THE NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

CANDIDATES' ITEM RESPONSE ANALYSIS REPORT FOR THE CERTIFICATE OF SECONDARY EDUCATION EXAMINATION (CSEE) 2018

094 WELDING AND METAL FABRICATION

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FOREWORD

The National Examinations Council of Tanzania is pleased to issue the 2018 Form Four National Examination report on Candidates' Item Response Analysis for Welding and Metal Fabrication subject. The report has been written in order to provide feedback to the candidates, teachers, parents, policy makers and the public in general about the performance of the candidates in this subject.

The Certificate of Secondary Education Examinations (CSEE), marks the end of four years of Ordinary Level Secondary Education. It is a summative evaluation which, among other things, shows effectiveness of the education system in general and the education delivery system in particular. Essentially, the candidates' responses to the examination questions are strong indicators of what the education system was able or unable to offer to the candidates in their four years of Ordinary Level Secondary Education.

The analysis presented in this report is intended to contribute towards the understanding of possible reasons behind the candidates' performance in Welding and Metal Fabrication subject. The report highlights factors that made the candidates to perform well. Such factors include ability to identify requirements of the question and the candidates' adequate knowledge on the concepts related to the subject. Despite the good performance, the report also highlights factors which made some candidates to fail. Such factors include lack of adequate knowledge in relation to a particular concept, failure to interpret the requirements of the questions and poor command of the English Language. The feedback provided will enable the educational administrators, school managers, teachers, candidates and other stakeholders to identify proper measures to be taken in order to improve the candidates' performance in future examinations administered by the Council.

The National Examinations Council of Tanzania will highly appreciate comments and suggestions from teachers, candidates, education quality controllers, curriculum developers and the public in general, that can be used to improve future Examiners' reports.

Finally, the Council would like to thank the Examination Officers and all others who participated in typesetting the document, reviewing and analyzing the data used in this report.

Dr. Charles E. Msonde
EXECUTIVE SECRETARY

1.0 INTRODUCTION

This report is focused on the analysis of the performance of the candidates in the Certificate of Secondary Education Examination (CSEE) 2018, in Welding and Metal Fabrication subject. The examination paper consisted of questions which intended to measure the candidates' competences, knowledge and skills on the subject contents stipulated in the 1994 syllabus of Welding and Metal Fabrication.

The paper consisted of three sections, A, B and C. Section A consisted of one multiple choice question with items (i) – (x) and carried a total of ten (10) marks. Section B comprised ten (10) short answer questions. The section carried a total of (30) marks. Section C consisted of five structured questions of which the candidates were required to answer any three (3) questions; each question carried twenty (20) marks.

The general performance in 2018 for Welding and Metal Fabrication subject was average. Among 139 candidates who sat for the examination, 76 (54.68%) candidates passed while 63 (45.32%) failed. In 2017, among 121 candidates who sat for the examination, 77 (66.38%) candidates passed while 44 (33.62%) failed. The candidate performance in 2018 for Welding and Metal Fabrication subject decreased by 11.7% when compared to 66.38% who passed the examination in 2017.

The candidates' performance in each question was considered as unsatisfactory, average or good if the percentage of candidates who scored 30 percent and above in the marks allocated for a particular question falls within the intervals of 0 to 29, 30 to 64 and 65 to 100 percent, respectively.

The report provides feedback on the performance of the candidates by showing what the candidates were required to do as well as their strengths and weaknesses in their responses. Samples of candidates' answers (extracts) have been used to show good and weak responses. It is expected that this report will be useful to teachers, candidates and other education stakeholders and will enable them to identify the areas where candidates faced learning difficulties and help them in making decisions for improving teaching and learning process of Welding and Metal Fabrication subject. Table 1 and Figure 1 show overall performance of 139 candidates who sat for Welding and Metal Fabrication subject CSEE 2018.

Table 1: Overall Candidates' Performance in Welding and Metal Fabrication

Grade Ranges	Description	Candidates	
		Number	Percentage
0-29	Unsatisfactory	74	53.24
30-64	Average	60	43.17
65-100	Good	5	3.6
TOTAL		139	100

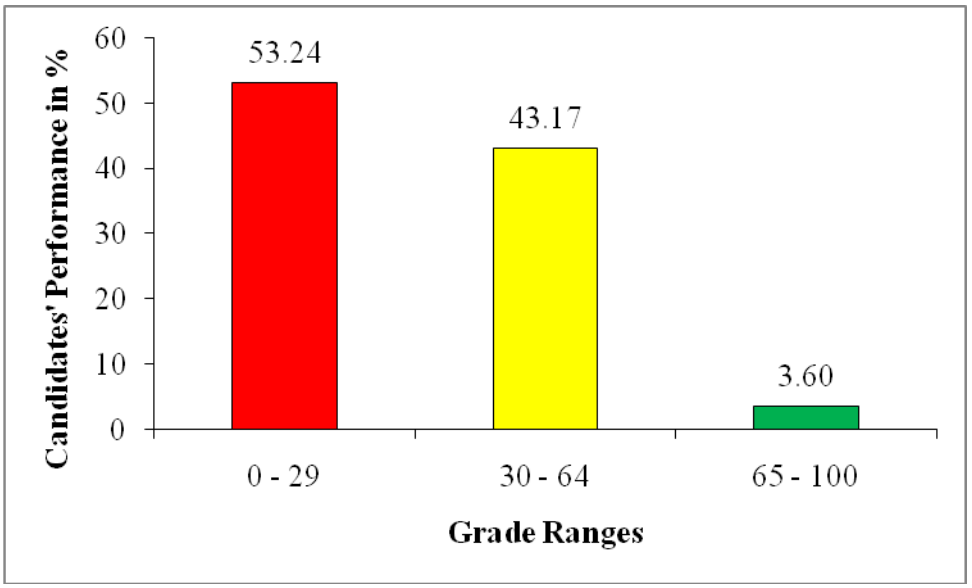


Figure 1: *The general students' performance in Welding and Metal Fabrication.*

2.0 ANALYSIS OF PERFORMANCE IN EACH QUESTION

2.1 SECTION A: OBJECTIVE QUESTIONS

2.1.1 Question 1: Various Topics

This question consisted of 10 multiple choice items, (i) – (x), derived from various topics, such as Gas Welding Equipment and Accessories, Gas Shielded Arc Welding, Electric Arc Welding Accessories and Equipment, Welding Position, Filler Metal, Soft Soldering, Sheet Metal Fabrication, Distortion and Oxy-acetylene Flame Cutting. For each item, the candidates were required to choose the correct answer from among the given alternatives and write its letter beside the item number.

This question was attempted by 139 candidates (100%), out of which 27 candidates (19.42%) scored from 0 to 2 marks, 89 candidates (64.03%) scored from 3 to 6.0 marks and 23 candidates (16.55%) scored from 7 to 10 marks. The range and performance of the question was presented in Table 2.

Table 2: Summarized Performances Scores of Candidates for Question 1

Marks Scores	Percentage Range	Description	Candidates	
			Number	Percentage
0-2	0-29	Unsatisfactory	27	19.42
3-6	30-64	Average	89	64.03
7-10	65-100	Good	23	16.55
TOTAL			139	100

The overall performance of the candidates in this question was good because 80.58 percent of them scored from 30 percent and above (3-10 marks). This performance indicates that most of the candidates were able to identify the correct answer from the given alternatives in at least two or more items in the question. On the other hand there were some candidates who could not make correct choices of the right answer in most of the items as illustrated in Figure 2.

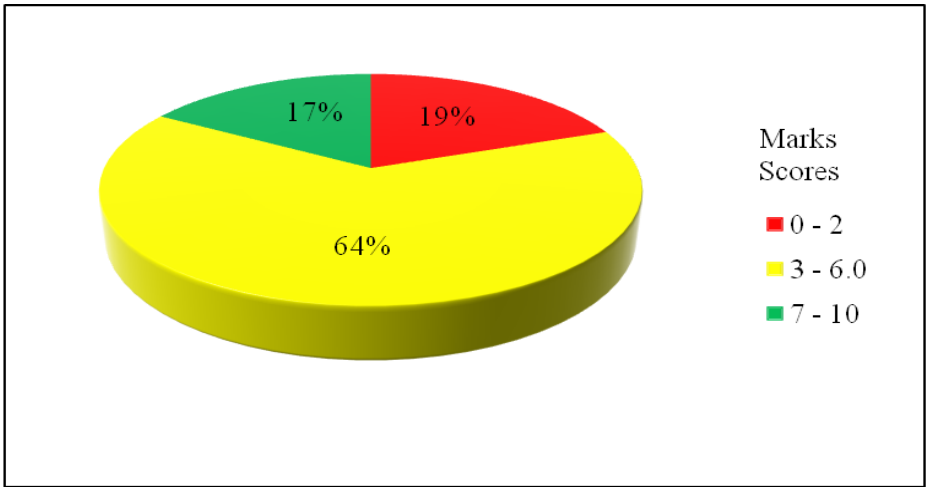


Figure 2: *The candidates' performance in percentage for Question 1*

ANALYSIS OF THE ITEM

All the items were attempted by the candidates but those in which most candidates failed were (v) from the topic of *Filler Metals* and (vi) from the topic of *Soft Soldering.* The items which most of the candidates got correctly were (i) and (ii) from the topics of *Gas Welding Accessories and Equipment* and *Gas Shielded Welding*, respectively.

In item (i), the candidates were required to find out the common category which is used to verify the quantity of gas in a cylinder. Candidates were required to apply the knowledge of Gas Welding Equipment and Accessories to answer the question. The question was:

(i) Which of the following is normally used to determine the quantity of gas in a cylinder?

A Temperature of the cylinder
B Cylinder pressure gauge
C Weight of the cylinder
D Colour of the cylinder
E *Size of the cylinder*

The correct answer was B, *Cylinder pressure gauge.* The candidates who opted for this answer showed a good understanding of Gas Welding Equipment and Accessories. This implies that the candidates had sufficient knowledge on the topic of Gas Welding Accessories and Equipment. The candidates who opted for E, *Size of the cylinder* was misinterpreted the need of question as the amount of gas inside the cylinder but not the quantity of gas occupied by the cylinder. Moreover, those opted for the rest extract lacked the knowledge on category used to measure the quantity of gas in cylinder.

Item (ii), the candidates were required to recognize the type of welding process which doesn't consume electrode. The question was:

(ii) The welding process in which electrode is not consumed is called

A Tungsten inert gas welding
B Metal inert gas welding
C DC arc welding
D Flux core arc welding
E Arc welding process

The correct answer was A, *tungsten inert gas welding,* which was chosen by the candidates who had good knowledge on the process which use a non consumable electrodes. However, some of the candidates chose B, *Metal inert gas welding* and E, *Arc welding process* lacked a knowledge of appropriate type of welding process among presented which uses electrode, but the electrode itself is not consumed. Moreover, the candidates who opted C, *DC are welding* and D, *Flux core arc welding*, misunderstanding welding process and welding equipments.

Item (iii) tested the candidates ability to identify types of welding machines that produce both Direct Current and Alternating Current in welding processes. The question was:

(iii) Which of the following are welding machines that produce both Direct Current and Alternating Current?

A Spot welding machines
B Flush butt welding machines
C Resistance butt welding machines
D Rectifier welding machines
E Transformer of alternating current machines

The correct answer was D, *Rectifier welding machines*, the candidates who opted for this answer had knowledge on Arc welding equipment and accessories. The question need to measure the competence of candidates in identifying various types of welding plants and equipment. Most of the candidates opted for A, *Spot welding machine*, B, *Flush butt welding machines* and C, *Resistance butt welding machine*, lacked knowledge of power sources used in arc welding.

Item (iv) required the candidates to give reason why rocking motion is performed in depositing upward vertical weld beads. Rocking motion in upward vertical welding is the welding technique to overcome the flow of molten metal and electrode during the stage of liquid to solidification. The question was:

(iv) Why rocking motion is performed in deposing upward vertical weld beads?

A To vary beads width and depth
B To give enough time for metal to solidify
C To improve welds metal strength

D To vary beads width and length
E To have enough time for metal to melt

The correct answer was B, *To give enough time for metal to solidify*. The Candidates who opted for this answer has knowledge on welding position and its procedures. Those who opted A, *To vary beads width and depth* and D, *To vary beads width and length*, misinterpreted the welding movements and welding motion for upward vertical welding processes. The aim of welding movement is to improve the width, depth and strength of the welded portion and not to secure the solidification of the welding bead. This candidates lacked knowledge and skills in the practice of various welding positions.

In item (v), the candidates were required to identify the material used to coat electrodes. Electrically, the resistance of an arc is dependent upon the state of the ionized gases in an arc column. These ionized gases can be obtained by coating the wire electrode with materials called flux. The question was:

(v) The material used to coat electrodes is identified as

A Flux
B Slag
C Binder
D Lump
E Paint

The correct answer was A, *flux*. Most of the candidates responded correctly to this question. The candidates who opted the correct answer had the knowledge and skill on the coating materials used in electrode. However, some candidates opted for E, *Paint.* These candidates confused the process used to cover the electrode with material used to coat the electrode. The candidates lacked understanding of the topic of filler metals.

Item (vi) demanded the candidates to list down the composition of soft soldering. The aim of this question was to measure the understanding of the composite materials of soft soldering used to join various metal. The question was:

(vi) Which of the following is the composition of ordinary solder?

A Lead 63%, tin 30%
B Lead 50%, tin 50%

C *Lead 37%, tin 63%*
D *Lead 70%, tin 30%*
E *Lead 75%, tin 25%*

The correct answer was B, *Lead 50%, Tin 50%,* which was chosen by the candidates who were knowledgeable with composition of ordinary solder in the topic of soft soldering. Other candidates opted for C, *Lead 37%, Tin 63%, D, Lead 70%, tin 30%, E, Lead 75%, tin 25%.* This implies that the candidates had inadequate knowledge on Tin Lead solders with their percentage compositions.

Item (vii) tested the candidates ability to identify the measurements of sheet metals. According to the International Standard Organization (ISO), there are standard dimensions used to describe the measurements of sheet metals used for fabrication. Therefore, the competent candidates should be familiar with it. The question was:

(vii) *Which of the following is a common method of expressing measurements of a sheet metals?*

A *Thickness, length and breath*
B *Thickness, depth and length*
C *Length, volume and width*
D *Width, volume and thickness*
E *Length , thickness and volume*

The correct answer was A, *Thickness, length and breadth*. Most of the candidates who got this question showed an understanding on sheet metal work and measurements used. The candidates who opted B, *Thickness, depth and length,* C, *Length, volume and width,* D, *Width, volume and thickness* and E, *Length, thickness and volume* lacked knowledge and skills on sheet metal measurements and operations.

Item (viii) required the candidates to identify the standard colour used to recognize the oxygen gas cylinders. The oxy-acetylene gas cylinders uses ISO colour identity as one of the category of recognition. The question was:

(viii) *Which of the following cylinders is usually painted in black colour?*

A *Oxygen cylinder*
B *Acetylene cylinder*
C *Hydrogen cylinder*

D Propane cylinder
E Argon cylinder

The correct answer was A, *Oxygen cylinder*. This answer was chosen by candidates who were conversant on identification of gas welding cylinders and equipment. Those who opted the remaining alternatives lacked knowledge of distinguishing features of oxygen and acetylene cylinders in gas welding accessories and equipment topic.

Item (ix) required the candidates to apply knowledge of welding defects to emphasize the task to be taken in order to overcome angular distortion. The aim of this question was to measure the candidates' common understanding in welding defects causes and its remedial so as to build their awareness in metal joining and fabrication of the components. The question was:

(ix) The task which is done in order to overcome angular distortion is known as
A Tacking
B Supporting
C Pre heating
D Preparing
E Aligning

The correct answer was E, *Aligning*, and the candidates who chose the correct alternative were familiar with welding defects and ways of overcoming it. Moreover, their failure to respond correctly was a result of lack of knowledge of the procedure of preventing distortion on welding processes.

Item (x) tested the candidates' ability of understanding common size of cutting tips with respect to materials specification. The question was:
(x) Which of the following governs the size of a cutting tip?

A Thickness of a material
B Type of a gas flame
C Speed of torch travel
D Gap between base metals
E Angle of the torch

The correct response was A, *Thickness of material.* The candidates who opted for this alternative had ample knowledge on gas welding and cutting as well as ways of determining cutting tip sizes. However, most candidates responded wrongly to this question. This implies that candidates lacked sufficient knowledge on ways of identifying what governs the size of cutting tip under a topic of gas welding and cutting.

2.2 SECTION B: SHORT ANSWER QUESTIONS

2.2.1 Question 2: Gas Welding Accessories and Equipment

This question had two parts, namely (a) and (b). In part (a), the candidates were required to state procedures of lighting and adjusting torch. Part (b) required the candidates to identify the reason why it is not suggested to hang up a torch when not in use.

This question was attempted by 118 (84.9%) candidates of which, 108 (91.53%) candidates scored from 0 to 0.5 marks, 5 (4.25%) candidates scored from 1 to 1.5 marks and 5 (4.25%) scored from 2 to 3 marks. The summary of candidates' scores in this question is presented in Table 3.

Table 3: **Summarized Performances Scores of Candidates for Question** 2

Percentage Range	Marks scored	Remark	Candidates	
			Total Number	Percentage
0-29	0-0.5	Unsatisfactory	108	91.525
30-64	1-1.5	Average	5	4.237
65-100	2-3	Good	5	4.237
		TOTAL	**118**	**100**

Generally, the candidates' performance in this question was unsatisfactory because 91.53 percent scored below 30 percent (0 - 0.5 marks). Some of the candidates failed to understand what the question wanted them to do or lacked knowledge of the subject matter, thus scored zero. They lacked practical skills on gas welding practices. The statistical presentation of the performance of the candidates in this question is as shown in Figure 3.

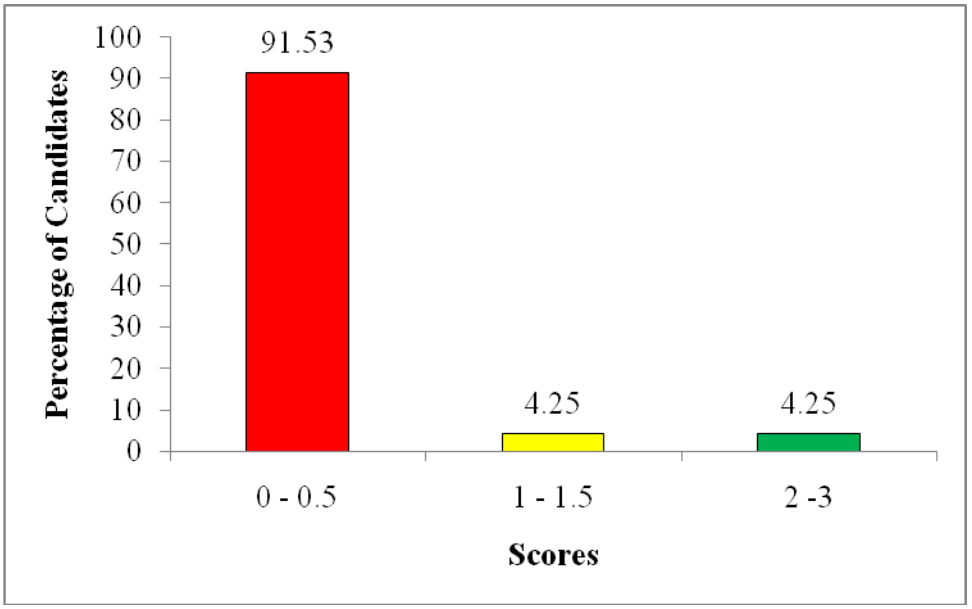
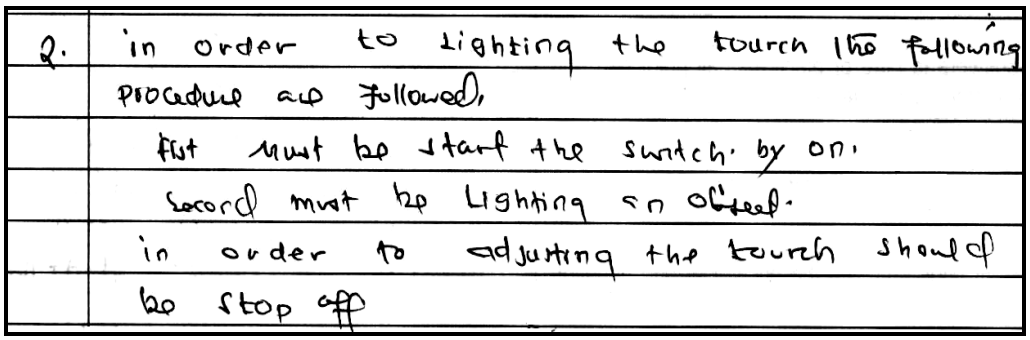


Figure 3: *The candidates' performance in question 2.*

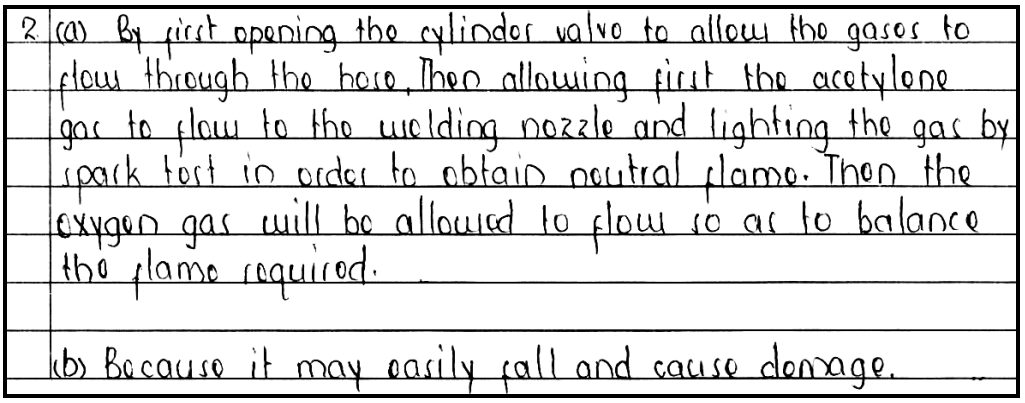
Moreover, the candidates who scored 0 to 0.5 marks failed to state the procedures of lighting the torch and giving the reason why it is not recommended to hang up a torch when not in use. Extract 2.1 shows a sample of response from a script of a candidate who provided irrelevant answer to the question.


2. in order to lighting the tourch the following procedure are followed,
first must be start the switch by on.
second must be lighting on oxygen.
in order to adjusting the tourch should be stop off

Extract 2.1 shows a response of a candidate who provided incorrect procedures of lighting the torch, and a reason of why it is prohibited to hang up a torch when it is not in use.

The candidates who scored 0.5 to 1.5 marks were able to provide only one correct response on the procedures of lighting the torch and reasons why it is not recommended to hang up a torch when not in use. They lacked the general knowledge on gas welding equipment and accessories in welding processes.

However, the candidates who scored 2 to 3 marks, managed to provide correctly at least two procedures of lighting the torch and giving a reasons why it is not recommended to hang up a torch when not in use. They exhibited a good knowledge on topic of Gas Welding equipment and Accessories and sufficient practical skills on Gas Welding practices. Extract 2.2 shows a sample of response from a script of a candidate who provided correctly the procedures of lighting the torch and a reason why the torch should not be hang up when not in use.


2 (a) By first opening the cylinder valve to allow the gases to flow through the hose. Then allowing first the acetylene gas to flow to the welding nozzle and lighting the gas by spark test in order to obtain neutral flame. Then the oxygen gas will be allowed to flow so as to balance the flame required.

(b) Because it may easily fall and cause damage.

Extract 2.2 shows a good response of a candidate who provided correctly the procedures of lighting the torch and gave a reason why the torch should not be hang up when not in use.

2.2.2 Question 3: Weld Joints

This question required candidates to emphasise the necessity of design in welding processes. The quality of welding joint can be obtained if the proper procedure of welding processes can be followed.

The question was attempted by 123 (88.5%) candidates, out of which 37 (30.08%) scored from 0 to 0.5 marks which is unsatisfactory, 16 (13.01%) percent scored from 1 to 1.5 marks which is average performance and 70 (56.91%) scored from 2 to 3 marks which are good response. Table 4 and Figure 4 represent such performance of the candidates who attempted this question.

Table 4: Summarized Performances Scores of Candidates for Question 3

Percentage Range	Marks scored	Remark	Candidates	
			Total Number	Percentage
0-29	0-0.5	Unsatisfactory	37	30.08
30-64	1-1.5	Average	16	13.01
65-100	2-3	Good	70	56.91
		TOTAL	**123**	**100**

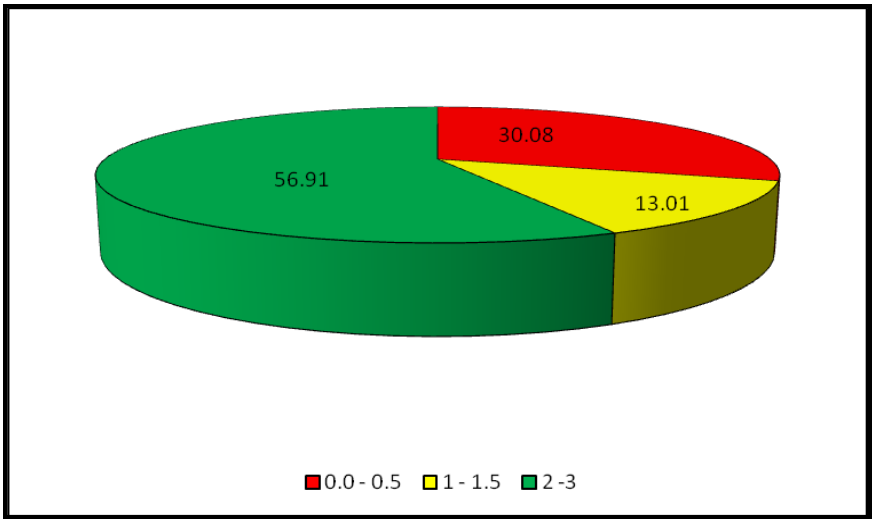
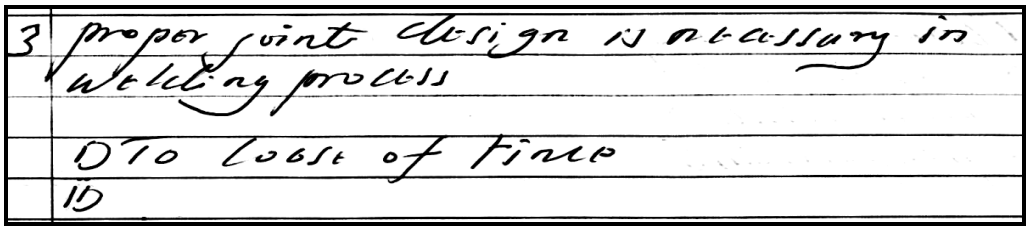


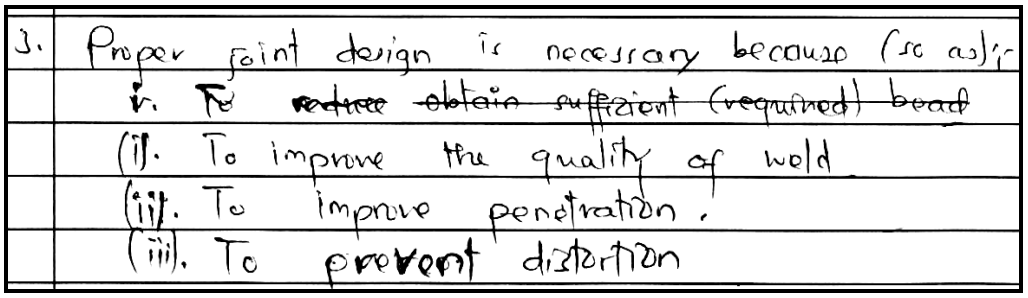
Figure 4: *The trend of candidates' performance in Question 3.*

Generally, the candidates' performance in this question was Good. However those candidates who failed to respond correctly to this question understood the requirements of the question, but lacked knowledge on the topic, thus could not provide correct and clearly stated answers. Extract 3.1 shows a sample of response from a script of a candidate who provided irrelevant answer to the question.



Extract 3.1 shows the response of a candidate who failed to give three reasons why proper joint design is necessary in welding processes.

The candidates who scored 1 mark were able to provide only one correct response on the reasons why joint design is necessary in welding process. They lacked the general knowledge on weld joints to be able to respond correctly to the question. However, the candidates who scored 2-3 marks, managed to provide correctly at least two to three reasons. They exhibited a good understanding on the topic of weld joints as shown in Extract 3.2.


3. Proper joint design is necessary because (so as)
i. To ~~reduce obtain sufficient (required) bead~~
(ii). To improve the quality of weld
(iii). To improve penetration.
(iii). To prevent distortion

Extract 3.2 shows a good response of a candidate who mentioned correctly the three reasons why joint design is necessary in welding process.

2.2.3 Question 4: Filler Metals

A total of 122 (87.8%) candidates attempted this question. Out of these, 78 (63.93%) candidates scored from 0 to 0.5 marks, 26 (21.31%) scored from 1 to 1.5 marks and 18 (14.75%) scored from 2 to 3 marks. The 17 (12.2%) of the candidates didn't attempt the question. Moreover, the candidates' performance of for this question was very unsatisfactory. The summary of candidates' scores in this question is presented in Table 5.

Table 5: Summarized Performances Scores of Candidates for Question 4.

Percentage Range	Marks scored	Remark	Students	
			Total Number	Percentage
0-29	0-0.5	Unsatisfactory	78	63.93
30-64	1-1.5	Average	26	21.31
65-100	2-3	Good	18	14.75
		TOTAL	**122**	**100**

The question demanded the candidates' to identify three situations for which small electrodes are preferred for use. In welding and fabrication process, besides parent metal characteristics, electrodes can be used depending on the types, size and ingredients. The size of electrode is determined by the diameter

whereby the factors such as welding position, stress of welded part, thickness of material to be welded and others should be considered. Some of candidates failed to examine the factors, to meet the need of question. Figure 5 illustrates the marks score of candidates with respective performance in percentagewise.

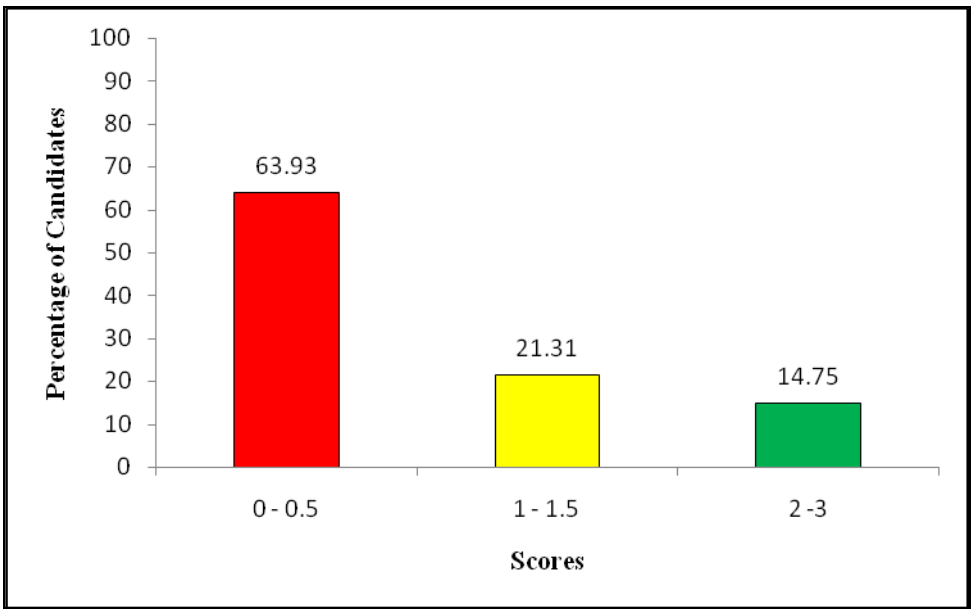
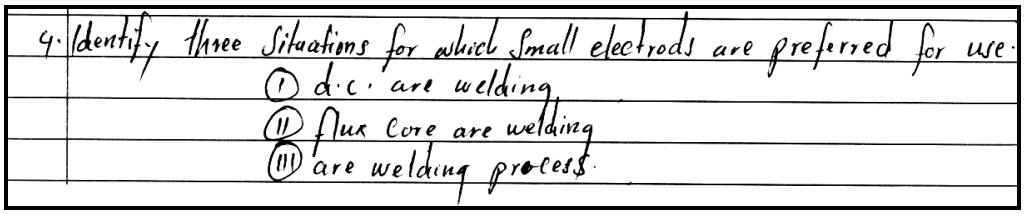


Figure 5: *The percentages of candidates' performance in question 4.*

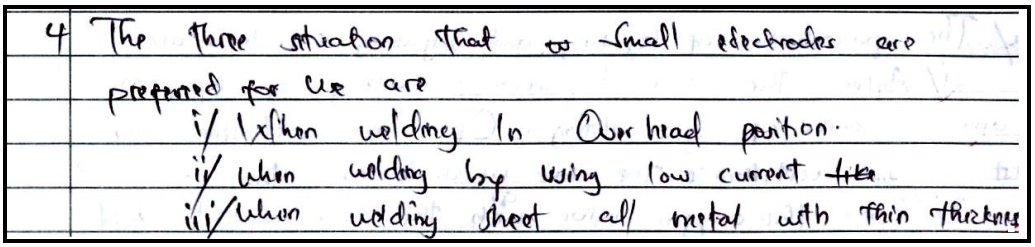
The analysis shows that most of the candidates failed to identify three situations for which small electrodes are preferred for use, hence they provided answers which do not relate to the question. This implies that the candidates were lacking knowledge on filler metals. Extract 4.1 shows a sample of response from a script of a candidate who provided irrelevant answer to the question.


4. Identify three situations for which small electrods are preferred for use.
(i) d.c. are welding
(ii) flux core are welding
(iii) are welding process.

Extract 4.1 shows the response of a candidate who failed to name three situations for which small electrodes are preferred for use.

The candidates who scored 1-1.5 marks were able to provide only one or two correct responses on the situations for which small electrodes are preferred for use. They lacked the general knowledge on filler metals to respond correctly to

the question. However the candidates who scored 2-3 marks, managed to provide correctly two or three situations. They exhibited a good understanding on filler metals as shown in Extract 4.2.



Extract 4.2 shows a good response of a candidate who named correctly the three situations for which small electrodes are preferred for use.

2.2.4 Question 5: Sheet Metal Fabrications

This question had two parts, (a) and (b), set from the topic *Sheet metal operation*. Part (a) demanded the candidates to mention four processes associated with sheet metal works. Part (b) based in properties of material and require the candidates to find out meaning of the term spring back of the metal.

A total of 110 candidates attempted this question. Out of these, 72 (65.45%) of the candidates scored from 0 to 0.5 marks, 30 (27.27%) of the candidates scored from 1 to 1.5 marks and 8 (7.27%) scored from 2 to 3 marks. 29 (20.9%) candidates didn't attempt this question. Table 6 shows the summary of candidates' scores in this question.

Table 6: Summarized Performances Scores of Candidates for Question 5

Percentage Range	Marks scored	Remark	Students	
			Total Number	Percentage
0-29	0-0.5	Unsatisfactory	72	65.45
30-64	1-1.5	Average	30	27.27
65-100	2-3	Good	8	7.27
		TOTAL	**110**	**100**

Candidates who scored good marks managed to outline correctly at least two, three or four answers in part (a) and correct give an answer in part (b). These candidates exhibited a good understanding on sheet metal operations. Those who were failure in this question misunderstood the demand of the question or

lacked knowledge on Sheet metal fabrication. Figure 6 illustrates the percentages of candidates' performance in question 5.

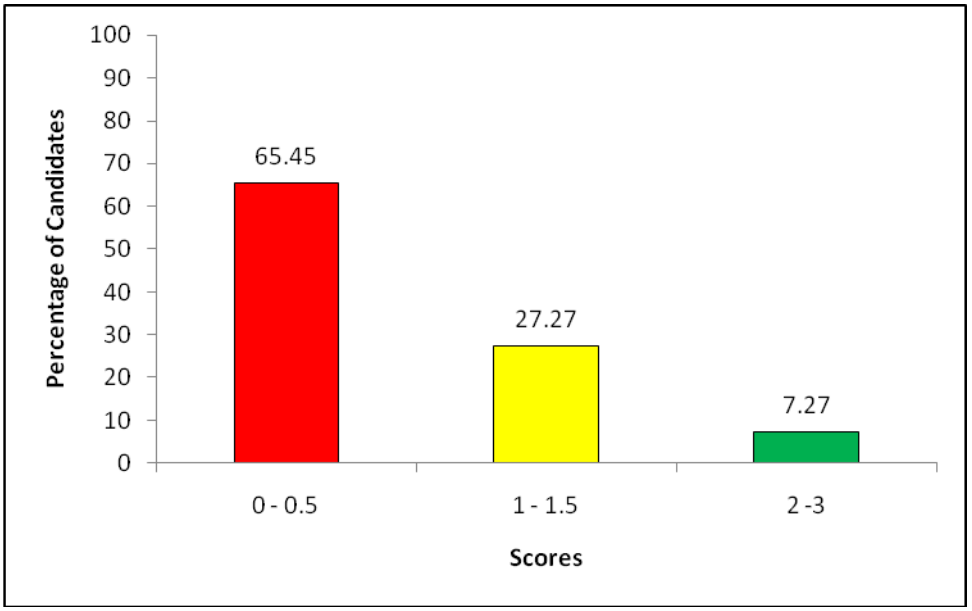
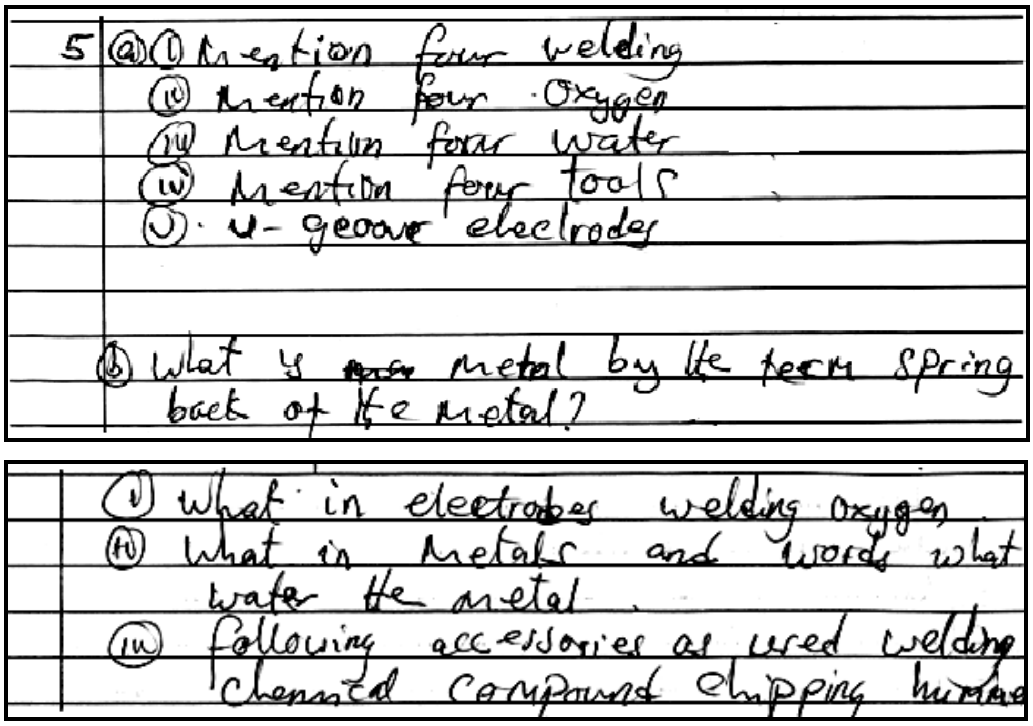


Figure 6: *The candidates' performance in question 5.*

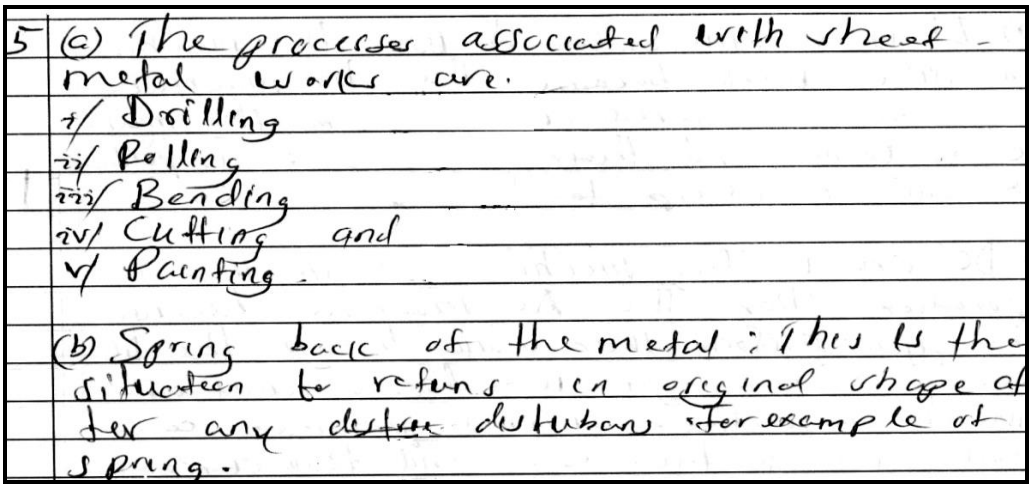
Majority of candidates who scored from 0 to 0.5, either misunderstood the demand of the question or lacked knowledge of sheet metal operations and its properties. Poor performance of the candidates in this question reveals that they lacked knowledge and practical skills on the topic of sheet metal operation. Some of them copied questions from the question paper and presented them as answers to the question. Copying statements, phrases, clauses, sentences or questions as it is and presenting them as answers shows the highest degree of the candidates' lack of knowledge as well as their failure to abide by the given instructions in answering the questions. It can, therefore be concluded that such candidates were not knowledgeable about the topic of sheet metal operations, thus they failed to identify what the question required them to do. Extract 5.1 shows a sample of response from a script of a candidate who provided irrelevant answer to the question.



Extract 5.1 shows the response of a candidate who failed to give relevant answers to both parts (a) and (b) of a question

However, those who had little knowledge and partial understanding of the demand of the question scored from 1 to 1.5 marks because they failed to mention correctly some process associated with sheet metals work and define the term spring back. These candidates had exhibited different strengths and weakness in their responses. For example, listing the two to three points without explaining the properties of sheet metal to return to its original position after stretching (Spring properties).

Nonetheless, the candidates who managed to score 2 to 3 marks had adequately understood the question. The candidates were able to list the process of sheet metal and give the explanation of springy condition of the sheet metal as example of Extract 5.2.


5 (c) The processes associated with sheet metal works are.
i/ Drilling
ii/ Rolling
iii/ Bending
iv/ Cutting and
v/ Painting.

(b) Spring back of the metal: This is the situation to returns in original shape after any ~~defor~~ disturbans ~~for~~ example of spring.

Extract 5.2 shows a good response of a candidate who gave correct answers to both parts, (a) and (b), of the question.

2.2.5 Question 6: Gas Welding Accessories and Equipment

This question, extracted from Gas welding accessories and equipments topic, required the candidates to outline the functions of (a) Welding helmet, (b) Leather gloves and (c) Chipping hammer. A total of 130 (93.5%) candidates attempt this question.

The analysis of candidates' performance shows that 25 (19.23%) candidates scored from 0 to 0.5 marks indicating an unsatisfactory performance. Furthermore, 12 (9.23%) candidates scored from 1 to 1.5 marks which is an average performance and, 93(71.54%) candidates scored from 2 to 3 marks which is a good performance. The performance in this question can be categorized as good because 93 (71.54%) candidates were able to score from 2 to 3 marks. Table 7 shows the summary of candidates' scores in this question.

Table 7: Summarized Performances Scores of Candidates for Question 6.

Percentage Range	Marks scored	Remark	Students	
			Total Number	Percentage
0-29	0-0.5	Unsatisfactory	25	19.23
30-64	1-1.5	Average	12	9.23
65-100	2-3	Good	93	71.54
		TOTAL	**130**	**100**

A few 12 (9.23%) candidates who scored from 1 to 1.5 marks managed to provide the few correct answers but failed to exhaust all or properly the functions of welding tool and PPE as the question demanded. The summary of candidates' scores in this question is presented in Table 7.

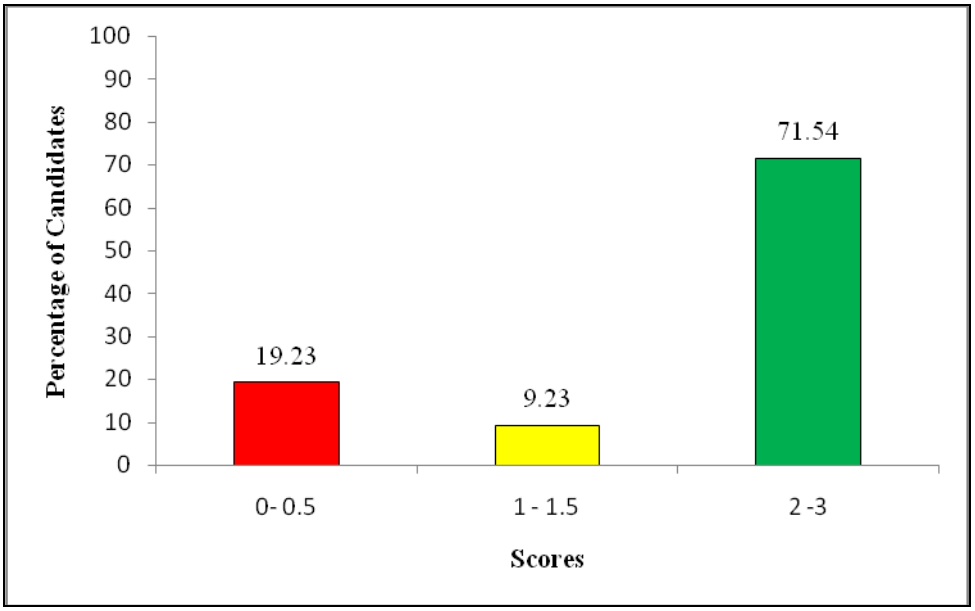
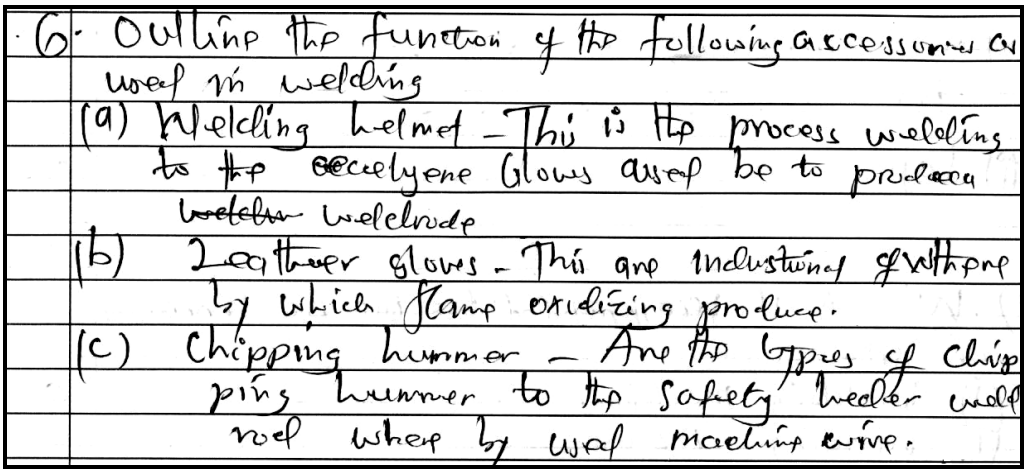


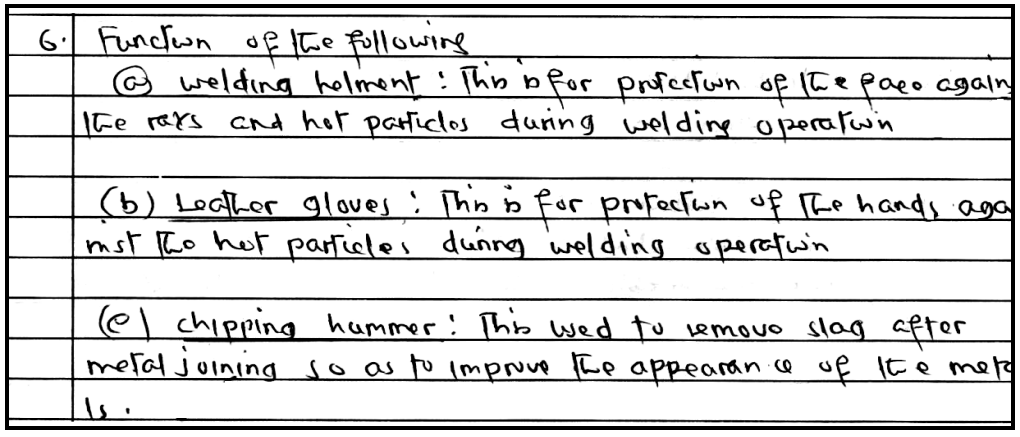
Figure 7: *General statically presentation of candidate's performance for Question 6.*

Poor performance in this question by some of the candidates was attributed to insufficient knowledge on Gas Welding Equipment and Accessories which lead their failure to give correct responses to this question. This reveals that those candidates on this category did not know application of tools and equipments as well as personal protective equipment (PPE) used in welding and fabrication process. Extract 6.1 shows a sample of response from a script of a candidate who provided irrelevant answer to the question.


6. Outline the function of the following accessories as used in welding
(a) Welding helmet - This is the process welding to the acetylene flows used be to produce welding welelrode
(b) Leather gloves - This are industrial gloves by which flame oxidizing produce.
(c) Chipping hammer - Are the types of chipping hammer to the safety welder weld used when by used machine wire.

Extract 6.1 shows the response of a candidate who failed to give correct answers.

Candidates who scored good (2 to 3) marks were able to explain clearly and unambiguously the functions of a Welding helmet, Leather gloves and Chipping hammer. The good performance suggest that the candidates had sufficient knowledge on the topic of Gas Welding Equipment and Accessories. Extract.6.2 shows a good response of a candidate who outlined correctly the answers to the question. On the other hand, the candidates who scored averagely were able to give function to one or two equipment out of the required three, while others were partially addressing the question.


6. Function of the following
(a) welding helment : This is for protection of the face again the rays and hot particles during welding operation
(b) Leather gloves : This is for protection of the hands aga nst the hot particles during welding operation
(c) chipping hammer : This used to remove slag after metal joining so as to improve the appearance of the mete ls.

Extract 6.2 shows a good response of a candidate who outlined correctly the answers to question.

2.2.6 Question 7: Weld Joints

This question was derived from the topic *Welding Joints* and tested candidates to identify types of lap joints. A total of 118 (84.9%) candidates attempt this question.

The analysis of performance shows that 94 (79.66%) candidates scored from 0 to 0.5 marks indicating an unsatisfactory performance. Further analysis indicates that 15 (12.71%) candidates' scored from 01 to 1.5 marks which is an average performance and, 9 (7.63%) candidates' scored from 02 to 03 marks which is a good performance. The performance in this question can be categorized as unsatisfactory because 94 (79.66%) candidates' scored 0 to 0.5 marks which are below the average. Table 8 and Figure 8 shows the summary of candidates' performance in this question.

Table 8: Summarized Performances Scores of Candidates for Question 7

Percentage Range	Marks scored	Remark	Students	
			Total Number	Percentage
0-29	0-0.5	Unsatisfactory	94	79.66
30-64	1-1.5	Average	15	12.71
65-100	2-3	Good	9	7.63
		TOTAL	**118**	**100**

The analytical performance of the candidates for question 7 is presented in Figure 8.

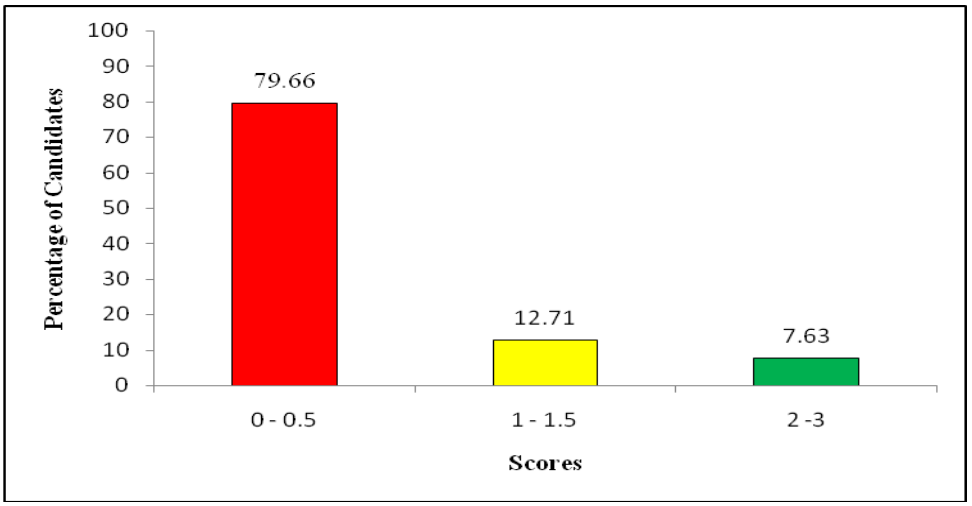
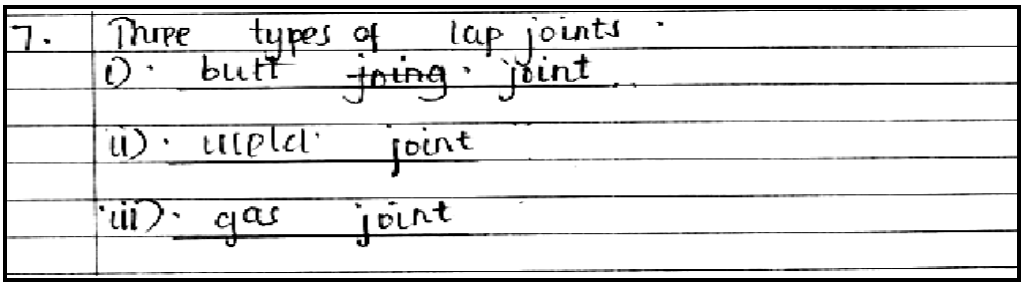


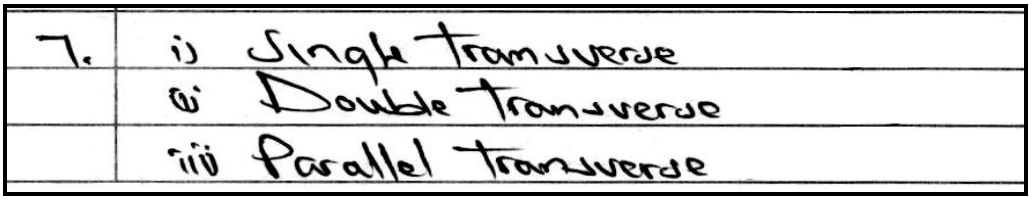
Figure 8: *The candidates' performance in question 7.*

Most of the candidates scored from 0 to 0.5 marks. The major weakness of this group were the candidates' failure to understand the demand of the question, and lack of knowledge of the subject matter. On the other hand, candidates who scored from 1 to 1.5 which is average marks were able to give either one or two types of lap joint out of the three types. Poor performance in this question by majority of the candidates shows that they lacked knowledge of Weld Joint. Extract 7.1 shows a sample of response from a script of a candidate who provided irrelevant answer to the question.


7. Three types of lap joints
i). butt joint
ii). lapld joint
iii). gas joint

Extract 7.1 shows the response of a candidate who failed to mentioned three types of lap joints.

Nonetheless, the candidates who managed to scored good marks (from 2 to 3) were able to mention clearly the three types of lap joint. These candidates exhibited that they had sufficient knowledge on the topic of Weld Joint. Extract.7.2 shows a good response of a candidate who mentioned correctly the three types of lap joint.


7. i) Singk Tranverse
ii Double Tranverse
iii Parallel Tranverse

Extract 7.2 shows a good response of a candidate who mentioned correctly the three types of lap joints.

2.2.7 Question 8: Electric Arc Welding Accessories and Equipment

The question was derived from the topic Electric Arc Welding Accessories and Equipment. The question had two parts, (a) and (b). Part (a) demanded the candidates to give a reasons why it is recommended to use DC machines on site work. Part (b) required the candidates to explain briefly why DC arc welding

machines are smoother in operation than the AC machines. A total of 119 (85.6%) candidates attempted this question.

The analysis of candidates' performance shows that 103 (86.55%) candidates scored from 0 to 0.5 marks indicating an unsatisfactory performance. Further analysis indicates that 14 (11.76%) candidates' scored from 1 to 1.5 marks which is an average performance and 2 (1.68%) candidates' scored from 2 to 3 marks which is a good performance. The performance in this question can be categorized as unsatisfactory because 103 (86.55%) candidates' scores below the average marks, i.e., 0 to 0.5 marks. Table 9 and Figure 9 present the summary of candidates' scores in this question.

Table 9: Summarized Performances Scores of Candidates for Question 8

Percentage Range	Marks scored	Remark	Students	
			Total Number	Percentage
0-29	0-0.5	Unsatisfactory	103	86.55
30-64	1-1.5	Average	14	11.76
65-100	2-3	Good	2	1.68
		TOTAL	**119**	**100**

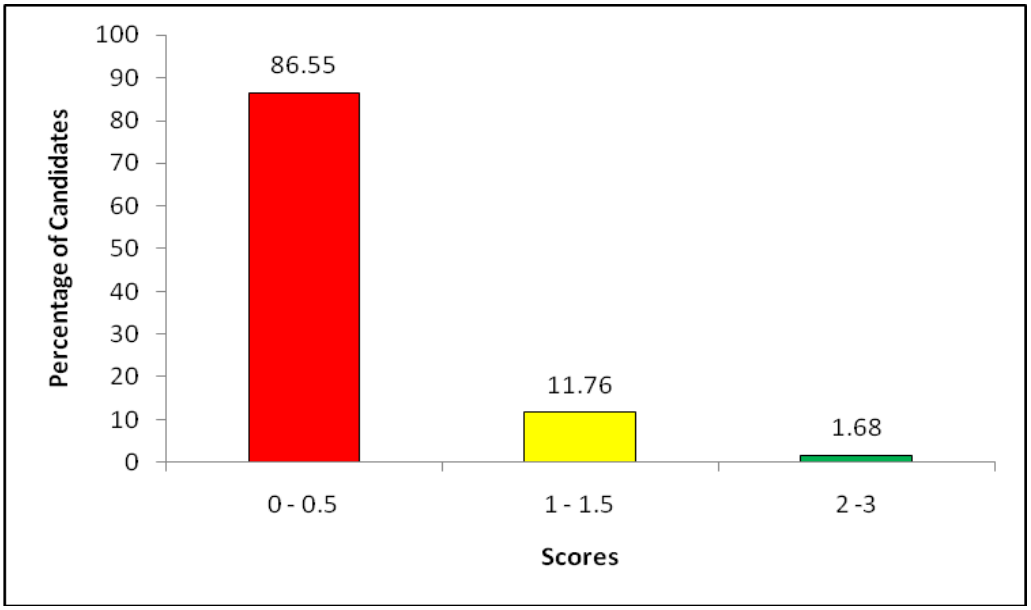
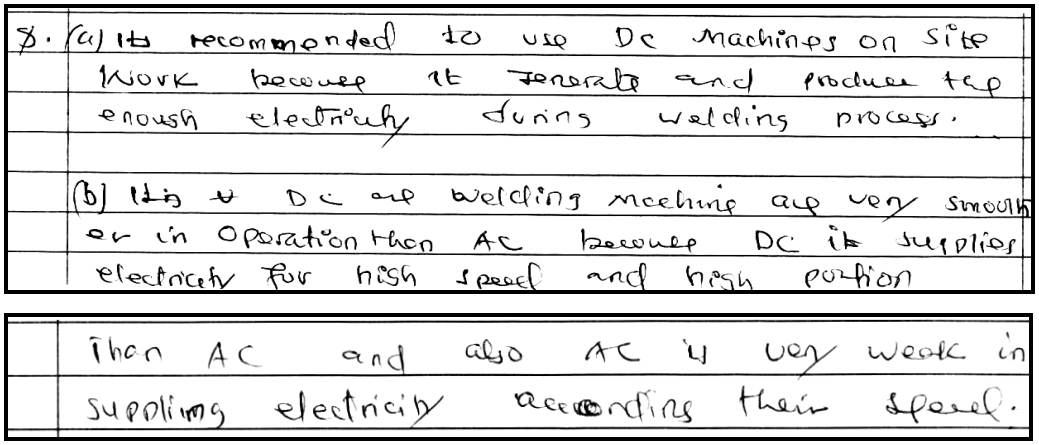


Figure 9: *The candidates' performance in question 8.*

In essence, 103 (86.55%) candidates scored from 0 to 0.5 marks, 84.9 percent scored a 0 mark. Some of the candidates wrote inappropriate and incomprehensible selectees and as a result they were awarded a 0 mark. Poor performance in this question by majority of the candidates was attributed to insufficient knowledge on Electric arc Welding Accessories and Equipment which lead them to failure to give correct responses to both parts of the questions. Extract 8.1 shows a sample of response from a script of a candidate who provided irrelevant answer to the question.

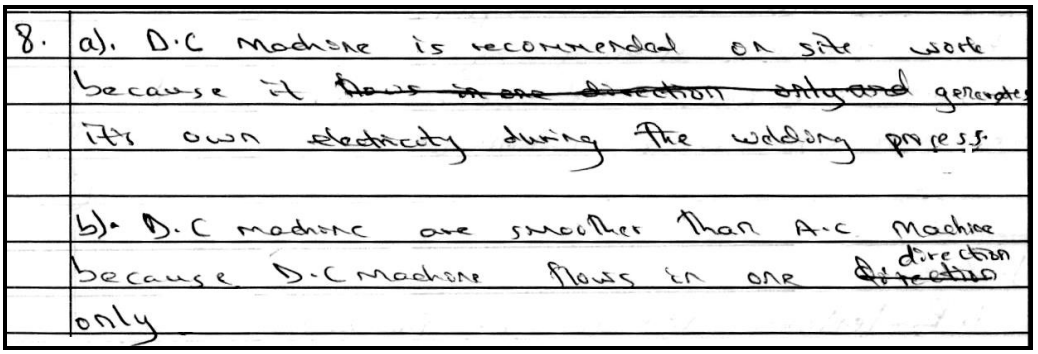

8. (a) Its recommended to use DC machines on site work because it generate and produce top enough electricity during welding process.

(b) Its DC are welding machine are very smooth or in operation than AC because DC is supplies electricity for high speed and high portion than AC and also AC is very weak in supplying electricity according their speed.

Extract 8.1 shows the response of a candidate who failed to give correct responses to both parts of the question, (a) and (b).

However, a few candidates who scored from 1 to 1.5 marks, were able to give correct response to one part of the question or partially response to both part of the questions.

The candidates who scored from 2 to 3 marks exhibited a good understanding of the question demands. They were able to provide reasons of uses of DC welding machine on site and quality of welding processes when used DC arc welding machine. However, those who scored 3 marks managed to give correct response to both parts of the question by explaining clearly and unambiguously. They exhibited a good understanding on Electric arc Welding Accessories and Equipment topic as shown in Extract 8.2.



Extract 8.2 shows a good response of a candidate who gave correct responses to both parts of the question, (a) and (b).

2.2.8 Question 9: Soft Soldering

This question required the candidates to outline three points which lead to failure of wetting process during soldering. A total of 98 (70.5%) candidates attempt this question.

The analysis of candidates' performance shows that 67 (68.37%) candidates scored from 0 to 0.5 marks indicating an unsatisfactory performance. Further analysis indicates that 20 (20.41%) scored from 1 to 1.5 marks which is an average performance and 11 (11.22%) candidates scored from 2 to 3 marks which is a good performance. The general performance in this question can be categorized as unsatisfactory because 67 (68.37%) candidates scores were below the average marks, i.e., 0 to 0.5 marks. Table 10 and Figure 10 presents the performance of the candidates in question 9.

Table 10: Summarized Performances Scores of Candidates for Question 9

Percentage Range	Marks scored	Remark	Students	
			Total Number	Percentage
0-29	0-0.5	Unsatisfactory	67	68.37
30-64	1-1.5	Average	20	20.41
65-100	2-3	Good	11	11.22
		TOTAL	**98**	**100**

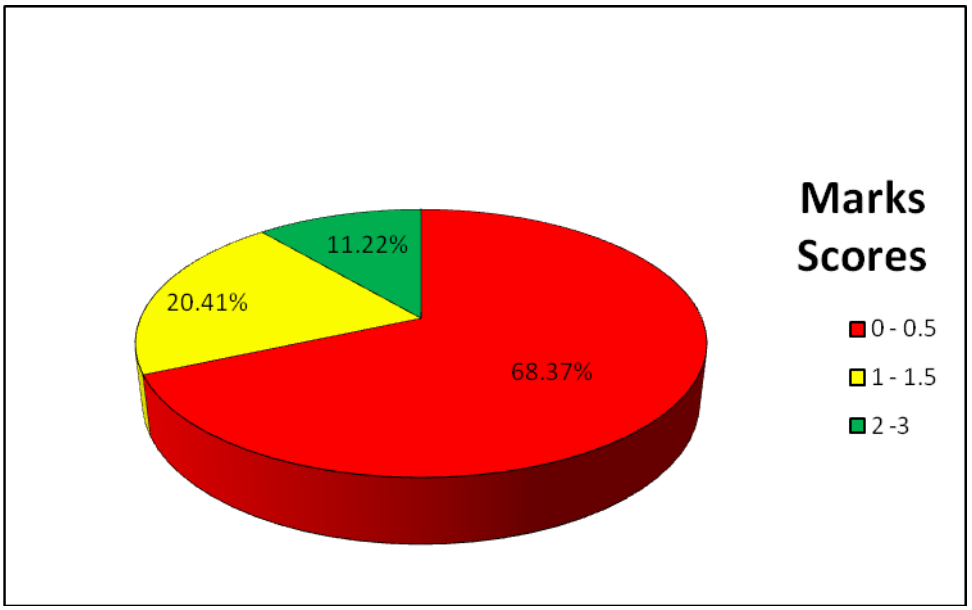
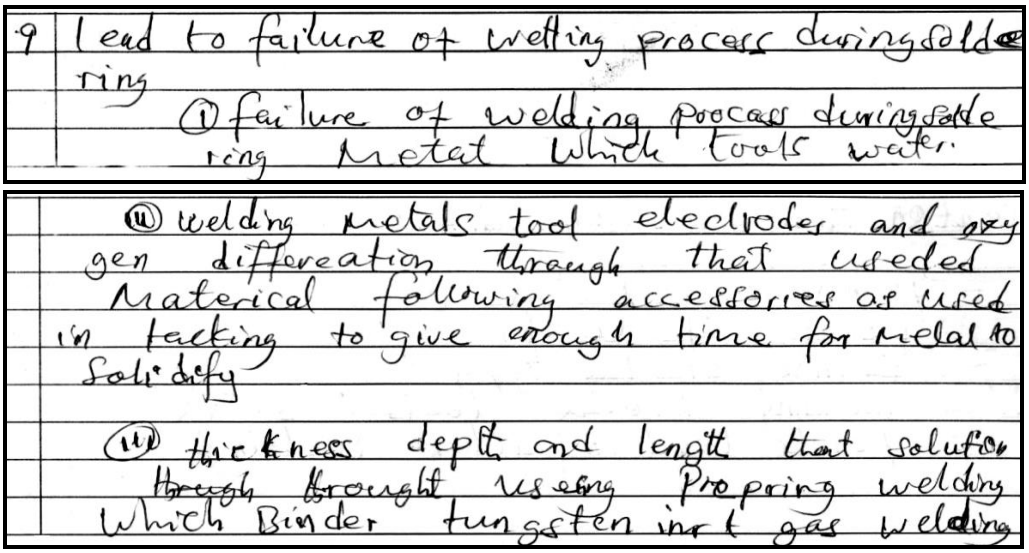


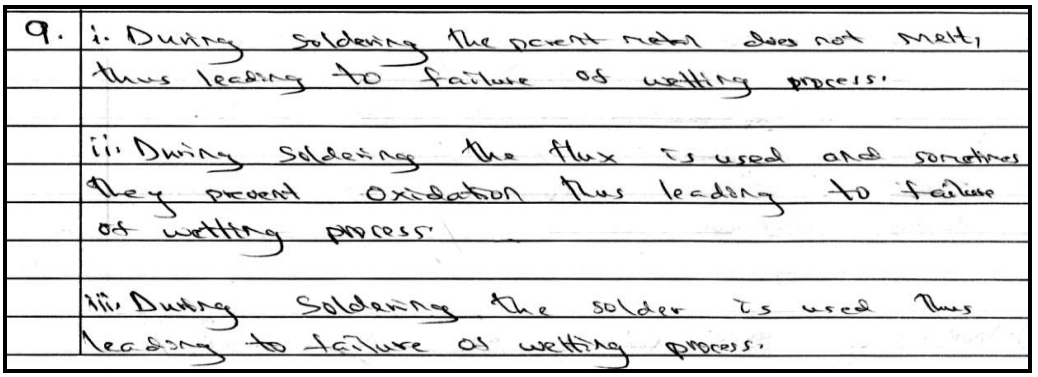
Figure 10: *The candidates' performance in question 9.*

Majority of the candidates performance is poor on this question on which 67 (68.37%) scored 0 to 0.5. These shows that the candidates lacked knowledge of Soft Soldering that is why they failed completely to give any point. Extract 9.1 shows a sample of response from a script of a candidate who provided irrelevant answer to the question.


9 lead to failure of wetting process during soldering
(i) failure of welding process during soldering Metal which tools water.
(ii) welding metals tool electrodes and oxygen differeation through that useded Materical following accessories as used in tacking to give enough time for metal to Solidify
(iii) thickness depth and length that solution through brought using Proping welding Which Binder tungsten inert gas welding

Extract 9.1 shows the response of a candidate who failed to outline three points which lead to failure of wetting process during soldering.

On the other hand, the candidates who scored 1 to 1.5 marks which is average were able to give one or two points out of the three required. Few candidates who scored good marks were able to outline clearly the three points which lead to failure of wetting process during soldering. Extract 9.2 shows a good response of a candidate who give correctly the three points.



Extract 9.2 shows a good response of a candidate who outlined correctly the three points which lead to failure of wetting process during soldering.

2.2.9 Question 10: Electric Arc Welding

This question was derived from the topic Electric Arc Welding which had two parts, namely (a) and (b). In part (a) the candidates were required to define the term "carbon electrode". Part (b) required the candidates to mention two types of carbon electrodes. A total of 120 (86.3%) candidates attempt this question.

The analysis of candidates' performance shows that 90 (75%) candidates scored from 0 to 0.5 marks indicating an unsatisfactory performance. Further analysis indicates that 22 (18.33%) scored from 1 to 1.5 marks which is an average performance and 8 (6.67%) scored from 2 to 3 marks which is a good performance. Table 11 and Figure 11 presents analysis of the candidates performance for question 10.

Table 11: Summarized Performances Scores of Candidates for Question 10

Percentage Range	Marks scored	Remark	Students	
			Total Number	Percentage
0-29	0-0.5	Unsatisfactory	90	75
30-64	1-1.5	Average	22	18.33
65-100	2-3	Good	8	6.67
		TOTAL	**120**	**100**

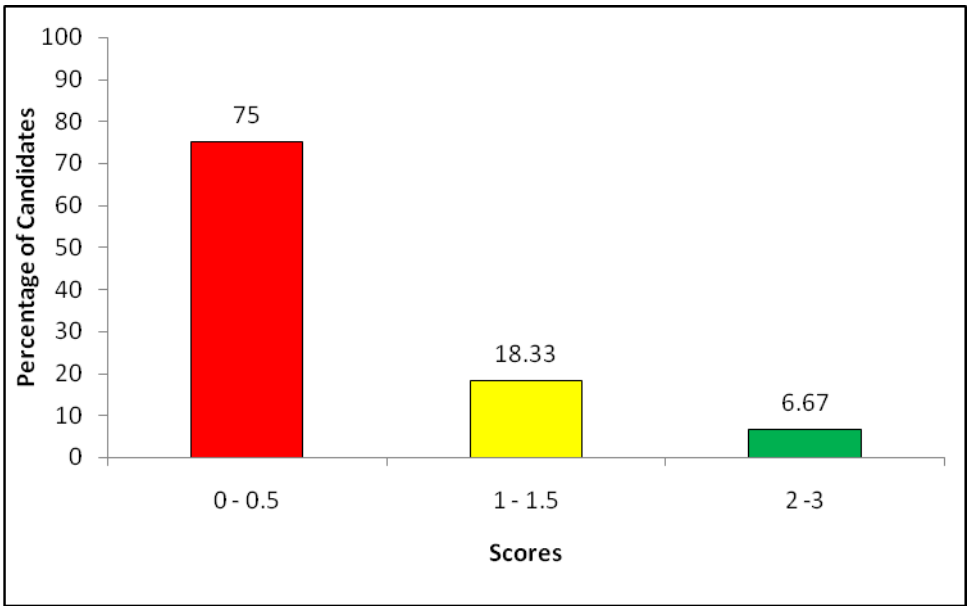
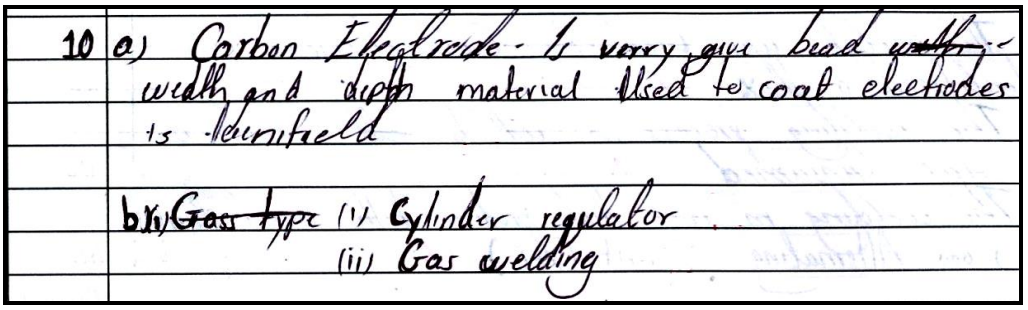


Figure 11: *The candidates' performance in question 10.*

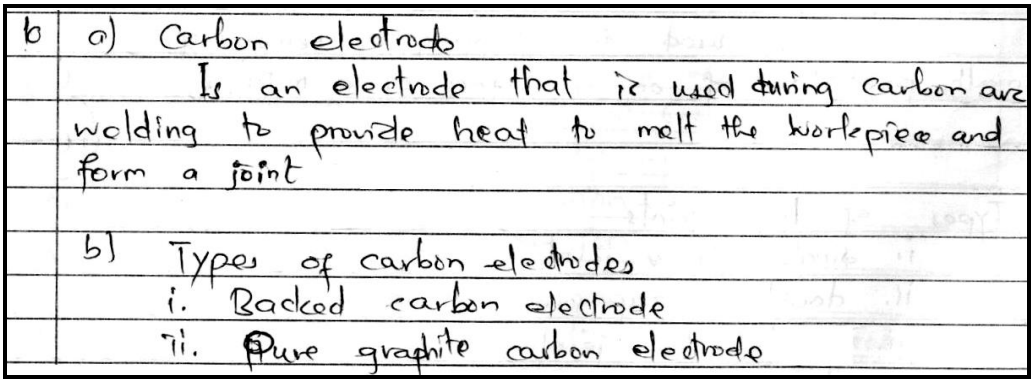
The performance in this question can be categorized as unsatisfactory because 90 (75%) candidates scored below the average marks, i.e., 0 to 0.5 marks.

The candidates who performed poorly they failed to give correct response in both parts of the question. Poor performance of the majority in this question implies that candidates lacked knowledge and practical skills on Electric arc Welding. Extract 10.1 shows a sample of response from a script of a candidate who provided irrelevant answer to the question.



Extract 10.1 shows the response of a candidate who failed to give correct responses to both parts of a question, (a) and (b).

On the other hand, the candidates who scored averagely were able to mention at least one of the types of electrode or partially define the term. Few candidates who scored good marks were managed to define the term carbon electrode in part (a) and mentioned the two types of electrodes in part (b) of the question. These candidates exhibited that they had sufficient knowledge on Electric Arc Welding. Extract 9.2 shows a good response of a candidate to both part of the question.



Extract 10.2 shows a good response of a candidate who gave correct responses to both parts of a question.

2.2.10 Question 11: Gas Shielded Arc Welding

This question had two parts, (a) and (b). In part (a), the candidates were required to name the two general types of Gas - shielded arc welding processes. Part (b) required the candidates to explain why it is better to have equipment fitted with a high frequency starting system in a Tungsten arc gas shielded welding. A total of 112 (80.6%) candidates attempt this question.

The analysis of candidates' performance shows that 60 (53.57%) candidates scored from 0 to 0.5 marks indicating an unsatisfactory performance. Further analysis indicates that 5 (4.46.%) scored from 1 to 1.5 marks which is an average performance and 47 (41.96%) scored from 2 to 3 marks which is a good performance. The performance in this question can be categorized as unsatisfactory because 60 (53.57%) candidates scores below the average marks i.e. 0 to 0.5 marks. The performance of the candidates is presented in Table 12 and Figure 12.

Table 12: Summarized Performances Scores of Candidates for Question 11

Percentage Range	Marks scored	Remark	Students	
			Total Number	Percentage
0-29	0-0.5	Unsatisfactory	60	53.57
30-64	1-1.5	Average	5	4.46
65-100	2-3	Good	47	41.96
		TOTAL	**112**	**100**

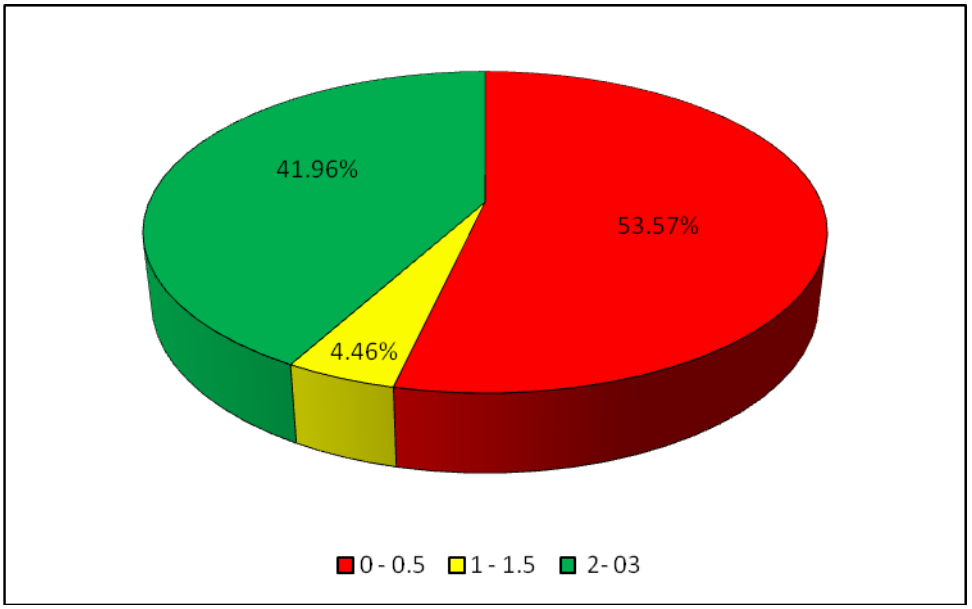
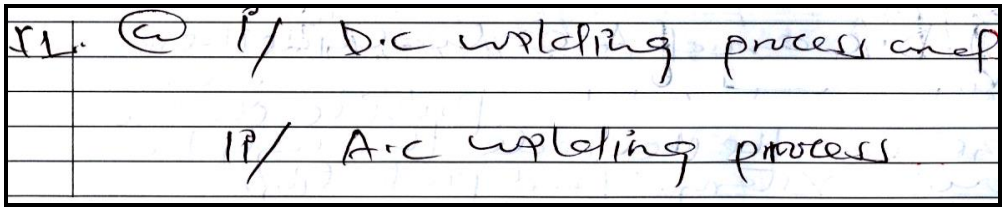


Figure 12: *The candidates' performance in question 11.*

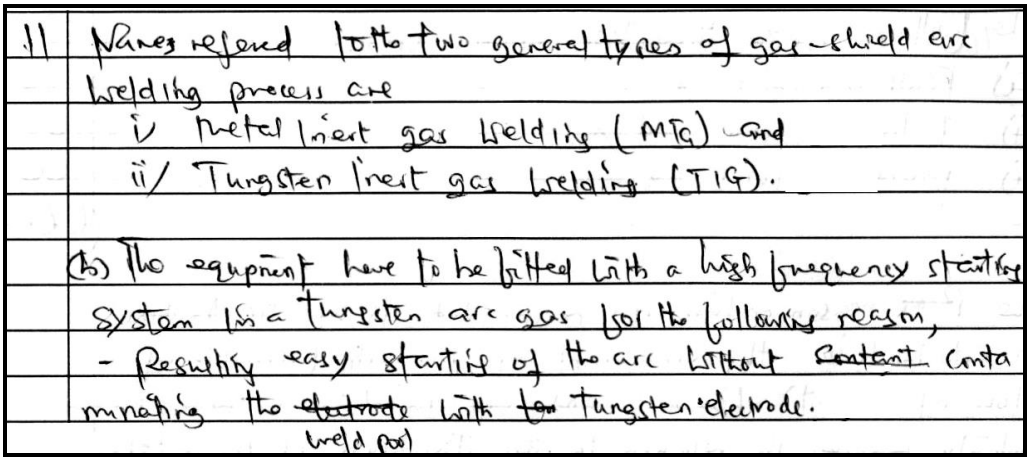
The candidates who perform poorly they failed to give correct response in both part of the question. Poor performance by the candidates implies that they had insufficient knowledge and practical skills on Gas Shield arc Welding.

On the other hand, candidates who scored averagely were able to mention at least one type of Gas Shielded Welding processes or give partially response to both part of the question.

Candidates who scored good marks were managed to give correct response to both parts of the questions. This candidates' good performance indicate that they had sufficient knowledge on Gas shield Arc Welding. Extract 11.1 and 11.2 presents a sample of response from a script of a candidate who provided irrelevant and good responses, respectively.



Extract 11.1 shows the response of a candidate who failed to give correct answers to both parts of the question, (a) and (b).



Extract 11.2 shows a good response of a candidate who gave correct answer to both parts of the question, (a) and (b).

2.3 SECTION C: STRUCTURED QUESTIONS

2.3.1 Question 12: Soft Soldering

This question had four parts, namely (a) , (b), (c) and (d) In part (a), the candidates were required to distinguish between hard soldering and soft soldering. Part (b) it required the candidates to explain the composition and properties of the following fluxes (i) in organic or acid corrosive fluxes, (ii) mild fluxes and (iii) non corrosive fluxes. In Part (c), the candidates were required to describe five factors which guide the welder in selecting the solder to be used, and in part (d), it required the candidates to explain four means of cleaning the metal parts before soldering.

A total of 45 (32.4%) candidates opted this question. The analysis of candidates' performance shows that 41 (91.11%) candidates scored from 0 to 5.5 marks indicating an unsatisfactory performance. Further analysis indicates that 4 (8.89%) scored from 6 to 12.5 marks which is an average performance. No candidates scored from 13 to 20 marks which is a good performance. The performance in this question can be categorized as unsatisfactory because 41 (91.11%) candidates scored below the average marks, i.e., 0 to 5.5 marks. The analysis of the candidates performance for question 12 is presented in Table 13 and Figure 13.

Table 13: Summarized Performances Scores of Candidates for Question 11

Percentage Range	Marks scored	Remark	Students	
			Total Number	Percentage
0-29	0-5.5	Unsatisfactory	41	91.11
30-64	6-12.5	Average	4	8.89
65-100	13-20	Good	0	0
		TOTAL	**45**	**100**

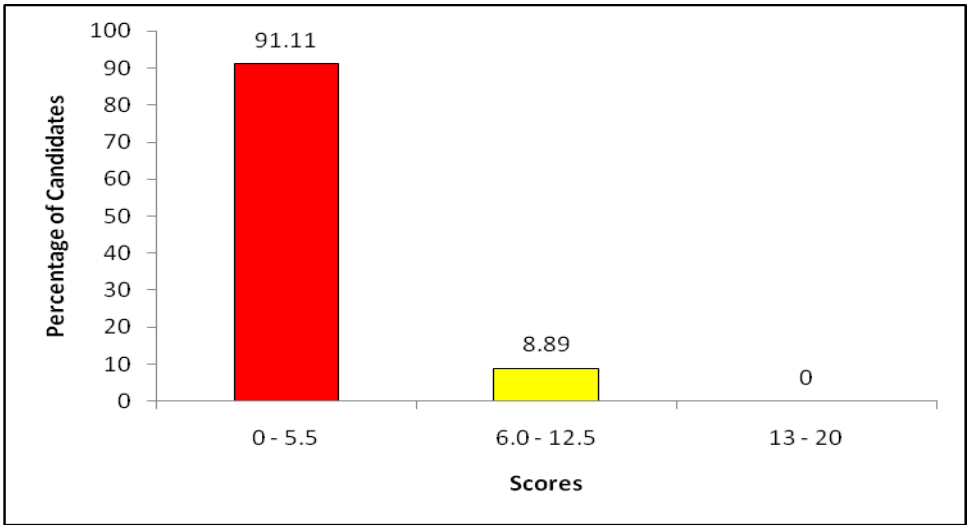
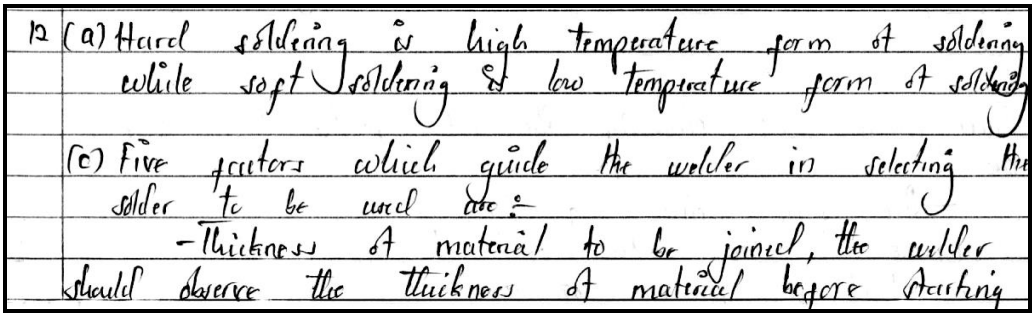


Figure 13: *The candidates' performance in question 12.*

In this question there is no candidates who scored above average 13 to 20 marks which is a poor performance. This implies that candidates had insufficient knowledge and skills on soft soldering topic. On the other hand, candidates who scored averagely proved to have in adequate knowledge on the subject matter, because at least they managed to provide correct answers to some parts of the question. They were able to give correct answers on parts, such as giving distinction between hard soldering and soft soldering, describing the factors which guide the welder in selecting the solder to be used, etc. Extract 12.1 represents a response of such candidate who scored average marks.


12 (a) Hard soldering is high temperature form of soldering while soft soldering is low temperature form of soldering

(c) Five factors which guide the welder in selecting the solder to be used are :-

- Thickness of material to be joined, the welder should observe the thickness of material before starting

the work in order to produce a good and strong joint, because each kind of thickness should be joining by using corresponding solder.

- Current flow, a welder must know the quantity of electricity flowing in the work and must select the solder to control the quantity of electricity flowing in order to form a better arrangement of weld bead.

- Speed of welding, the welder must select the solder which move weld correctly in the speed which is required to joining the metal and the welder must choose the appropriate solder to produce good and hard joint.

- Properties of material to be joined, the welder must select or choose the solder according to the properties of material to be joined because other material contain properties which is not given the type of solder.

- Position of the welding, the welder also must choose the appropriate solder according to the position of the joining the metal because each of solder is required at a certain position of the welding during welding process.

12 (d) Four means of cleaning the metal parts before soldering are

- By using grender, grender is used to clean the surface of the metal and it applied when there is bad arrangement of weld bead so it flush

away the impurities which are present in the joint or work piece.

- By using emery cloth, metal can be cleaned by using emery cloth this cloth remove the impurities that are found in the metal piece by means of rubbing the area which contain impurities in order to form a good work in the metals.

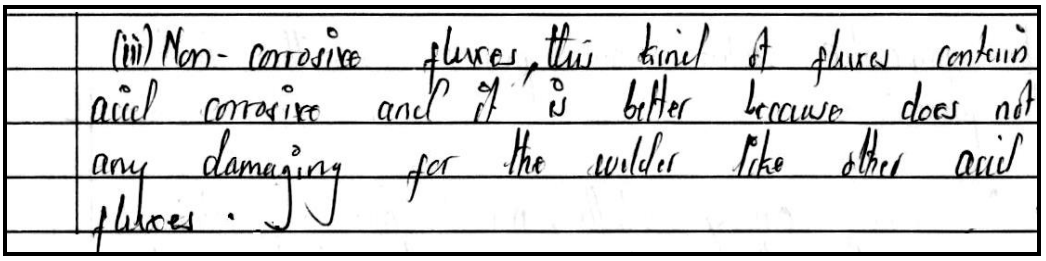
- By using wire brush, metal can be cleaned that is removing the impurities by using ~~emery~~ wire brush, this brush consist of wire which is hard and can remove impurities easily during working the welding or welding processes.

- By using a piece of cloth, metal can be cleaned by using piece of cloth by removing the impurities on the surface of the material by means of rubbing the metal and it is mostly used in work shop not a.

12 (b) The compositions and properties of the following fluxes a

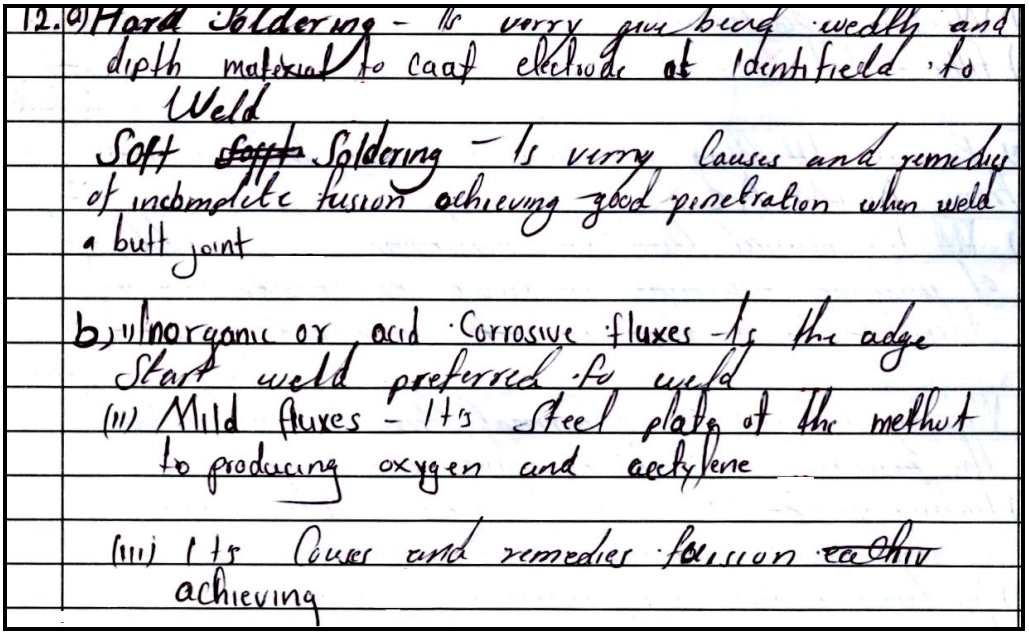
(i) Inorganic or acid corrosive fluxes, this kind of fluxes containing greater amount of acid and may cause skin damage for the welder when it dropped on the surface of the skin or body.

(ii) Mild fluxes, this containing the equal amount of acid and non-acid material and they contain small amount of corrosion or acid so this can cause skin damage for the welder.


(iii) Non-corrosive fluxes, this kind of fluxes contain acid corrosive and it is better because does not any damaging for the welder like other acid fluxes.

Extract 12.1 shows a response given by a candidate who provided correct responses to most parts of the question.

The candidates who performed below average failed to understand the question. As a result their responses had no relation with soft soldering while others comprehended partially and provided responses which were incomplete . They seemed to face much difficult in answering part (b) and (c) of the question. Most candidates provided irrelevant answer or skipped the parts. Poor performance by the candidates revealed that they were not knowledgeable about the topic, Soft Soldering. Extract 12.2 shows a sample of response from a script of a candidate who provided irrelevant answers to the question.

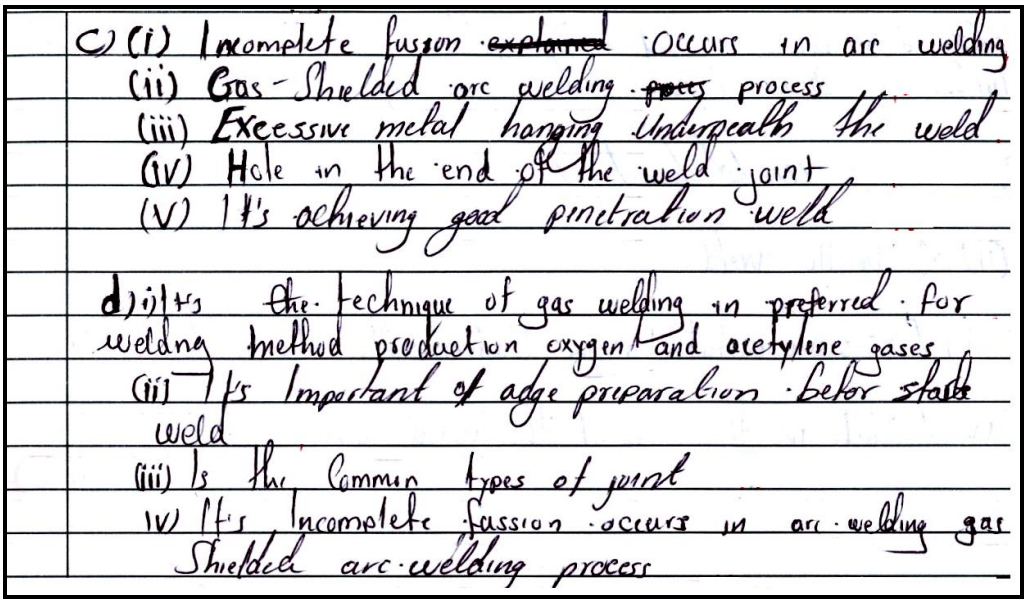

12. a) Hard Soldering - Is very give bind wedly and dipth material to caat electrode at identfield to Weld

Soft ~~Soft~~ Soldering - Is verry causes and remedies of incomplete fusion achieving good penetration when weld a butt joint

b) (i) Inorganic or acid Corrosive fluxes - Is the edge Start weld preferred to weld

(ii) Mild fluxes - It's Steel plate of the methut to producing oxygen and acetylene

(iii) It's Cause and remedies for ~~reaction~~ achieving



Extract 12.2 shows a response given by a candidate who failed to provide correct answers to all parts of the question.

2.3.2 Question 13: Gas Welding

This question had three (3) parts, (a) , (b) and (c) derived from Gas and Welding topic. Part (a) demanded the candidates to use a sketches to explain how *Leftward* and *Rightward* gas welding techniques were performed. Part (b) required the candidates to explain which technique of gas welding is preferred for welding steel plate over 6mm thick, and in part (c) the candidates were required to describe 'braze welding' process.

A total of 114 (82.0%) candidates opted this question. The analysis of candidates' performance shows that 35 (30.7%) candidates scored from 0 to 5.5 marks indicating an unsatisfactory performance. Further analysis indicates that 27 (23.68%) candidates scored from 6 to 12.5 marks which is an average performance and 52 (45.61%) candidates scored from 13 to 20 marks which is a good performance. General performance of this question can be categorized as good because 52 (45.61%) candidates scored above the average marks. Table 14 and Figure 14 presents analytical performance of the candidates for question 13.

Table 14: Analytical Summarized Performances Scores of Candidates for Question 13

Percentage Range	Marks scored	Remark	Students	
			Total Number	Percentage
0-29	0-5.5	Unsatisfactory	35	30.70
30-64	6-12.5	Average	27	23.68
65-100	13-20	Good	52	45.61
		TOTAL	**112**	**100**

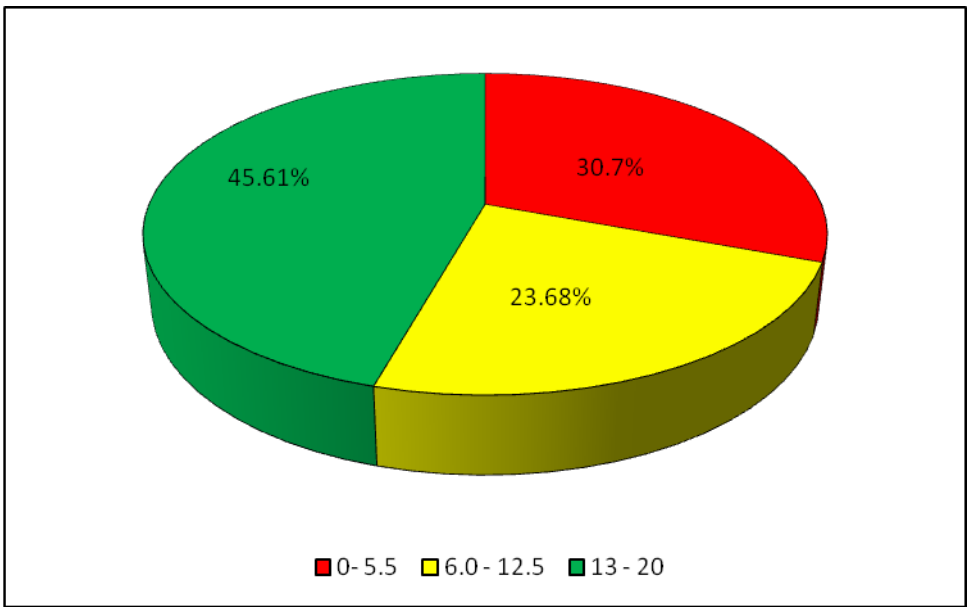


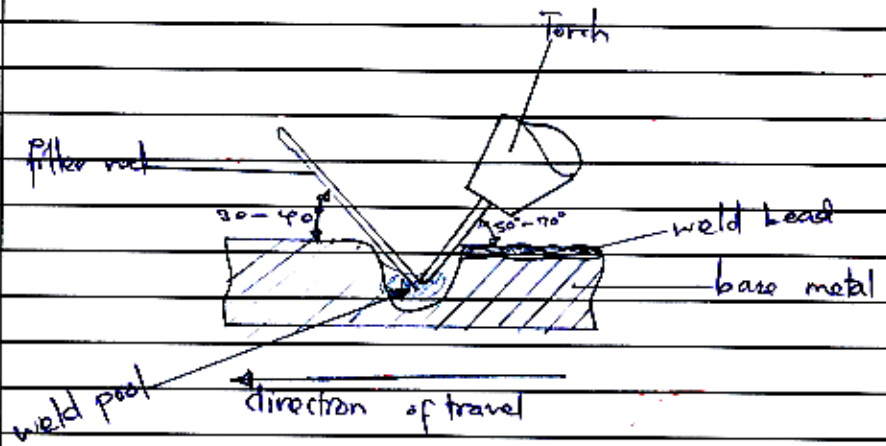
Figure 14: *The candidates' performance in question 13.*

Candidates who scored from 13 to 20 which is good marks managed to give correct response to most or all parts of the question. This candidates had an adequate knowledge on the subject matter, because they managed to provide correct responses to the question. Extract.13.2 shows a good response of a candidate to the question.

13 a) i. Left ward welding technique

Is the welding technique in which the torch progresses from right to left.

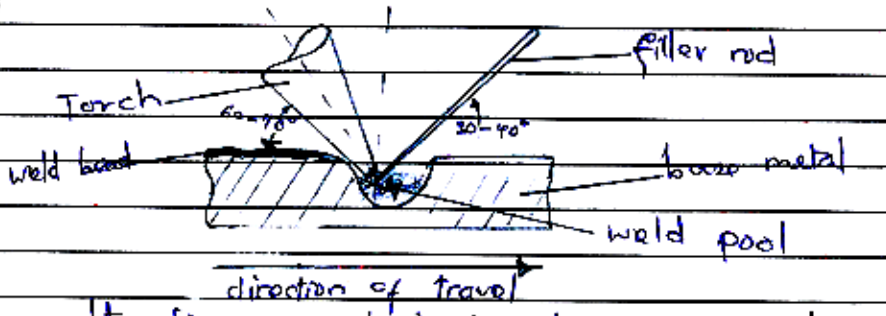
- It is used to weld metals with thickness below 6mm 6mm



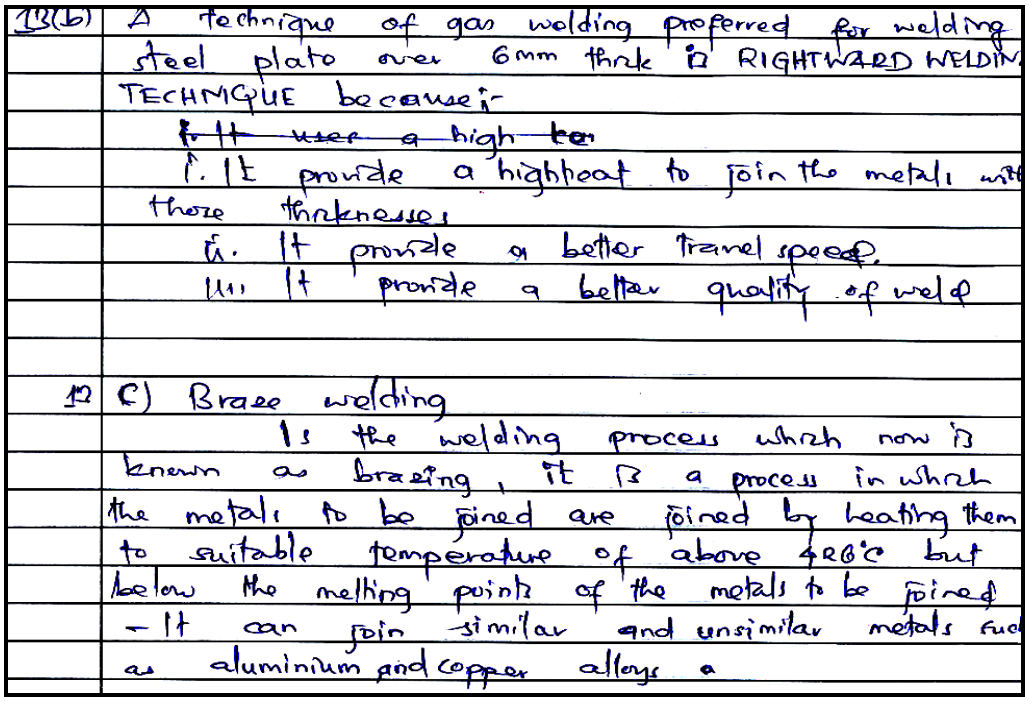
ii) Right ward welding technique

Is the welding technique whereby the torch progresses from left to right

- It is used to weld metals with thickness above 6mm and it provides a better view of a weld pool.

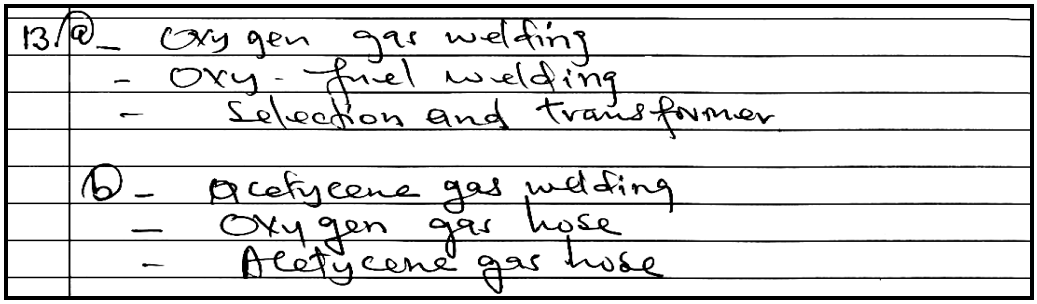


- It gives a high travel spee d - It is less expensive



Extract 13.2 shows a response given by a candidate who provided correct responses to most parts of the question.

On the other hand, the candidates who scored 6 to 12.5 marks which is average were able to mention at least few or partially responses to the question. The candidates who scored from 0 to 5.5 marks which is poor, failed to understand the question. As a result their responses had no relation with gas welding techniques while others comprehended partially. Hence, they provided wrong responses to the most parts of the question. Most candidates, either provided irrelevant answer or skipped the parts. Their answers revealed that they were not knowledgeable enough about gas welding techniques. Extract 13.1 represents a bad response from one of the candidates.



Extract 13.1 shows a response given by a candidate who failed to provide correct answers to all parts of the question.

2.3.3 Question 14: Weld Joints

This question consisted of parts (a), (b) and (c) which based on the *Welding and Joints* topic. It required the candidates to confer the meaning of welding joint as applied in Welding and Metal Fabrication subject. Part (b) demanded the candidates to list and explain the common types of welding joints applicable in welding process. Welding joints is the locations where two or more members are jointed. In part (c), the candidate were required to delineate steps to be followed in order to obtain the good welding penetration on welding thick metal. It also demanded the candidates to explain the importance of edge preparation before start welding.

A total of 106 (76.3%) out of 139 candidates attempted this question. In this question, 80 (75.47%) candidates scored from 0 to 5.5 marks, 24 (22.64%) candidates scored from 6 to 9 marks and 2 (1.89%) candidates scored from 13 to 20 marks. The candidates who did not opt for this question were 33 (23.7%) of all candidates sat for this subject. Table 15 and Figure 15 present analytical performance of the candidates for question 14.

Table 15: Summarised Performances Scores of Candidates for Question 14

Percentage Range	Marks scored	Remark	Students	
			Total Number	Percentage
0-29	0-5.5	Unsatisfactory	80	75.47
30-64	6-12.5	Average	24	22.64
65-100	13-20	Good	2	1.89
		TOTAL	**106**	**100**

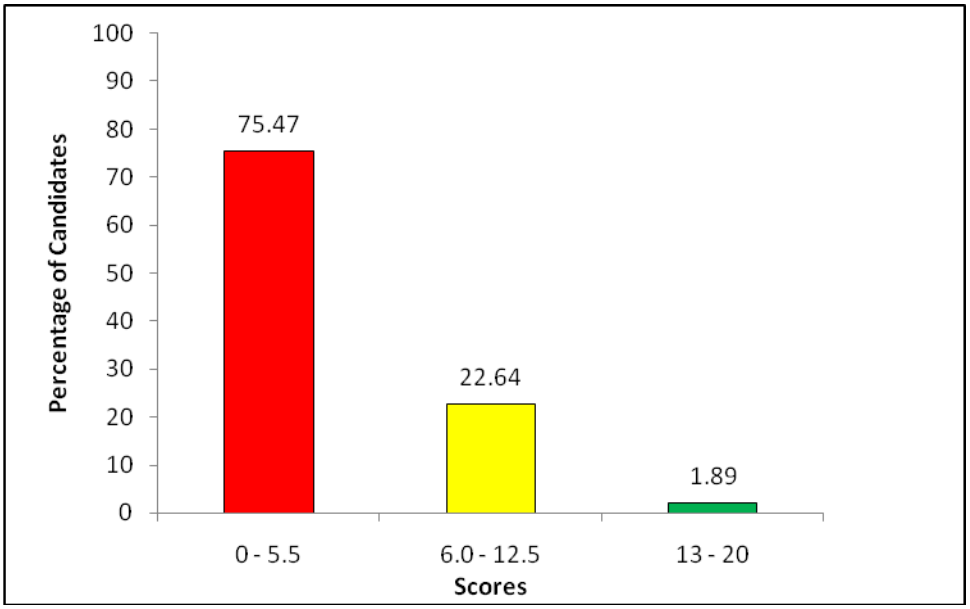
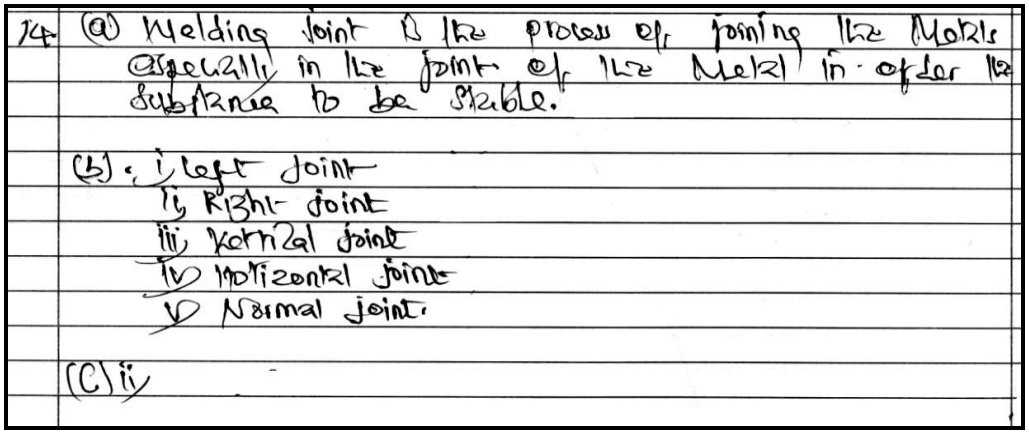


Figure 15: *The candidates' performance in question 14.*

Candidates who scored 0 to 5.5 marks failed to understand the demand of the question. They lacked knowledge and skills of welding joints. As a result their responses had no relation with weld joints, while others comprehended but not satisfactorily, hence provided irrelevant answers. Their answers revealed that they were not knowledgeable enough on weld joints. This implies that the candidates had insufficient knowledge on gas welding techniques. Extract 14.1 represents a poor response from one of the candidates.


14. (a) Welding joint is the process of joining the Metals especially in the joint of the Metal in order the substance to be stable.

(b) i. left joint
ii. Right joint
iii. Kortizal joint
iv. Motizontal joint
v. Normal joint.

(C) ii

Extract 14.1 shows a response given by a candidate who failed to provide correct answers to all parts of the question.

On the other hand, those who scored from 6 to 12.5 marks were able to provide correct answers to few parts of the question. They seemed to have faced much difficult in answering some parts of the question. Many candidates in this category either provided relevant answer to some of question parts or skipped the other. They had partial understanding on weld joints. They also failed to clearly identify weld joint applications and state the importance of edge preparation. The candidates had insufficient knowledge on weld joint topic.

The strength of the candidates who scored from 13 to 20 marks had a correct interpretation of the demand of the question. They were proved had adequate knowledge on the subject matter because at least they provided correct responses to some parts of the question. They were able to (a) give the meaning of welding joint. (b) List the common types of joints and for each type explain the application. Extract 14.2 represents a good response from one of the candidates.

14 (a) Welding joint refers to the permanent joint formed by the application of heat or pressure or both heat and pressure. When the heat is used only. This therefore called either fusion or non fusion welding.

(b) The following are the five common types of joints,

(i) Butt joint

(ii) Edge joint

- Used for material that they should under go bevelling ~~in many time~~ before welded.

(iii) Tee-joint

(iv) Flanged joint

(v) Lap joint.

(c) (i) The following are the four steps of achieving good penetration when welding abutt joint over 6mm thick,

(i) Bevelling, the metal is first bevelled at an angle of 35°, forming V or double V.

(ii) Proper clamping and pre-setting, the already bevelled edge of the metal are clamped and allowed to mesh,

(iii) before starting the ~~heat~~ welding the weld tacks should be done

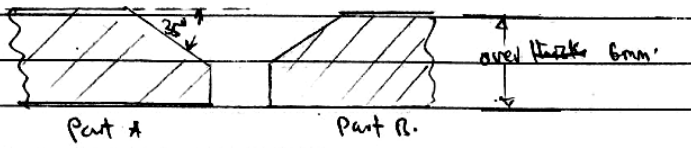
(iv) Welding along the tacks.

Therefore by following the following steps then the good pene

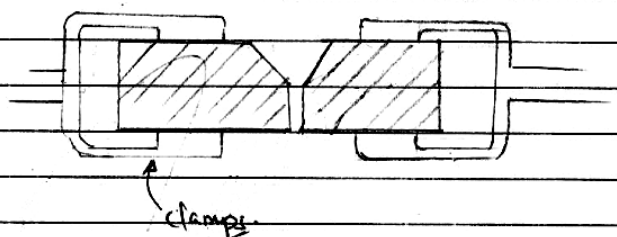
(ii) Fusion is achieved

Simple neat sketch for the all steps.

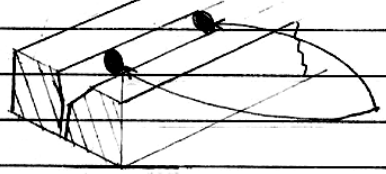
1.



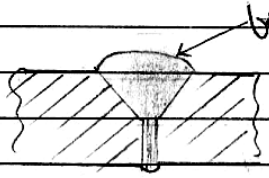
2.



3.



4.



(iii) The importance of edge preparation before someone starts welding is that,

(i) Good penetration is obtained

(ii) A well strengthened weld is formed

(iii) Reducing the risk of distortion, since the preparation is also a pre-setting stage,

(iv) Results in welding over 20mm thickness, which is very difficult without edge preparation.

Extract 14.2 shows a response given by a candidate who provided correct responses to most parts of the question.

2.3.4 Question 15: Weld Defects

This question was derived from the topic Weld Defects, and it tested the candidates' ability to analyze the welding defects of welded joint. The question consisted of three parts, namely (a), (b) and (c). In part (a), the candidates were required to explain the term weld defect as applied in welding joints and how porosity in arc weld joint is formed. Part (b) required the candidates, with the aid of sketches, to explain how incomplete fusion occurs in arc welding and also to give the causes and remedies of incomplete fusion. In part (c), the candidates were required to provide one cause for each of the given defects in gas welding.

A total of 41 (29.5%) candidates opted for this question. The analysis of candidates' performance shows that 20 (48.78%) candidates scored from 0 to 5.5 marks indicating an unsatisfactory performance. Further analysis indicates that 14 (34.15%) candidates scored from 6 to 12.5 marks which is an average performance and 7 (17.07%) candidates scored from 13 to 20 marks which is a good performance. The performance in this question can be categorized as unsatisfactory because 20 (48.78%) candidates scored from 0 to 5.5 marks which is below the average marks. The performance of the candidates is presented in Table 16 and Figure 16, respectively.

Table 16: Summarized Performances Scores of Candidates for Question 15

Percentage Range	Marks scored	Remark	Students	
			Total Number	Percentage
0-29	0-5.5	Unsatisfactory	20	48.78
30-64	6-12.5	Average	14	34.15
65-100	13-20	Good	7	17.07
		TOTAL	**41**	**100**

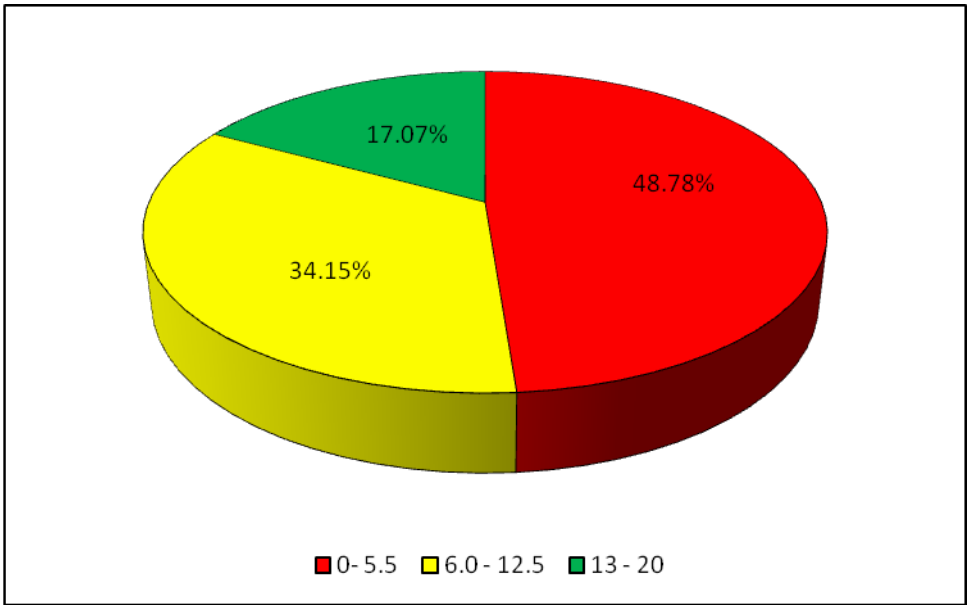


Figure 16: *The candidates' performance in question 15.*

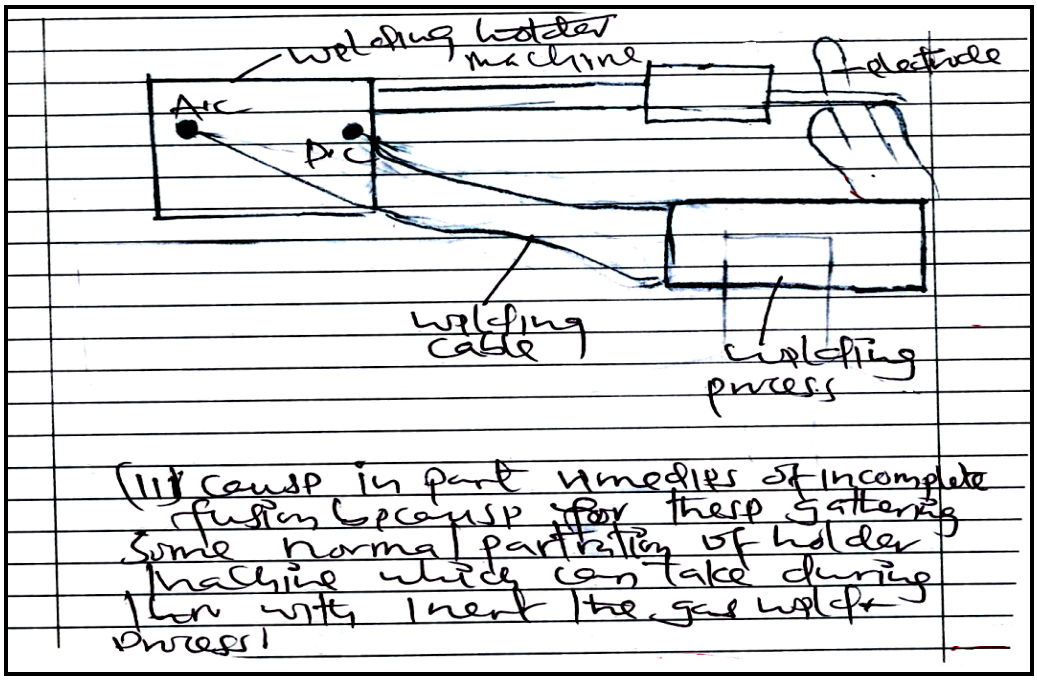
Those who scored a 0 mark misinterpreted the question, while those who scored from 0.5 to 5.5 marks had little understanding of the subject matter. Those who scored 0 mark failed to give correct response in all parts of the question. Poor performance by the candidates implies that they lacked enough knowledge and skills in welding practices. Extract 15.1 shows a sample of response from a script of a candidate who provided irrelevant answers to the question.

15 (a) (i) defect as applied in welding joint refer to the part of welding holder in which it's common responsibility when occur to interrupt the joint set.

(ii) Arc welded joint refer when it's occur during the after welding part or process will with remedies of the incomplete the long hanging underneath the weld.

When with occur the application of storage provided through, can take part during the defects welding the over to part.

(b) Arc welding like welding machine which can be without using of one electrode during the welder.



(iii) cause in part remedies of incomplete fusion because for these gathering some normal partition of holder machine which can take during then with inert the gas welder process.

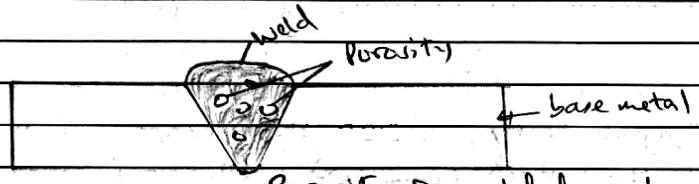
Extract 15.1 shows a response given by a candidate who failed to provide correct answers to all parts of the question.

Furthermore, the candidates who scored from 6 to 12.5 marks gave short explanation for which they could not get high marks. They were proved to have inadequate knowledge on the subject matter because at least they managed to provide correct responses to some parts of the question and skipped the others. For examples, they were able to explain the term defect and mentioned the causes of porosity but failed to list causes and remedies of incomplete fusion.

The strength of the candidates who scored from 13 to 20 marks made correct interpretation of the demand of the question. They provided detailed explanations and correct causes and remedies of welding defects. The candidates who scored good marks managed to give correct responses to some parts of the questions. They were able to give the meaning of weld defect as applied in welding joints and explain how porosity in arc weld joint is formed. The candidates' good performance indicate that they had sufficient knowledge on the topic. Extract.15.2 shows a good response of a candidates.

15 @(i) Defect is the problem occured to the welded joint which make it to fail to fuse together hence make the joint weak. eg porosity, lack of fusion, undercut, overlap etc.

(ii) Porosity is the spongy that occured to the welded part cause it to have the hole in the welded joint. Porosity is formed when there is insufficienty current and high speed. use correct speed and current.

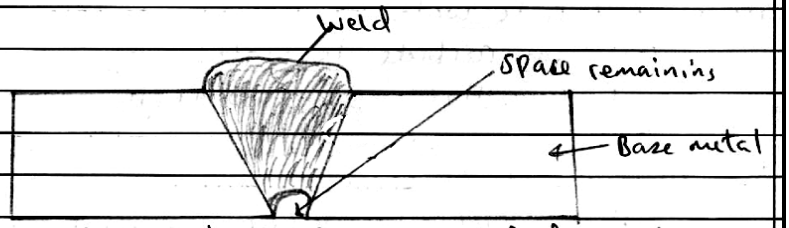


Porosity in welded part.

(b)(i) Incomplete fusion This is among the weld defect that occured when the weld fail to fuse completely in the gap of the base metal.

(ii)

It is caused by:	Prevention/remedies
(i) High speed	- Use correct speed
(ii) Low current	- Use required current
(iii) High arc length.	- Use the suitable arc length.



Incomplete fusion in welded joint.

15 (c) (i) low temperature (Incorect pressure settings)
(ii) low temperature (Incorect pressure settings)
(iii) High temperature (faiure of selecting type of flame)
(iv) High temperature (fairule of pressure setting)

Extract 15.2 shows a response given by a candidate who provided correct responses to most parts of the question.

2.3.5 Question 16: Gas Welding, Production, Accessories and Equipment

This question had three parts, namely (a), (b) and (c) and was derived from *Welding Gas Production* and *Gas welding Accessories and Equipments* topics. Part (a) required the candidate to explain the methods of producing oxygen and acetylene gases, and also to outline three characteristics of oxygen gas and four impurities formed after production of acetylene gas. In Part (b), the candidates were required to explain the method used for testing the presence of impurities in acetylene gas and in part (c) to list down five rules used in caring for cylinder regulators.

A total of 66 (47.5%) candidates out of 139 opted for this question. The analysis of candidates' performance shows that 35 (53.03%) candidates scored from 0 to 5.5 marks indicating an unsatisfactory performance. Further analysis indicates that 23 (34.85%) candidates scored from 6 to 12.5 marks, which is an average performance and 8 (12.12%) candidates scored from 13 to 20 marks, which is a good performance. General performance for this question was unsatisfactory because 35 (53.03%) candidates scored below the average marks. Table 17 and Figure 17 presents analysis of the candidates' performance for question 16.

Table 17: Summarized Performances Scores of Candidates for Question 16.

Percentage Range	Marks scored	Remark	Students	
			Total Number	Percentage
0-29	0-5.5	Unsatisfactory	35	53.03
30-64	6-12.5	Average	23	34.85
65-100	13-20	Good	8	12.12
		TOTAL	**66**	**100**

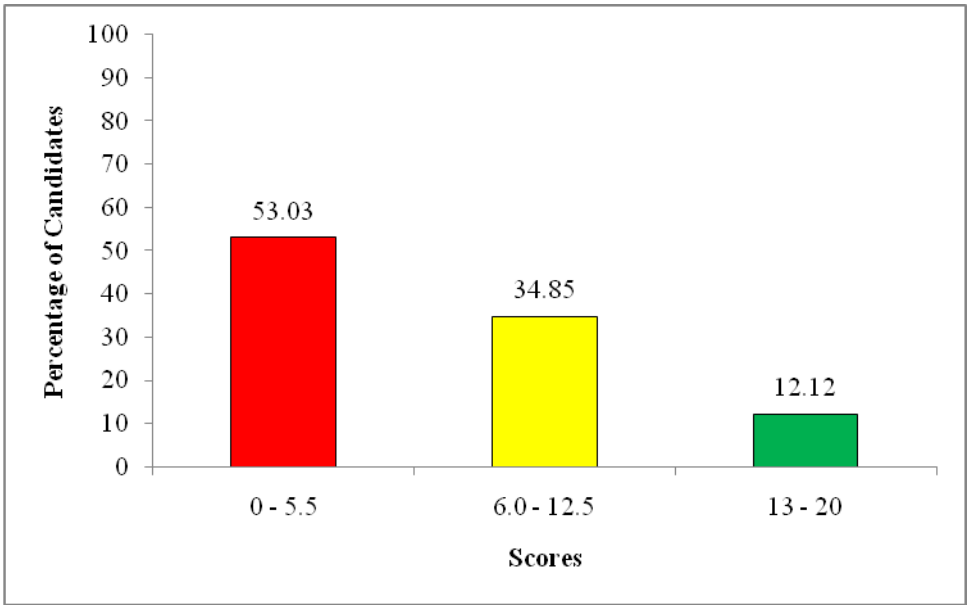
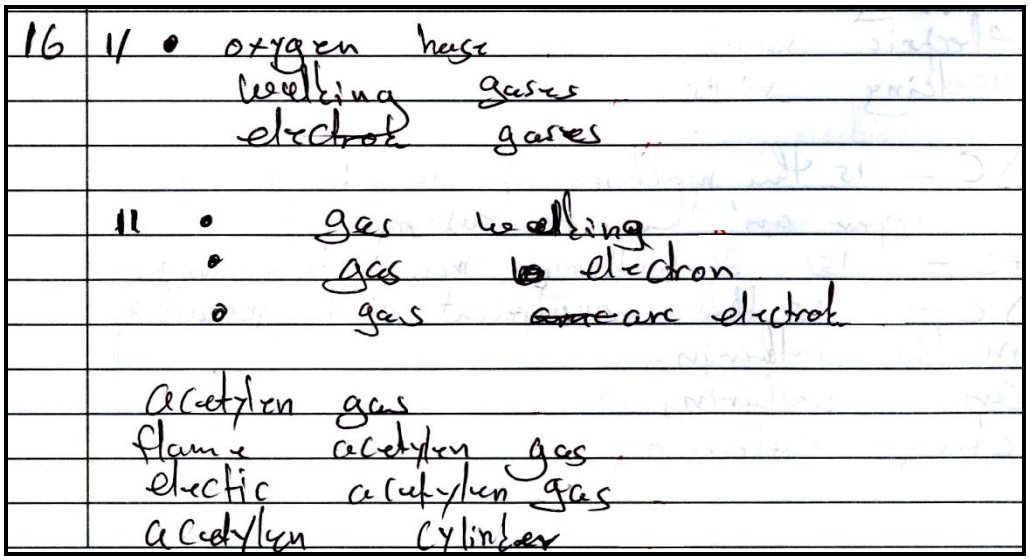
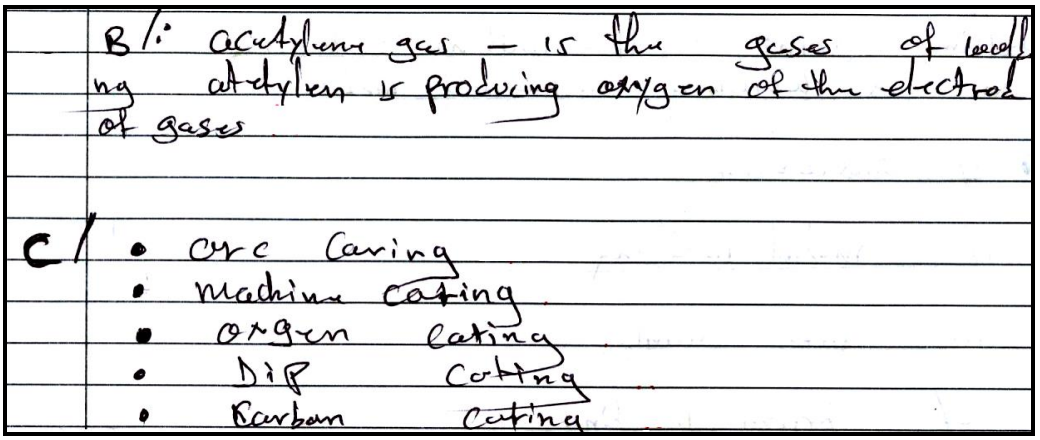


Figure 17: *The candidates' performance in question 16.*

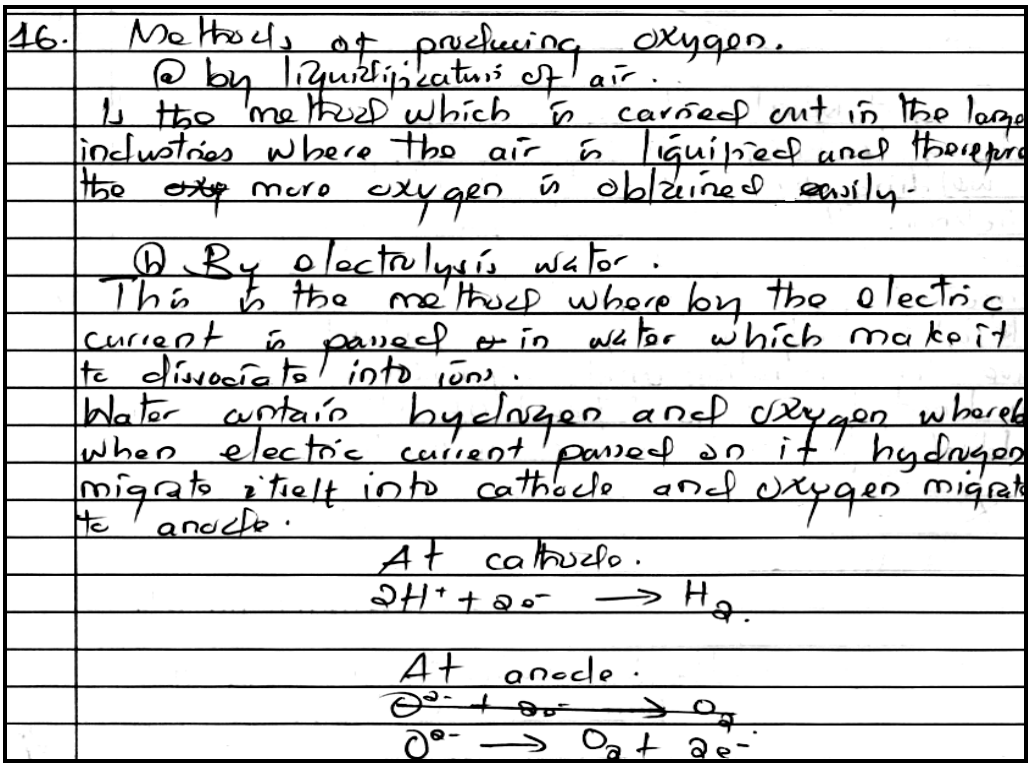
The candidates who performed poorly, failed to give correct responses in all parts of the question. They also failed to explain clearly the method used to test for presence of impurities in acetylene gas, and list down five rules used in caring cylinder regulators. This poor performance by the candidates implies that they had insufficient knowledge and lacked skills on these two topics (*Welding Gas Production* and *Gas welding Accessories and Equipments).* Extract 16.1 shows a sample of response from a script of a candidate who provided irrelevant responses to the question.





Extract 16.1 shows a response given by a candidate who failed to provide correct answers to all parts of the question.

On the other hand, the candidates who scored averagely were able to give partially response to few part of the question. They had partial understanding on the topic. The candidates who scored good marks managed to give correct response to all parts of the questions. These had sufficient knowledge on the topic of Production of Welding Gas and Gas Welding Accessories and Equipment. Extract.16.2 shows a good response of a candidate.



16. Therefore the oxygen is collected in the ancelo.

productwn of acetylene gases.

Acetylene gases are produced by the gases known as calcium carbide on water or water on calcium carbide.

Calcium carbide react with water to form acetylene gas.

$$CaC_2 + H_2O \longrightarrow C_2H_2 + Ca(OH)_2$$

C_2H_2 is the acetylene gas produced from calcium carbide and water.

ii) characteristics of oxygen gas.

a) It is the gas which support combustion.

b) React with hydrogen to form water.

c) It is ~~tasteless~~ and ~~colourless~~ colourless.

Impurities formed after productwn of acetylene gas are. a) Air b) Nitrogen c) Acetone d) oxygen e) hydrogen sulphide.

(b). presence of impurities in acetylene gas is tested by the method ~~known as~~ using asbestos, kapok and chalk.

c). a) close the valve of cylinder regulator after finishing working.

b) put separately working cylinder regulator and

16. pressure regulator.

c) Ensure that the cylinder regulator are safe to use before starting any work.

d) Don't let it open when it's not in use.

e) place in proper ~~pla~~ way which can not get any damage.

Extract 16.2 shows a response given by a candidate who provided correct responses to most parts of the question.

3.0 ANALYSIS OF CANDIDATES' PERFORMANCE IN EACH TOPIC

Generally, the performance of the candidates for the topics which were examined in this subject was average because eight out of ten performed above average marks. The highest performance in this paper was that of the multiple choice question whose items were derived from different topics. The candidates' performance in this question was 80.58%. Obviously, the good performance in this question was the result of the candidates' adequate knowledge, ability to understand the demand of the question and the nature of the items.

The topics which were averagely performed were: Gas Welding Accessories and Equipment (52.85%), Weld Defects (51.22%), Production of Welding Gases (46.97%), Gas Shielded Arc Welding (46.43%),Weld Joints (38.26%), Filler Metals (36.07%) and Sheet Metal Fabrication (34.55%). The other two topics had weak performance as follows: Soft Soldering (20.26%) and Electric Arc Welding Accessories and Equipment (13.45%). (See appendix I and II)

The weakness shown by the candidates in the poorly performed topics include inability to interpret the questions, and to provide logical and clearly stated answers. Generally, the candidates exhibited very low level of knowledge and practical skills in topics under structure questions in section C. The performance in all the questions in this section was weak. The candidates exhibited weakness in formulating responses for questions of higher order or questions which required long answers.

4.0 CONCLUSION

The report analyzed the candidate's performance on individual questions in Welding and Metal Fabrication subject. It has indicated the strengths and weaknesses which the candidates demonstrated in answering questions. The candidates' performance in the Welding and Metal Fabrication examination (CSEE 2018) was average since 54.68 percent of the candidates passed. Most of those candidates had good performance in question 1 and average performance in questions 3, 11 and 13. On one hand, the candidates' good English language proficiency, adequate knowledge of the subject matter as well as ability to understand the demand of the questions were the pillars upon which their good performance based. On the other hand, the candidates' inadequate knowledge of the subject matter, poor English language proficiency, inability to identify the demands of the question, lack of good

drawing skills and poor essay writing skills were the root causes of their poor performance. The analysis of the candidates' overall performance per topic is presented in Appendix II while the comparison of the candidates 's grade between 2018 and 2017 is presented in Appendix III.

5.0 RECOMMENDATIONS

In order to improve the performance of the candidates in this subject, the following are recommended:

(a) Students should be guided and encouraged to read various Welding and Metal Fabrications books so as to improve their knowledge and skills. Improved knowledge and skills will help them to avoid providing partial and fragmented answers.

(b) Teacher should develop in students the culture of reading questions carefully before any attempt to answer so that they understand the demand of a question.

(c) Students should be helped to practice drawing which will help them to draw sketch neatly labeled diagrams and graphs.

(d) Internal assessment questions should be set in line with the syllabus and in examination format so as to improve students' cognitive, psychomotor and effective domains.

(e) Teacher's and other education stakeholders' effort should be directed at improving students' English language skills, namely speaking and writing by encouraging students to participate in debates, discussion and presentation of various assignments.

(f) Students should be given enough exercise so as to boost their understanding and writing skills. This will enable them to have a long lasting memory on topic taught.

(g) Follow - up on the learning and teaching processes in schools made by academic masters, head of school Educational Quality Assurers and other education stakeholders should be directed at identifying and re-dressing and or eliminating the shortfalls mentioned in this report.

(h) Seminars and workshops should be organized so as to equip teachers with knowledge and new teaching skills. Indeed, by sharing scholarly experienced with teachers from different schools, one's teaching methods will be greatly improved.

Appendix I

Table 18: The Performance of the Candidates in Each Topic

S/N	Topic	Number of Questions	Percentages of Candidates who Scored an Average of 30 % and Above	Remarks
1.	Multiple Choice Question (Various Topics)	1	80.58	Good
2.	Gas Welding Accessories and Equipment	2, 6 and 13	52.85	Average
3.	Weld Defects	15	51.22	Average
4.	Production of Welding Gases	16	46.97	Average
5.	Gas Shielded Arc Welding	11	46.43	Average
6.	Weld Joints	3 , 7 and 14	38.26	Average
7.	Filler Metals	4	36.07	Average
8.	Sheet Metal Fabrication	5	34.55	Average
9.	Soft Soldering	9 and12	20.26	Weak
10.	Electric arc Welding Accessories and Equipment	8 and 10	19.22	Weak

Appendix II

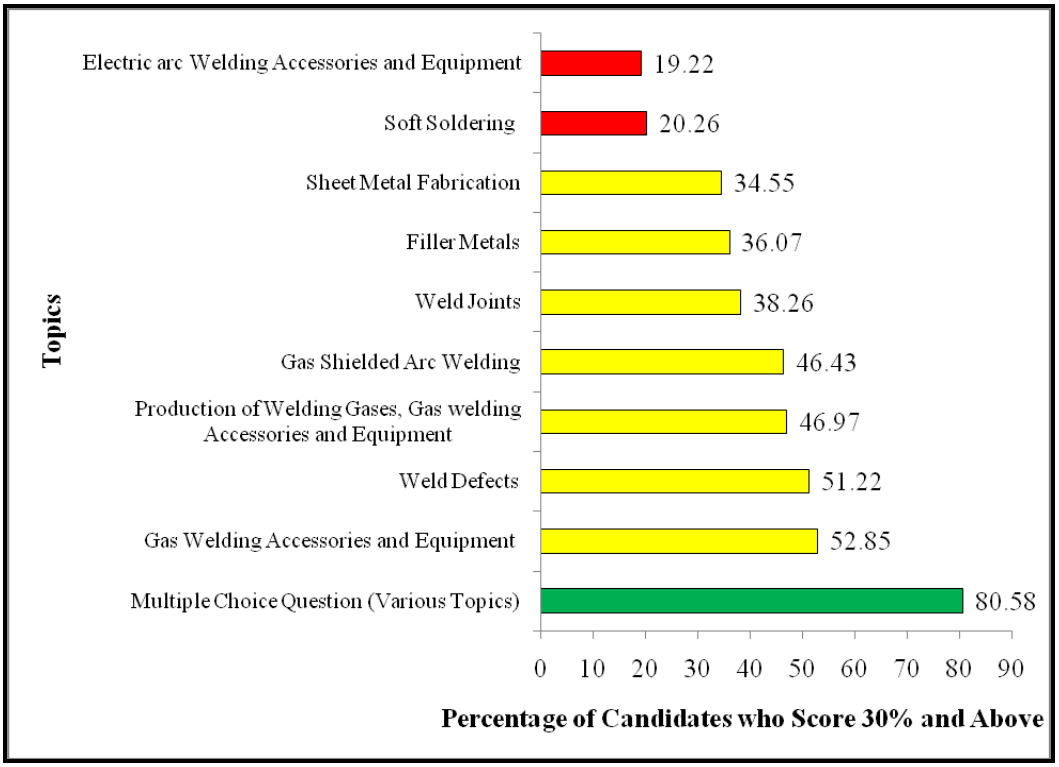


Figure 18: *The candidates' Performance Topic Wise*

Appendix III

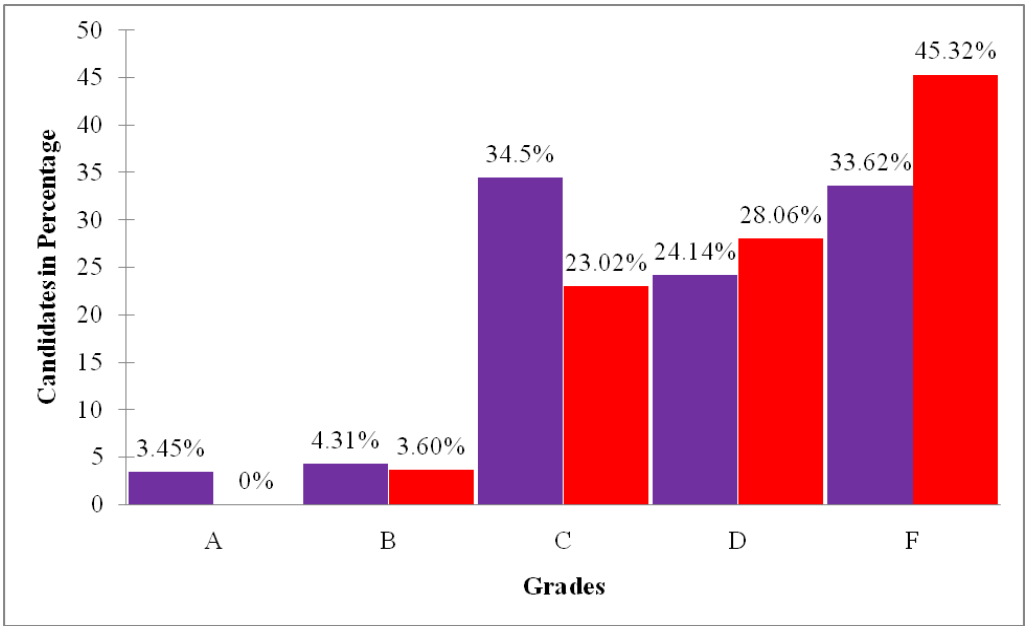


Figure 18: *Comparison of the Candidates' Grade between 2018 and 2017.*