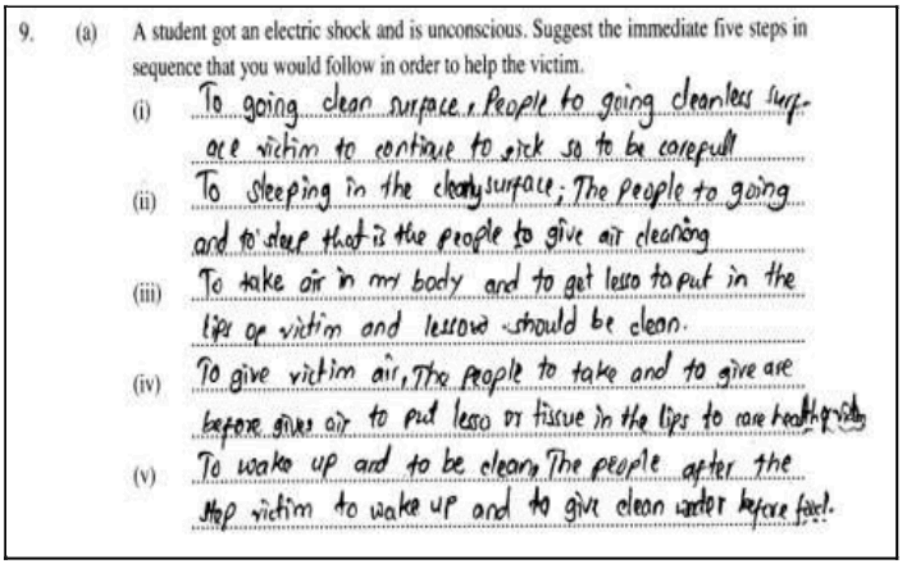
(iii) Check whether a victim is breathing or not, if a victim does not breath begin mouth to mouth respiration

(iv) Administer first aid to the burns, injuries and wounds that a victim has

(v) Lastly, seek for immediately for the nearby medical facility for further treatment.

**Extract 7.1**: A sample of correct responses to Question 9

In Extract 7.1, a student managed to suggest sequentially the immediate five steps to administer a victim of an electric shock. Beside good performance, 43 (14.01%) students performed poorly. Most of the students wrote steps in wrong sequence. Some gave wrong answers like "to take the stick not the water, then differ to stick not to the water". Extract 7.2 is a sample of incorrect responses.


9. (a) A student got an electric shock and is unconscious. Suggest the immediate five steps in sequence that you would follow in order to help the victim.

(i) To going clean surface, People to going clearless surface victim to continue to sick so to be corepull

(ii) To sleeping in the clearly surface; The people to going and to sleep that is the people to give air clearing

(iii) To take air in my body and to get lesso to put in the lips of victim and lessow should be clean.

(iv) To give victim air, The people to take and to give are before give air to put lesso or tissue in the lips to save healthy victim

(v) To wake up and to be clean, The people after the stop victim to wake up and to give clean water before fast.

**Extract 7.2:** A sample of incorrect responses to Question 9

Extract 7.2 shows that a student understood the question, but lacked communication skills and misinterpreted the demand of the question.

## 2.3 SECTION C: STRUCTURED QUESTION

This section had one (1) compulsory question from the topic of Introduction to Electricity. The question carried 15 marks.

### 2.3.1 Question 10: Introduction to Electricity

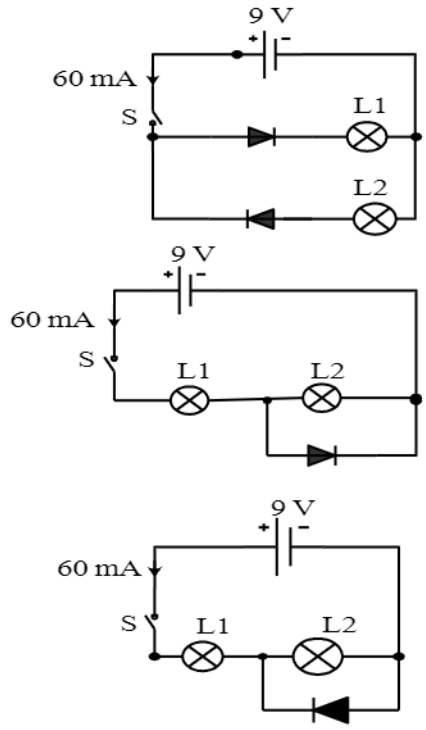
This question consisted of parts (a), (b) and (c). The question measured the competence on series and parallel connection as well as the diode operation when in forward and reverse bias. It tested a student ability to construct a circuit and to use formula to calculate some electrical quantities in a circuit. The question was:

*You are assigned to construct a* circuit *which comprises two filament lamps A and B with 0.8 A and 0.9 A respectively when connected across voltage supply.*

*(a) If the lamps are connected in series determine, the resistance of each lamp across 110 V supply and total resistance of a circuit.*

*(b) Draw a circuit of two lamps A and B connected in parallel across the voltage supply.*

*(c) Study the circuit shown in Figures 4, 5 and 6. For each circuit, state whether the lamp is bright, dim or off.*




This question was attempted by 307 (100%) students. Out of those who attempted 70 (22.80%) scored from 0 to 4 marks, 134 (43.65%) scored from 4.5 to 9.5 marks and 103 (33.55%) scored from 10 to 15. The overall student's performance in this question is summarized in Figure 10.

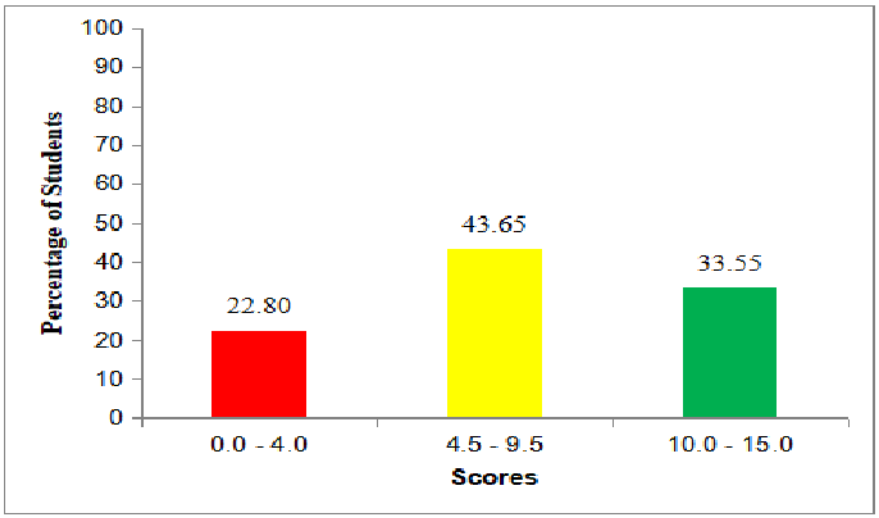



**Figure 10**: *The Student's Performance in Question 10*

The general performance was good since 237 (77.20%) student scored average and above. The analysis shows that majority of the students had sufficient knowledge and skills on the topic Introduction to electricity and semiconductor (PN-junction) materials. Extract 8.1 shows a sample of correct responses from one of the students.

10. You are assigned to construct a circuit which comprises two filament lamps A and B with 0.8 A and 0.9 A respectively when connected across voltage supply.

(a) If the lamps are connected in series determine:

(i) The resistance of each lamp across 110 V supply and total resistance of a circuit.

Solo:

Given Lamp A = 0.8A

Lamp B = 0.9A

$R_1 = ?$

$R_1 = \frac{V}{R}$

$R_1 = \frac{110V}{0.8}$

$R_1 = 137.5\,\Omega$

$R_2 = \frac{V}{R}$

$R_2 = \frac{110V}{0.9A}$

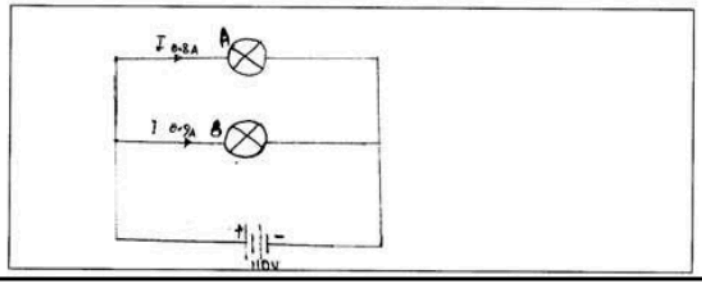
$R_2 = 122.22\,\Omega$

Lamp A = 137.5Ω , Lamp B = 122.22Ω

Total resistance = $R_1 + R_2$ , 137.5Ω + 122.22 Ω

Total resistance = 259.72 Ω

(b) Draw a circuit of two lamps A and B connected in parallel across the voltage supply.



(c) Study the circuit shown in Figures 4, 5 and 6. For each circuit, state whether the lamp is bright, dim or off?

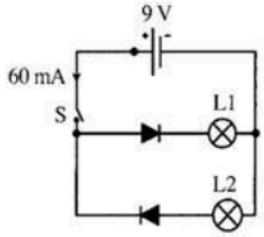



**Figure 4**

To the Electronics circuit state whether the lamps power voltage

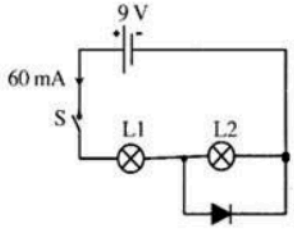



**Figure 5**

To the electronics circuit state whether the lamps of the Electrical power

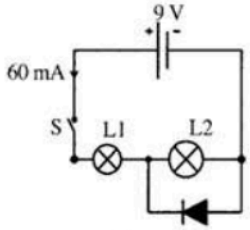



**Figure 6**

To the electronics circuit state whether the lamps of the Electrical power and electrics

**Extract 8.1:** A sample of correct responses to Question 10

In Extract 8.1, a student applied the correct formula and calculated correctly the required resistance of the circuit. Also s/he managed to draw a correct circuit and stated correctly the conditions of the lamps in each of the figure as demanded in the question.

Besides, there were 70 (22.80%) students who failed to correctly determine the required resistance, drew the circuit and state the conditions of the lamps in each of the given figures. For example in part (a) one student who had no enough knowledge on ohms' law used incorrect formula, $\text{Resistance} = \frac{\text{R}}{1} + \frac{\text{R}}{2}$ to calculate resistance and $R = \frac{I}{V}$ to calculate voltage and current which led to incorrect answers.

In part (b), others drew a series circuit instead of parallel circuit as instructed in the question and in part (c), some students gave wrong and the same answer for all circuits. They wrote all lights will be off indicating that students were just guessing and did not understand the working condition of PN junction diode that is, it operates (on condition) when it is in forward biased condition. In Figure 4 of the question the L1 will light bright since diode is forward biased and L2 is off since diode is reverse biased. Contrary, one student explained that "lamp is dim, because symbol of diode L1 to direct opposition of negative and diode L2 direct to opposition of positive charge". The student was unable to understand when diode is forward biased and when and how diode is reverse biased.

In Figure 5 of the question, students were expected to provide response like L1 will light bright since there is no restriction, but L2 will be off since the diode will be forward biased and all current pass through it. Contrary, some of the students in this figure stated that the lights are dim; he/she confused with the direction of diode by thinking it was reverse biased. The same applied to Figure 6 of the question where by some of the students stated that lights will be bright confused with the direction of diode by thinking that it is forward biased. Extract 8.2 shows a sample of incorrect responses from one of the students.

10. You are assigned to construct a circuit which comprises two filament lamps A and B with 0.8 A and 0.9 A respectively when connected across voltage supply.

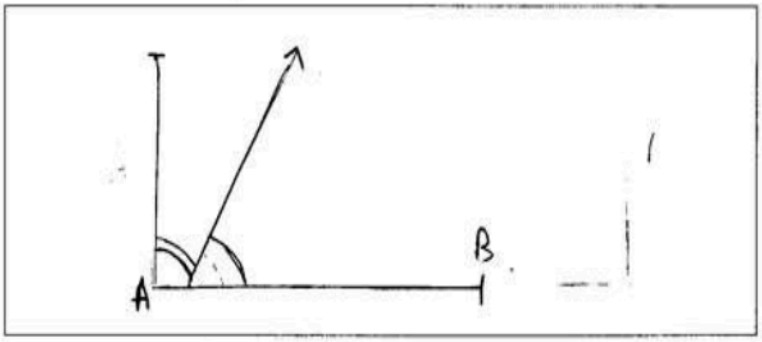
(a) If the lamps are connected in series determine:

(i) The resistance of each lamp across 110 V supply and total resistance of a circuit.

Hpat the you total path,
110 V - 52
V = matimat 110 V
V = 112 V - V + V = 20
= 5 V = 0.2 V 0.125
V
V 80 V = 16 V
= V2 = 1

The yatl thims Dotbth, Lovemat
V2 = 1

(b) Draw a circuit of two lamps A and B connected in parallel across the voltage supply.



(c) Study the circuit shown in Figures 4, 5 and 6. For each circuit, state whether the lamp is bright, dim or off?

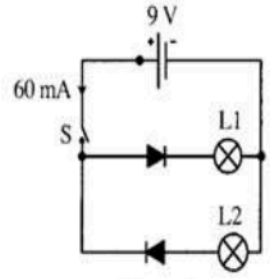



**Figure 4**

To the Eloctronics cicuit state wheaher the lampe power voltage

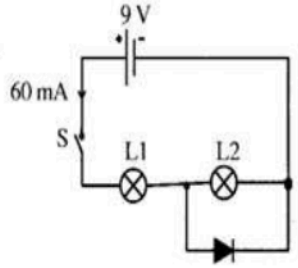



**Figure 5**

To the electronics cicuit state wheaher the lampe of the Electrical power

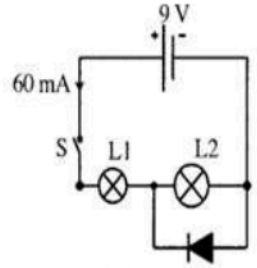



**Figure 6**

To the electronics cicuit state wheaher the lampe of the Electrical power and electrics

**Extract 8.2:** A sample of incorrect response to Question 10

Extract 8.2, shows that a student failed to apply the correct formula to calculate the required resistance of each lamp across 110 V supply and total resistance of the circuit. Also, s/he failed to draw two lamps A and B connected in parallel to the voltage supply and to state whether the lamp is bright, dim or off from the given figures.

## 3.0 THE STUDENTS' PERFORMANCE IN EACH QUESTION

The analysis of the students' performance on each question examined in the Electronics and Communication Engineering subject for the year 2023 is summarized in Table 3.

**Table 3**: A Summary of the Students' Performance on Each Question.

| Question Number | Performance in Percentage | | |
|---|---|---|---|
| | Weak | Average | Good |
| 1 | 10.42 | 57.33 | 32.25 |
| 2 | 49.18 | 41.37 | 9.45 |
| 3 | 40.02 | 38.76 | 19.22 |
| 4 | 29.32 | 57.33 | 13.35 |
| 5 | 41.37 | 28.01 | 30.62 |
| 6 | 43.00 | 42.34 | 14.66 |
| 7 | 21.17 | 44.30 | 34.53 |
| 8 | 48.86 | 41.69 | 9.45 |
| 9 | 14.01 | 38.11 | 47.88 |
| 10 | 22.80 | 43.65 | 33.55 |

The analysis indicates that the student's performance was good in question 9 whereby 264 (85.99%) students scored average and above. The good performance on this question signifies that the students had sufficient knowledge, skills and competence in the tested concept.

Furthermore, the analysis of the student's performance in each question indicates that the students also had good performance in question 7 (78.83%), question 10 (77.20%) and question 4 (70.68%) where students scored average and above. Students performed averagely in question 2 (50.81%), question 8 (51.14%), question 3 (57.98%), question 5 (58.63) and question 6 (57.00%). A summary of students' performance in each topic is presented in the Appendix.

## 4.0 CONCLUSION AND RECOMMENDATIONS

### 4.1 Conclusion

The general performance of students in Electronics and Communication Engineering on Form Two National Assessment (FTNA) in the year 2023 was good. Out of 307 students who sat for the paper, 239 (77.85%) passed, while 68 (22.10%) failed. The good performance of the students resulted from their ability to understand requirements of the questions, knowledge skills and competence in the subject matter, and their mastery of calculation skills.

The analysis of the students' performance reveals that, students faced some challenges when attempting the question. It was observed that inadequate content knowledge was one of the major reasons for weak performance to most of the students. Some of the students provided incorrect responses while other skipped some of the items without writing any answers. Further analysis shows that lack of mathematical skills was also a challenge to majority of the students, particularly in the question which require application of formula and calculations through several steps to reach the final answer. Also lack of drawing skills contributed to poor performance. Moreover, some students demonstrated poor communication skills leading to poor understanding of subject and poor response to the question.

### 4.2 Recommendations

From the shortcomings observed in the analysis of the student's item response, the followings are recommended:

(a) The teaching and learning process for the electronics and communication engineering subject should focus more on practical methods using real life examples, including drawing to give room for the learners to build their skills and competences in the subject matter.

(b) Students are advised to study hard in order to gain enough knowledge of the concept in the syllabus.

(c) Students should do different computation exercises to support their ability to tackle questions, which require application of formulas and calculations.

(d) Since English is the media of instruction for electronics and communication engineering subject, students should put more emphasis on the use of English language by practicing it through writing, reading, listening and speaking. This strategy will improve student's proficiency.

**Appendix**

**A Summary of Students Performance in each Topic in Electronics and Communication Engineering Subject for the Year 2023**

| S/N | Topic | Question Number | Percentage of students who scored 30 percent and above | Remarks |
|---|---|---|---|---|
| 1 | Introduction to measurements and instrumentation, electronics drawing, semiconductor devices, drawing techniques, semiconductors, electronics component and safety management and rule. | 1 | 89.58 | Good |
| 2 | Safety management and rule | 9 | 85.99 | Good |
| 3 | Introduction on electricity | 7 & 10 | 78.02 | Good |
| 4 | Drawing technique | 4 | 70.68 | Good |
| 5 | Electronic components | 5 | 58.63 | Average |
| 6 | Electronics engineering occupational information | 3 | 57.98 | Average |
| 7 | Introduction to measurements and instrumentation | 6 & 8 | 54.07 | Average |
| 8 | Electronics drawing | 2 | 50.81 | Average |