THE NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

STUDENTS' ITEMS RESPONSE ANALYSIS REPORT FOR THE FORM TWO NATIONAL ASSESSMENT (FTNA) 2018

071 CIVIL ENGINEERING

THE NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

STUDENTS' ITEMS RESPONSE ANALYSIS REPORT FOR THE FORM TWO NATIONAL ASSESSMENT (FTNA) 2018

071 CIVIL ENGINEERING

Published by
National Examinations Council of Tanzania,
P.O. Box 2624,
Dar es Salaam, Tanzania.

TABLE OF CONTENTS

FOREWORD

The Students' Items Response Analysis (SIRA) report on the Form Two National Assessment (FTNA) 2018 for the Civil Engineering Subject has been produced in order to provide feedback to secondary school students, teachers, education specialists, policy makers, and other stakeholders. The examiners analysed the students' responses for each question and identified some factors which contributed to poor performance like students' inability to interpret the demand of the question, incorrect mention of sequence of operations in various practical procedures and lack of knowledge and skills in various topics. Each question is well analysed and the performance is illustrated using sample answers extracted from the students' scripts.

The Form Two National Assessment is a comprehensive evaluation, which among other things, appraises the effectiveness of the general education system and specifically the mode of education delivery in Tanzania's Secondary Schools. The National Examinations Council of Tanzania presumes that the feedback that is provided in this report will enable various actors in the public or private sectors, individuals and others who work within the education sector, to take appropriate measures in enhancing general students' performance. The report has been concluded with recommendations to the on-going secondary school students, teachers and the Ministry of Education, Science and Technology.

The National Examinations Council of Tanzania remains grateful to all the Examinations Officers and other people who participated in processing and analysing the data used in this report in various capacities.

Dr. Charles E. Msonde
EXECUTIVE SECRETARY

1.0 INTRODUCTION

This report provides detailed analysis of the performance of the students in Civil Engineering paper in Form Two National Assessment (FTNA) in 2018. The paper adequately covered the Syllabus for Secondary School Education issued in 1994 and the paper was set in accordance with the Examination Format of 2016.

The Civil Engineering Assessment paper had thirteen (**13**) questions divided in two sections A and B. Section A comprised 8 questions; each weighing 5 marks, to make a total of 40 marks. Section B comprised 5 questions whereby each carried 60 marks. The students were instructed to answer all questions in section A and one question from section B depending on their areas of specialization.

Question 1 was a multiple choice one which comprised five items (i) to (v), drawn from various topics. Question 2 was a matching item question and consisted of five items (i) to (v) drawn from the topic on walls (arches). Question 3 consisted of five TRUE or FALSE assertions which required the students to write the word TRUE for the correct assertions and FALSE for the incorrect ones. The question was drawn from the topic on Walls. Questions (4) to (8) were short answer items derived from various topics including Foundation, Materials, Walls and Scaffolding.

Section B comprised 5 questions based on students' specializations. Question 9 was drawn from of Surveying. The parts of the question were derived from the following topics; Introduction, Surveying Instruments, Chain surveying and Chain and Compass Traversing. Question 10 was based on Carpentry and Joinery. Specifically, the question was set from Tools, equipment and Machines, Timber and Joints.

Question 11 was based on the brickwork and masonry field. The topics included brick and block making, mortar, bonding and concrete. Question 12 was based on the field of Painting and Signwriting. It covered the sub-topics of Tools, equipment and plants, brushes, Paint and Painting material, Painting technique, Water paint and Texture finishes. Lastly, Question 13 was based on the field of Plumbing. The question specifically covered the topics that included safety, tools, equipment's and plants, materials, bending and threading and pipe fitting.

A total of 655 students sat for this examination, out of 677 registered students. In 2017, the number of students who sat for FTNA for this subject was 549 which indicates there was an increase of 16.18% of students in 2018.

Generally, the performance was poor as only 29.77% of the students who sat for this assessment passed and 70.23% failed. The distribution of scores and students performance is shown in Table 1 and Figure 1.

Table 1: General Students' Performance in Civil Engineering Subject

Scores	Remarks	General Students Performance	
		Number	Percentage (%)
0 – 29	Weak	460	70.23
30 - 64	Average	192	29.32
65 – 100	Good	03	0.45
	Total	**655**	**100**

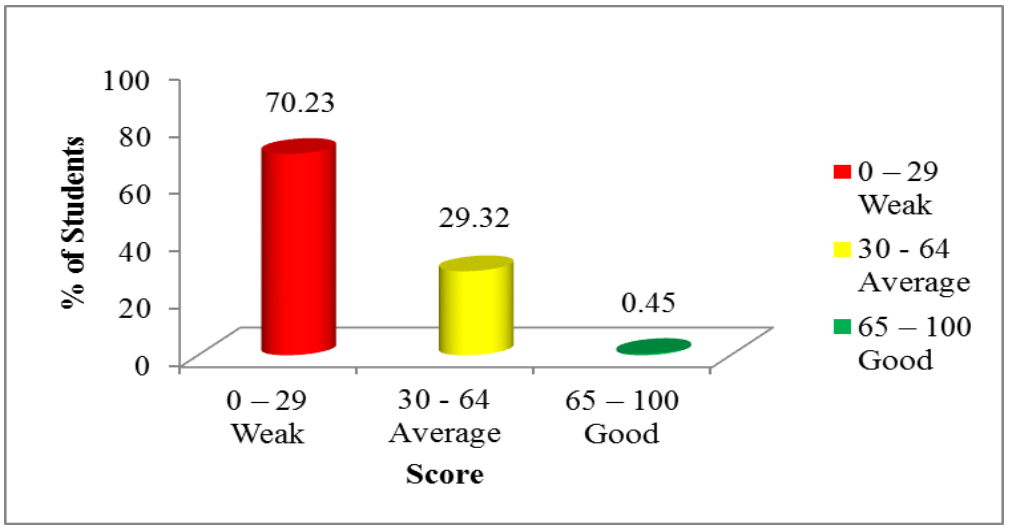


Figure 1: General Students' Performance in Civil Engineering

Relevant explanations on students' failures to attain the expected performance are given in each question. Sample answers extracted from the students' scripts have been attached to illustrate various aspects of students responses in the topics tested.

This report aims at providing feedback to the teachers, education stakeholders on the performance of the students for each question. The report presents the analysis of the students' performance by indicating the

task they were required to carry out in each question and how they responded.

2.0 ANALYSIS OF STUDENTS' ITEMS RESPONSE IN EACH QUESTION

2.1 SECTION A: VARIOUS TOPICS

2.1.1 Question 1: Multiple Choice Items

This question consisted of (5) five items (i) - (v) based on various topics within the syllabus. Each item carried 1 mark. Students in this question were required to demonstrate their skills in selecting the suitable type of foundation for a boundary and retaining wall, mentioning the correct member fixed diagonally across the standards for added rigidity of scaffolding erection, identify the correct process of terminating the walls at ends construction, selecting appropriate factors which affect the durability of timber and lastly to select the uses of information obtained during soil investigations.

A total of 655 candidates attempted this question and their general performance was good as 7.6% scored 0 out of the 5 marks allotted. Moreover, 5.5% of the students who attempted this question scored all the 5 marks and 86.9% got scores ranging from 1 to 4 marks.

The summary of students' scores for this question is presented in Table 2 and Figure 2.

Table 2: Trend of student's performance in question 1

Scores	Remarks	General Students Performance	
		Number	Percentage (%)
-	Omitted	-	-
0 – 1	Weak	165	25.20
2 - 3	Average	334	50.99
4– 5	Good	156	23.81
	Total	**655**	**100**

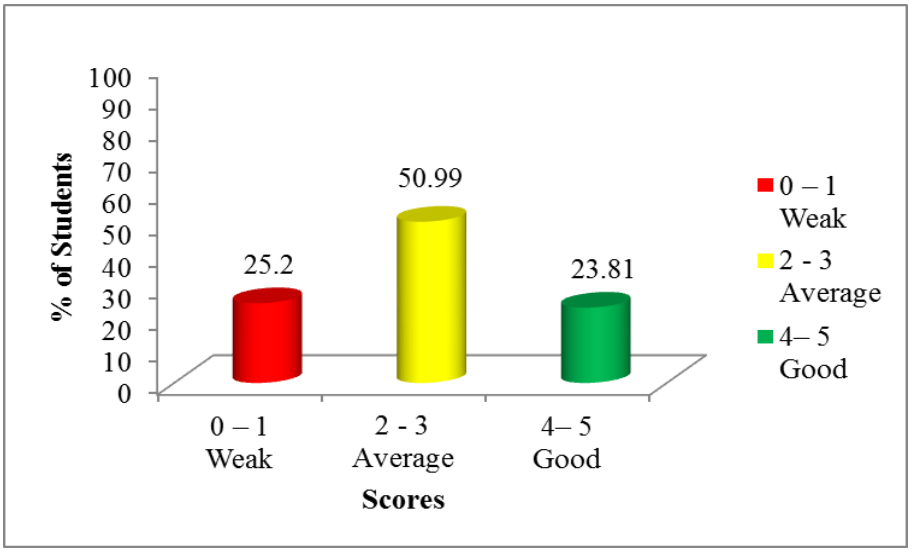


Figure 2: Trend of Student's Performance in Question 1

The students who managed to score good marks were able to answer correctly most of the questions by choosing the correct answers from the given alternatives of the multiple choice. This shows that they had good knowledge on foundations and walls, temporary structures such scaffolding, construction materials specifically timber and soil investigations. On the other hand, students who scored poorly had inadequate knowledge on some of the topics tested since they failed to choose the correct answer from among the given alternatives.

The majority of students responded poorly to the items (i), (ii) and (iii).

In item (i), the students were required to select the suitable type of foundation for boundary and retaining walls. The question read:

(i) The foundation which is suitable for boundary walls and retaining walls is known as:

A Pad foundation. B Strip foundation. C Raft foundation.
D Pile foundation. E Deep foundation.

The correct response was B 'Strip foundation.' The students who chose the correct answer 'Strip foundation' had enough knowledge on the selection of suitable type of foundation for boundary and retaining walls. The students who chose A 'Pad foundation' failed to understand that such a type of foundation is suitable for supporting a column load.

Those who selected C, ‘Raft foundation’ lacked enough knowledge on foundation selection, since such foundations are suitable for weak soils where the superstructure load is distributed evenly over the soil. The students who chose D, ‘Pile foundation’ did not understand that the type of foundation is suitable in waterlogged areas. Lastly, students who chose E, ‘Deep foundation’ did not understand that such type of foundation is usually suitable where hard bearing stratum is found.

In item (ii), the students were instructed to choose the appropriate member of scaffolding fixed diagonally across the standard. The question read as follows

(ii) A ledger fixed diagonally across the standard for added rigidity of scaffolding is known as

A reveal pin. *B standard.* *C joint pin.*
D brace. *E put log.*

The correct answer was D ‘brace’. The students who managed to get the correct answer had enough knowledge on scaffold erection since the members in scaffolding which are tied at an inclined angle/diagonally are braces. The students who chose A ‘reveal pin’ failed to understand that this is a component used to tie the tube member of scaffolding. Those who selected B, ‘standard’ did not understand that ‘standard’ is an upright member of the scaffold where brace is to be fixed. Thus it does not make sense when used in the sentence. The students who chose C, ‘joint pin’ did not understand that ‘joint pin’ is a component which is used to fix the tube member of scaffolding at the joint. Lastly, students who chose E, ‘put log’ did not understand that ‘put log’ is a member which is fixed at the right angle to the standards and it is supported by the wall.

In item (iii), the question tested student’s knowledge on setting successive brick/block work courses at the end of the wall in a stepped form. The question read:

(iii) The process of setting back each successive courses by 5cm of a wall is called

A toothing. *B kick back.* *C raking back.*
D cracks back. *E plastering back.*

The correct answer was C ‘raking back’. The students who chose A ‘toothing’ failed to meet the demand of the question due to their lack of knowledge, since ‘toothing’ is the process of indenting bricks alternately projecting at the end of a wall. The students who chose B, ‘kick back’ failed to realize that ‘kick back’ is a tendency of a piece of timber to be propelled back towards the operator at high rate of speed when he/she is trying to touch the circular saw. Those who selected D, ‘cracks back’ did not understand that ‘cracks back’ is a plausible distractor and those who chose E, ‘plastering back’ did not realize that ‘plastering back’ does not have any connection with the arrangement of brick/blocks in successive courses. Skilled students could easily eliminate the three distractors B, D and E because such ditractrors did not reflect the pattern of the question.

2.1.2 Question 2: Matching Items:

This question was derived from a topic on walls in building construction. The students were required to match the descriptions of arch terms mentioned in list A with specific names in list B by writing the letter of the correct response from list B beside a number form list A.

Question 2: Matching items Questions

List A	***List B***
(i) The underside surface of an arch *(ii) The portion of the wall which supports the arch* *(iii) The highest point of an arch* *(iv) The lower part of an arch which is half way to the crown* *(v) An imaginary line joining the two points in an arch*	*A Abutment* *B Soffit* *C Spring point* *D Crown* *E Haunch* *F Spring line* *G Span line*

The question was attempted by 655 students out of whom 21.8% scored 0. On the other hand 72.7% got scores that ranged from 1 to 4 marks and 5.5% scored all the 5 allotted marks. The general performance for

this question was good. The trend of student's performance in this question is summarized in Table 3.

Table 3: Trend of student's performance in question 2

Scores	Remarks	Students	
		Number	Percentage (%)
-	Omitted	-	-
0 – 1	Weak	301	49.95
2 - 3	Average	227	42.30
4– 5	Good	77	11.75
	Total	**655**	**100**

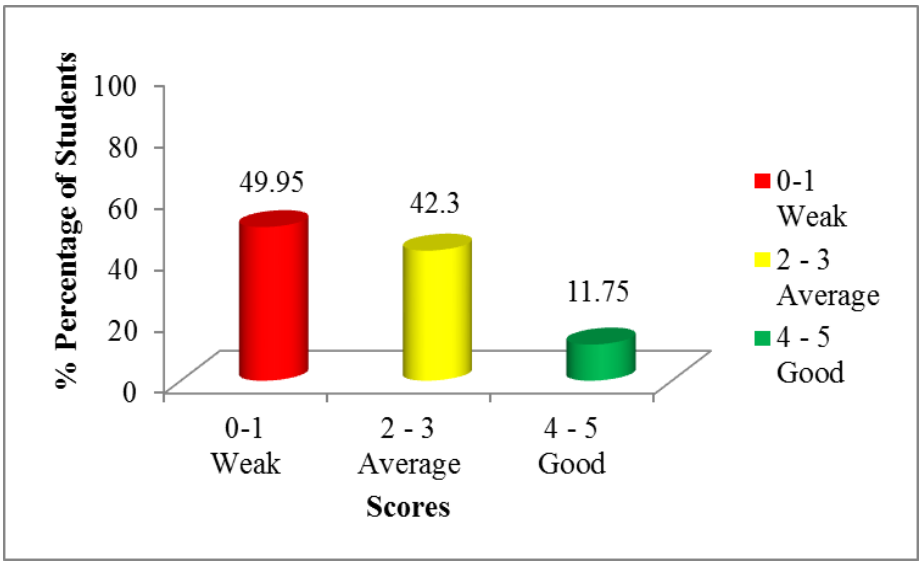


Figure 3: Trend of Student's Performance in Question 2

Majority of the students provided poor responses for items (i), (ii) and (v). Presented below is the analysis of students' responses for these items.

In item (i), the students were required to match the term which conforms with the underside surface of an arch. The correct response was B 'Soffit'. The students who chose the correct response 'Soffit' had good knowledge of the arch terminology. The students who chose D 'Crown' failed to understand that the term 'crown' refers to the highest point of an arch.

In item (ii), the students were required to match the term that defines the portion of the wall which supports the arch. The correct answer was A 'Abutment.' The students who chose response A 'Abutment' had good knowledge about arches. The students who matched it with E 'Haunch' failed to understand that a haunch is the lower part of an arch which is half way to the crown.

In item (v), the students were required to match the expression with the term that defines an imaginary line joining two points in an arch. The correct response was F 'Springing line.' The students who chose response F 'springing line' had good knowledge about arches. The students who matched with E 'Span line' failed to understand that this was a plausible distractor.

2.1.3 Question 3: True and False

This question required the students to write **TRUE** for the correct assertions and **FALSE** for the incorrect ones on the five statements set from the topic on walls. The question was attempted by 654 students which was equivalent to 99.75% of all the students who sat for this assessment out of whom 2% scored 0 and 1.4% scored all the 5 marks and 96.6% of the remaining ones got scores ranging from 1 to 4 out of 5 marks allotted.

Generally, the question was performed well as 84.30% of the students scored above average marks. Table 4 represents the performance of the students in this question.

Table 4: the trend of students' performance in Question 3

Score	Remarks	Students	
		Number	Percentage (%)
-	Omitted	1	0.15
0-1	Weak	103	15.71
2-3	Average	404	61.7
4-5	Good	147	22.44
Total		655	100

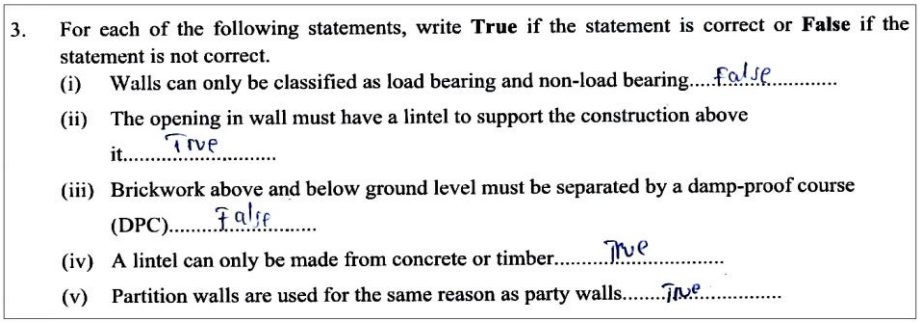
The question required the student to recall some important facts on the skills acquired on the construction of wall. Majority of the students remembered those facts but a few students were not able to recall

correctly the facts contained in all the statements. Item (ii) was the mostly poorly performed by majority of the students. The item asked;

(ii) The opening in a wall must have a lintel to support the construction above it.

Although most of the students agreed that, this statement is true, the fact is different. For example, the students failed to recall the function of an arch and a beam in the building construction. Moreover, they failed to realize that, together with its ornamental functions, an arch in wall construction supports the progressive activity above the wall. In summary, an opening in a wall requires more than a lintel. Extract 3.1 and 3.2 illustrate the poor and good responses respectively.

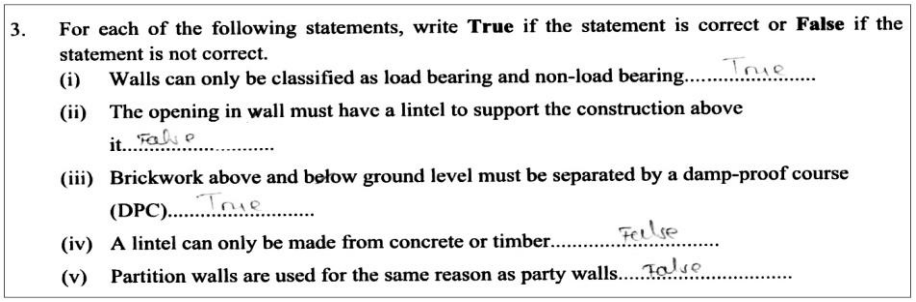
Extract 3.1



3. For each of the following statements, write **True** if the statement is correct or **False** if the statement is not correct.
   (i) Walls can only be classified as load bearing and non-load bearing.....False.....
   (ii) The opening in wall must have a lintel to support the construction above it.....True.....
   (iii) Brickwork above and below ground level must be separated by a damp-proof course (DPC).....False.....
   (iv) A lintel can only be made from concrete or timber.....True.....
   (v) Partition walls are used for the same reason as party walls.....True.....

Extract 3.1 A sample of response of a student who failed to answer any of the statement correctly and scored zero mark.

Extract 3.2



3. For each of the following statements, write **True** if the statement is correct or **False** if the statement is not correct.
   (i) Walls can only be classified as load bearing and non-load bearing.....True.....
   (ii) The opening in wall must have a lintel to support the construction above it.....False.....
   (iii) Brickwork above and below ground level must be separated by a damp-proof course (DPC).....True.....
   (iv) A lintel can only be made from concrete or timber.....False.....
   (v) Partition walls are used for the same reason as party walls.....False.....

Extract 3.2 A sample of the response provided by a student who was able to recall the facts of those statements and scored all the marks.

2.1.4 Question 4: Foundation

This question was based on the topic on foundation. Students were required to define (a) settlement and (b) to outline three causes of

settlement. The question was attempted by 653 students which was equivalent to 99.7% of all the students who sat for this assessment. Out of whom 575 scored 0, twenty seven (27) scored all the 5 marks and 53 got scores that ranged from 1- 4.5 marks. The majority of these students performed poorly in this question as summarized in Table 5 and Figure 4.

Table 5: The trend of students' performance in Question 4

Score	Remark	Students	
		Number	Percentage (%)
-	Omitted	2	0.30
0-1	Weak	589	89.9
2-3	Average	37	5.7
3.5-5	Good	27	4.10
Total		**655**	**100**

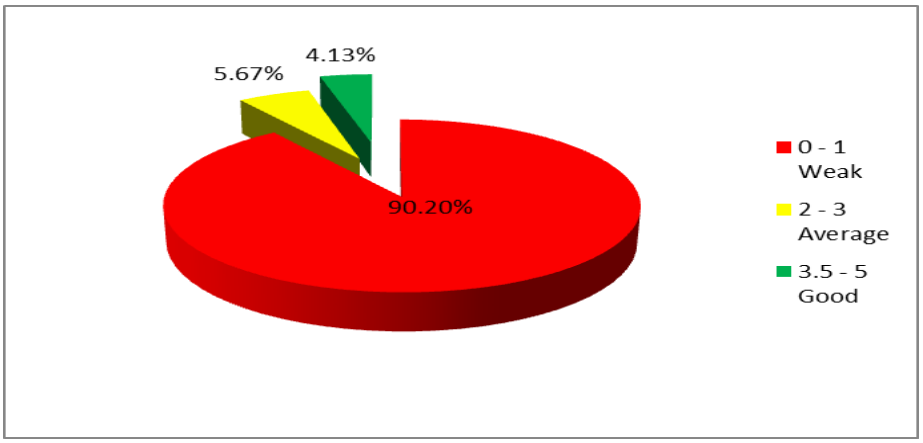
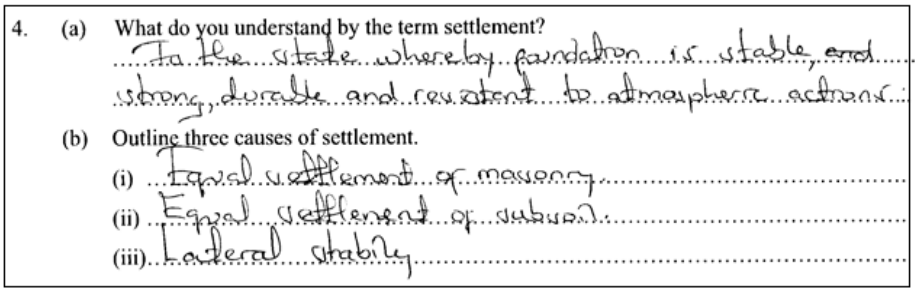


Figure 4: General Student's performance in question 4

Most of the students were not able to define the term 'settlement.' Also, they failed to outline causes of settlement. These failures indicate that they did not have enough knowledge on foundations. This analysis shows that some of the students gave explanations related to foundation but did not answer the questions asked. Instead, they tried to explain the purposes/functions of the foundations as illustrated in extract 4.1.

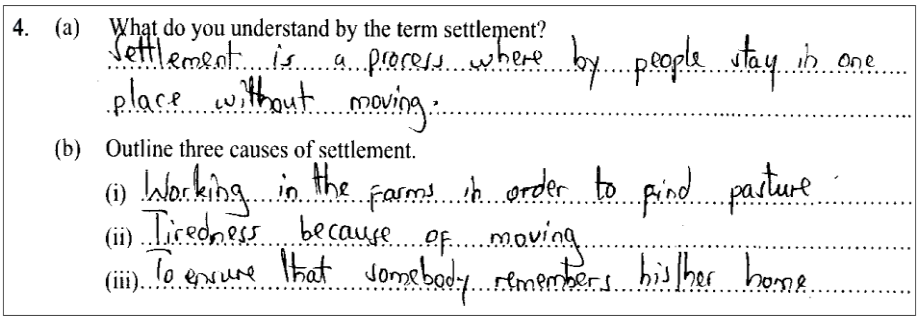
Extract 4.1


4. (a) What do you understand by the term settlement?
To the state whereby foundation is stable, and strong, durable and resistant to atmospheric actions
(b) Outline three causes of settlement.
(i) Equal settlement of masonry
(ii) Equal settlement of subsoil
(iii) Lateral stability

Extract 4.1 A sample of poor response given by the student who scored zero.

Further analysis of the students' responses shows that majority of the students related the term 'settlement' of foundation to normal shelter based on traditional list of immediate "basic needs" as illustrated by Maslow's hierarchy of needs under physiological needs. The students explained the need for people to have a place where they live as illustrated in extract 4.2.

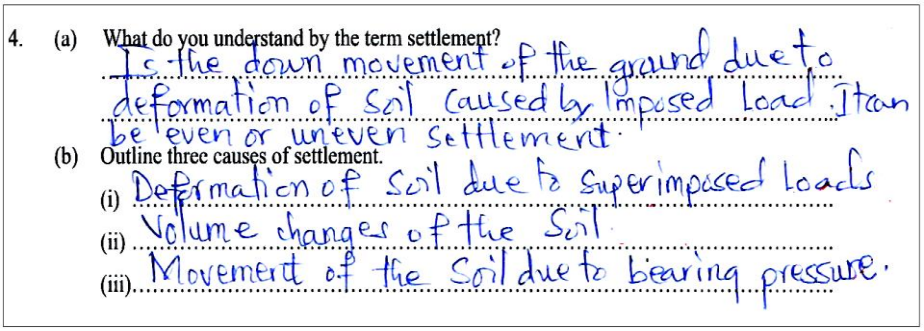
Extract 4.2


4. (a) What do you understand by the term settlement?
Settlement is a process where by people stay in one place without moving.
(b) Outline three causes of settlement.
(i) Working in the farms in order to find pasture
(ii) Tiredness because of moving
(iii) To ensure that somebody remembers his/her home

Extract 4.2 A sample of a poor response by the student who scored zero after writing Maslow's hierarchy of needs in physiological needs.

However, there were a few students who gave correct responses by defining the term 'settlement' as well as outlining the causes of settlement. Extract 4.3 provides a sample of a script of a student who was able to define 'settlement' and outline causes of settlement.

Extract 4.3


4. (a) What do you understand by the term settlement?
It is the down movement of the ground due to deformation of soil caused by imposed load. It can be even or uneven settlement.
(b) Outline three causes of settlement.
(i) Deformation of soil due to superimposed loads
(ii) Volume changes of the soil
(iii) Movement of the soil due to bearing pressure.

Extract 4.3 A sample of good response by a student who defined settlement and outlined its causes.

2.1.5 Question 5: Construction Material

The question required the students to name five factors on which transportation of fresh concrete depends.

The question was attempted by 652 students, of whom 82.7% scored 0. On the other hand, 16.5% got scores ranging from 1 to 4 marks and 0.3% scored all the 5 given marks. The general performance in this question was poor as indicated in Table 6 and Figure 5.

Table: 6 The trend of student performance in question 5

Scores	Remarks	General Students Performance	
		Number	Percentage (%)
-	Omitted	3	0.46
0 – 1	Weak	584	89.2
2 - 3	Average	58	8.9
4– 5	Good	13	1.8
	Total	**655**	**100**

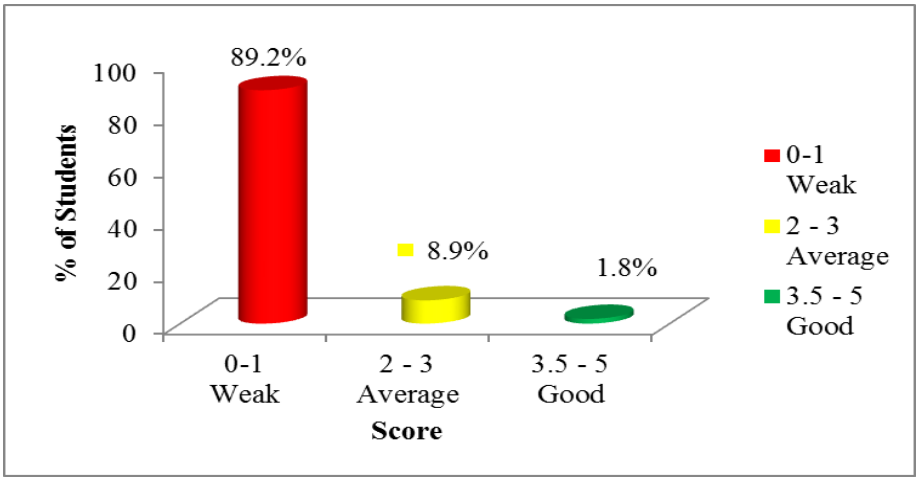


Figure 5: Trend of Student's Performance in Question 5

There was poor performance in this question since 82.7% of the students scored 0. Most of the students failed to name five factors required to transport fresh concrete. Some of them named types of materials used to prepare concrete instead of factors which were required in the questions. Others named types of foundation where concrete is used as base concrete.

There are a number of factors which are assumed to have contributed to the mass failure for this question. These factors include lack of practical skills, poor understanding of the subject matter and wrong interpretation of the question. Extract 5.1 provides a sample script for a poor response presented by the student who wrote construction materials instead of factors required to transport fresh concrete.

Extract 5.1

5. Name five factors that transportation of fresh concrete depends.

(i) Timber

(ii) Gonorte

(iii) Pipes

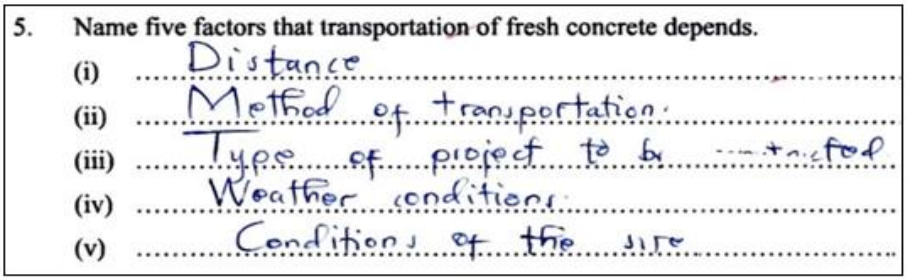
(iv) metals

(v) Bricks or bricks

Extract 5.1 A sample response presented by the student who wrote construction materials instead of factors required to transport fresh concrete.

Despite these poor responses, there were a few students who managed to mention the factors required to transport the fresh concrete. Extract 5.2 illustrates a sample of such responses.

Extract 5.2


5. Name five factors that transportation of fresh concrete depends.
(i) Distance
(ii) Method of transportation.
(iii) Type of project to be ...
(iv) Weather conditions.
(v) Conditions of the site

Extract 5.2 A sample script of the best response presented by the student.

2.1.6 Question 6: Walls

This question had two parts (a) and (b). Students were required in part (a) to define 'composite walling' and in part (b) to name three factors to be considered and kept in mind when building the corner of the wall.

The question was attempted by 653 students, out of whom 87.5% scored 0. 12.1% had scores that ranged from 1 to 4 marks and 0.1% scored all the 5 allotted marks. The general performance for this question was poor as indicated in Table 7 and Figure 6.

Table 7: Trend of student performance in question 6

Scores	Remarks	General Students Performance	
		Number	Percentage (%)
-	Omitted	2	0.30
0 – 1	Weak	621	94.88
2 - 3	Average	29	4.42
4– 5	Good	05	0.76
	Total	**655**	**100**

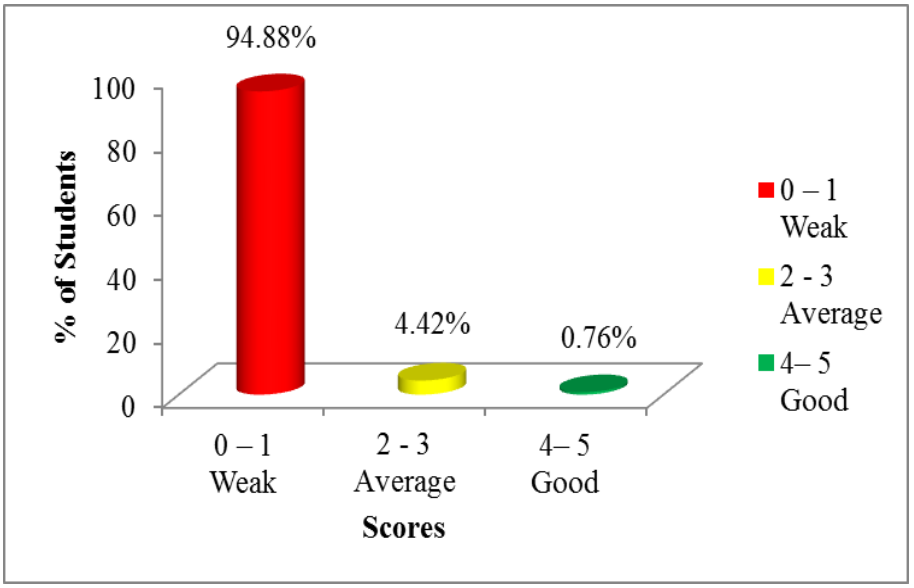
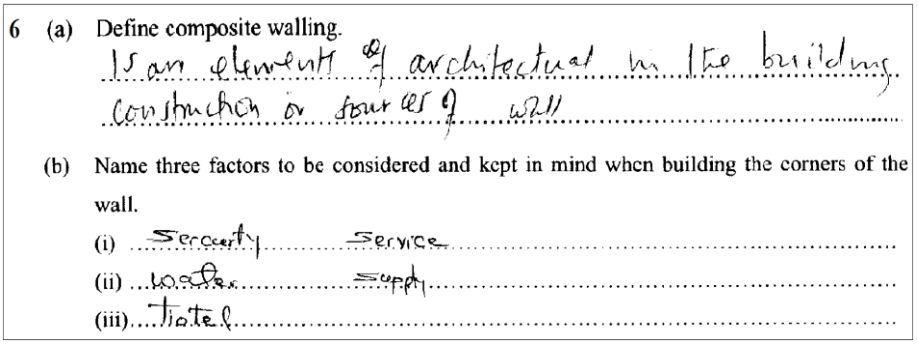


Figure 6: Trend of Student's Performance in Question 6

Most of the students in part (a) failed to define 'composite wall.' The students were supposed to show that "composite walling is a system of walling whereby the total thickness of the wall is made by using a combination of two different materials: For example, the inner side is built by stones and the outer side is built by facing bricks." Some of the students seemed to have not understood the question as they defined this wall as foundation and others defined it as a building material. In part (b), some of the students failed to understand the demand of the question. Hence, instead of naming factors to be considered and kept in mind when building the corner of the wall, they mentioned tools and materials used in construction works.

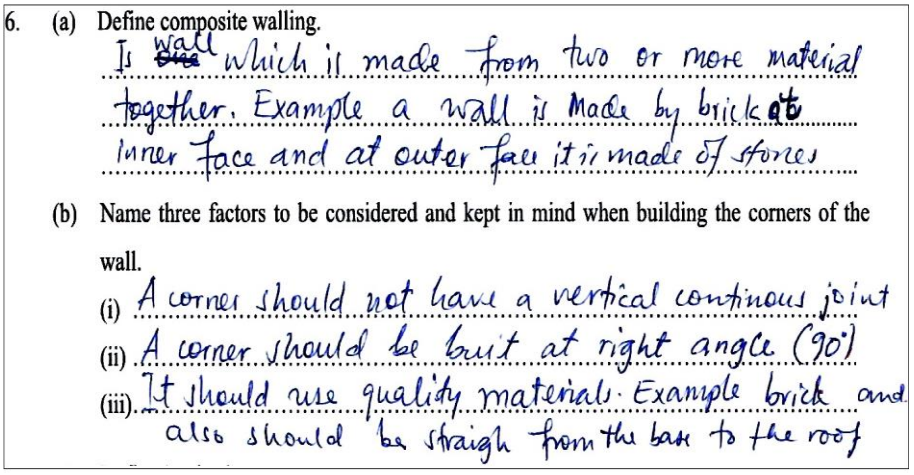
The performance for this question was poor because only 0.2% of the students could provide correct responses for this question. These candidates had basic knowledge on building materials and wall construction. Extracts 6.1 and 6.2 provide sample scripts of poor and good responses respectively.

Extract 6.1


6 (a) Define composite walling.
Is an element of architectural in the buildings construction or part of wall
(b) Name three factors to be considered and kept in mind when building the corners of the wall.
(i) Security Service
(ii) water supply
(iii) Tiotel

Extract 6.1 The response of the student who failed to write relevant materials in all parts of the question.

Extract 6.2


6. (a) Define composite walling.
Is ~~wall~~ which is made from two or more material together. Example a wall is made by brick at inner face and at outer face it is made of stones
(b) Name three factors to be considered and kept in mind when building the corners of the wall.
(i) A corner should not have a vertical continous joint
(ii) A corner should be built at right angle (90°)
(iii) It should use quality materials. Example brick and also should be straigh from the ban to the roof

Extract 6.2 A sample of good response from a student who was able to provide relevant materials in all parts.

2.1.7 Question 7: Arches

This question comprised parts (a) and (b). The students were required in part (a) to define 'Arches' and in part (b) to mention three geometrical forms of arches.

The question was attempted by 653 students, of whom 82.3% scored 0. Additionally, 16% got scores that ranged from 0.5 to 4.5 marks and 1.4% scored all the 5 marks. The general performance in this question was poor as indicated in Table 8 and Figure 7.

Table: 8 - The trend of student performance in question 7

Scores	Remarks	General Students Performance	
		Number	Percentage (%)
-	Omitted	2	0.30
0.5 – 1	Weak	569	86.57
2 - 3	Average	52	7.93
4.5 – 5	Good	34	5.19
	Total	**655**	**100**

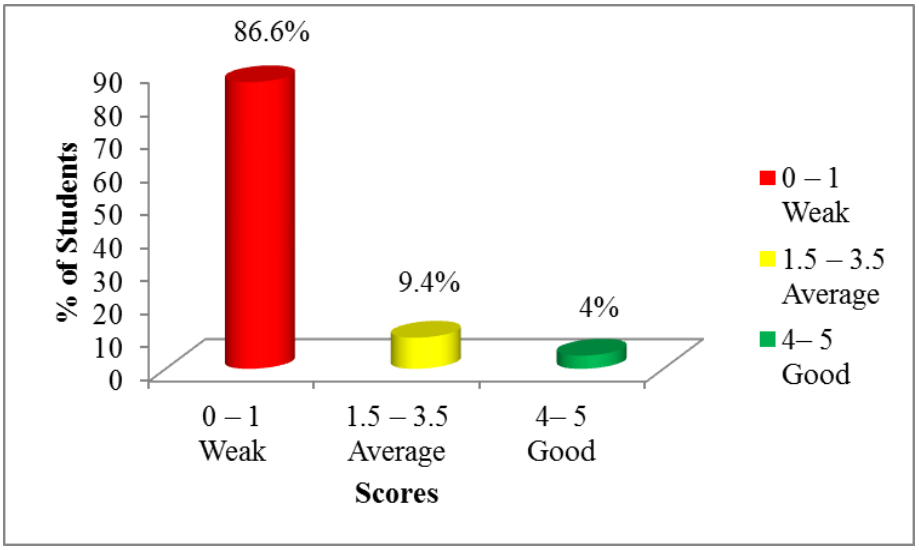
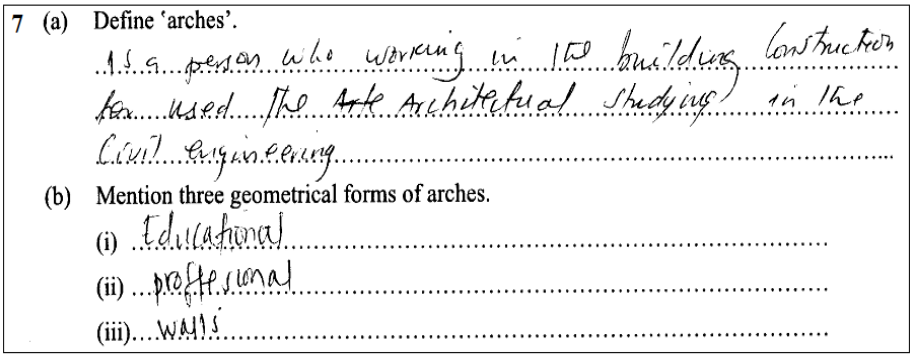


Figure 7: General Students Performance in Question 7

Most of the students in part (a) failed to define 'arches'. The students were supposed to say that, arches are an arrangement of wedge-shape blocks mutually supporting each other over an opening and designed to carry the wall and the load above. Some of the students seemed to have not mastered the knowledge of arches as they defined 'arches' as a person who does the work of building project and others defined it as an angle, a temporary structure which supports the portion of the wall, a kind of drawing that is used to draw building plans. In part (b) some of the students failed to mention the three geometrical forms of arches. Instead, they mentioned parts of arches, materials forming arches and others gave education and professional qualification of architects, since they failed to differentiate between arches and architects.

The analysis shows that the students' performance for this question was poor because only 4% of the students scored good marks. Extract 7.1 illustrates a sampled script of a poor response provided by the student.

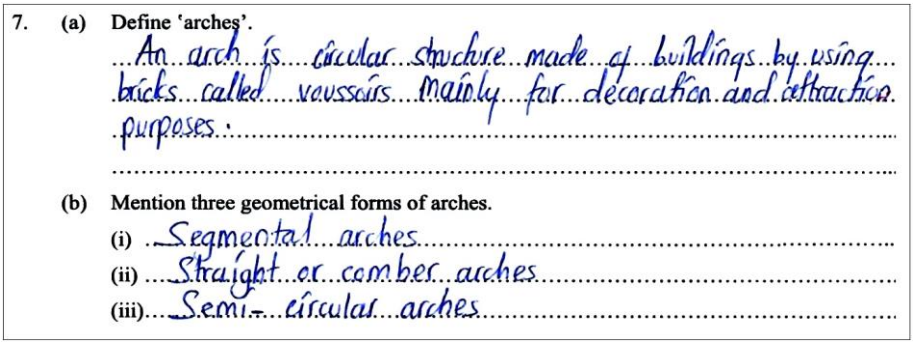
Extracts 7.1


7 (a) Define 'arches'.
It's a person who working in the building construction has used the ~~Arte~~ Architectural studying in the Civil engineering
(b) Mention three geometrical forms of arches.
(i) Educational
(ii) professional
(iii) wwis

Extract 7.1 A sample of a poor response for this question.

However, there are few students who had enough knowledge on arches and were able to explain clearly the meaning of arches and mentioned the three geometrical forms of arches as illustrated by extract 7.2.

Extracts 7:2


7. (a) Define 'arches'.
An arch is circular structure made of buildings by using bricks called voussoirs mainly for decoration and attraction purposes.
(b) Mention three geometrical forms of arches.
(i) Segmental arches
(ii) Straight or comber arches
(iii) Semi-circular arches

Extracts 7.2 A sample script of a good response given by the student.

2.1.8 Question 8: Scaffolding

This question was set from the topic on scaffolding. The students were required to differentiate between single coupler and double coupler scaffolding.

This question was attempted by 655 students. Out of them, 92.7% scored 0. 3.8% got scores ranging 0.5 to 4.5 marks and 2.9 % scored all the 5 allocated marks and 0.6% did not attempt this question. The general performance in this question was poor. Table 9 and Figure 9 illustrate the students' scores.

Table 9: The trend of student performance in question 8

Scores	Remarks	General Students Performance	
		Number	Percentage (%)
0.5 – 1	Weak	613	93.6
1.5 - 3	Average	13	1.90
4 – 5	Good	29	4.5
	Total	**655**	**100**

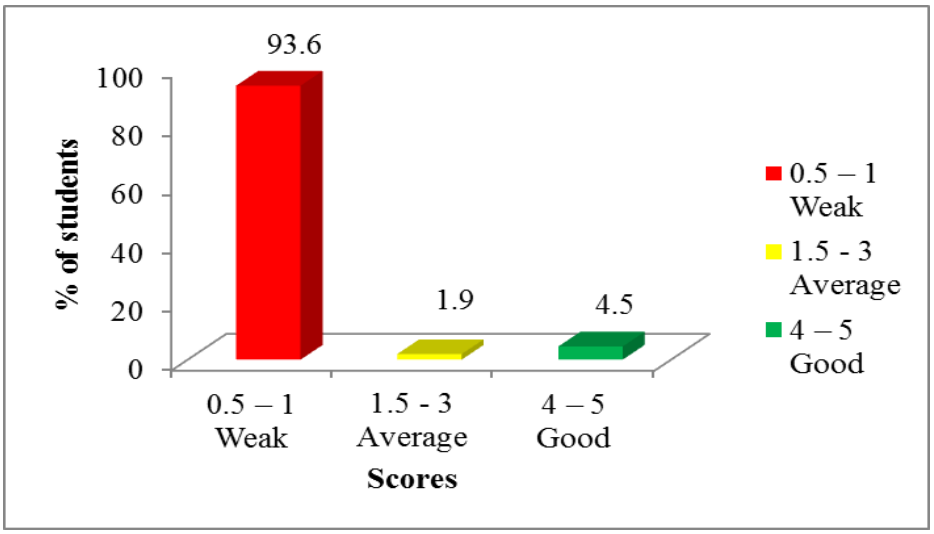
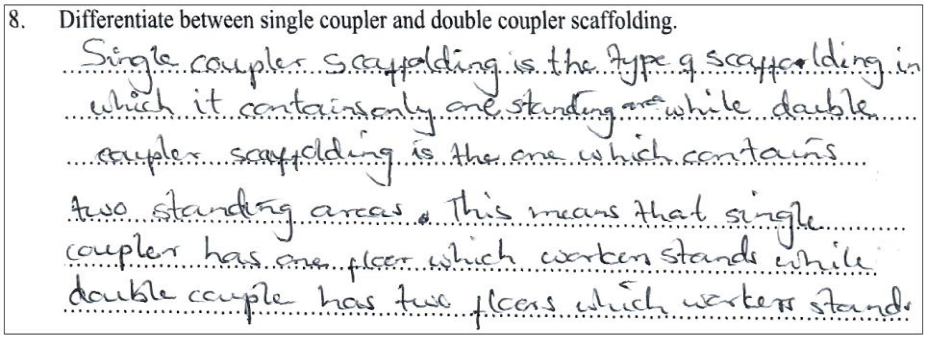


Figure 8: General Students Performance in Question 8

The analysis shows that the students' performance for this question was poor because only 4.5% scored good marks. This was indicative that these students had the basic knowledge of scaffolding. On the other hand, poor performance of students in this question could be attributed to lack of knowledge in steel scaffolding because of that, they wrote irrelevant information. Extract 8.1, illustrates a sampled script of a student whose responses involved irrelevant information related to single coupler and double coupler scaffolding.

Extracts 8.1

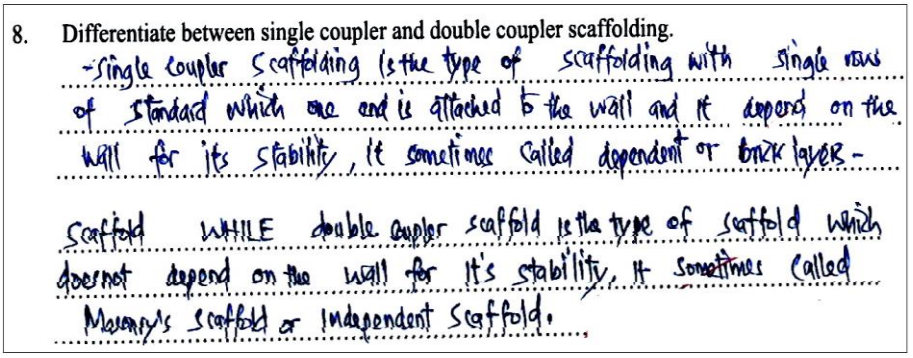

8. Differentiate between single coupler and double coupler scaffolding.

Single coupler scaffolding is the type of scaffolding in which it contains only one standing are while double coupler scaffolding is the one which contains two standing areas. This means that single coupler has one floor which workers stands while double couple has two floors which workers stands.

Extract 8.1 A sample of the students' responses for a student who wrote irrelevant information in this question.

Despite the aforementioned weakness, a few students managed to score high marks in this area of specialization. They successfully differentiated single coupler and double coupler scaffolding. They also showed adequate knowledge on types of scaffolding. Extract 8.2 illustrates the sampled script of a response of a student who was able to give the difference between single coupler and double coupler scaffolding.

Extracts 8.2


8. Differentiate between single coupler and double coupler scaffolding.

-Single coupler Scaffolding is the type of scaffolding with single row of standard which one end is attached to the wall and it depend on the wall for its stability, it sometimes called dependent or brick layer-Scaffold WHILE double coupler scaffold is the type of scaffold which doesnot depend on the wall for it's stability, it sometimes called Mason's scaffold or Independent Scaffold.

Extract 8.2 A sample of a response for the student who was able to differentiate single coupler from double coupler scaffolding.

2.2 SECTION B: AREA OF SPECIALIZATION

2.2.1 Question 9: Surveying

This question was attempted by students specializing in surveying. The topics covered in this question included *introduction, surveying instruments, chain surveying, chain and compass traversing*. The question was divided into five parts, (a), (b), (c), (d) and (e), which required the students to show their ability to use basic surveying tools, instruments and demonstrate their knowledge on the application on surveying principles. The question read as follows:

9 (a) (i) What are the two basic principles of surveying?

(ii) Mention two classification of surveying based on the following:

- Accuracy desired
- Instrument used
- Purpose of survey
- Place of survey.

(b) Explain the four requirements of good field notes.

(c) Describe the use of the following tools: (i) plumb bob (ii) line ranger (iii) pages (iv) ranging poles (v) arrows and (vi) plasterers laths.

(d) (i) Calculate the number of links 20cm in the length for a 30m metric chain

(ii) Differentiate between back sights from foresight

(iii) Define closed transverse and open transverse.

(e) (i) Give four reasons for natural errors.

(ii) Outline the four principal methods of traversing

(iii) What are the two principal methods of plotting a traverse survey?

This question was attempted by 28 students who specialized in this area. Out of them 5 students (17.86%) scored 0. On the other hand, 17 students (60.71%) who attempted this question got scores that ranged from 1 to 17.5 marks while the remaining 6 students (21.43%) got scores ranging from 18 to 38.5 marks. No one scored above average marks. The overall performance, therefore, was poor. Table 10 and Figure 9 illustrate the students' scores.

Table: 10- The trend of student's performance in question 9

Scores	Remarks	General Students Performance	
		Number	Percentage (%)
0 – 17.5	Weak	22	78.57
18 – 38.5	Average	06	21.43
39 – 60	Good	00	0.00
	Total	**655**	**100**

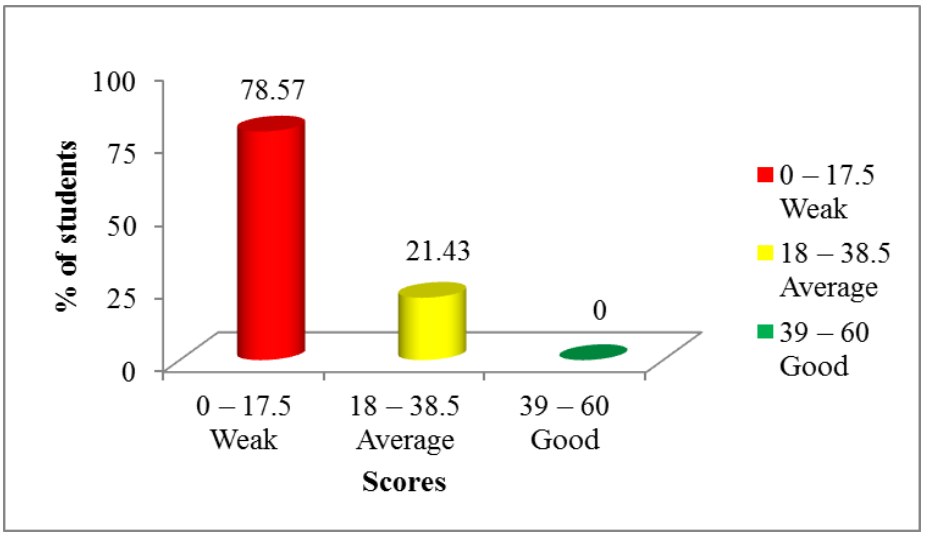


Figure 9: General student's performance in question 9

The analysis of the students' performance indicates poor performance in this question as only 21.43% of the students who attempted this question provided correct responses in parts a (i), and (ii), b, c and e. This means that such students had good knowledge on the basic principles of surveying. Extract 9.1 provides a sample of a good response from the students' answer sheet.

Extract 9.1

9. (a) (i) What are the two basic principles of surveying?

- To work from the whole to the part
- To locate a new station by at least two measurement (linear and angular) from fixed reference point

(ii) Mention two classification of survey based on the following:

- Accuracy desired
  - Plane survey
  - Geodetic survey
- Instrument used
  - Chain survey
  - Compass survey
- Purpose of survey
  - Mining survey
  - Archaelogical survey
- Place of survey
  - Aerial survey
  - land survey

(b) Explain four requirements of good field notes.

(i) Legible, should be clear and can read easily

(ii) good Field notes should include short and important information

(iii) good Field notes should be written briefly and understandable

(iv) good field notes should be written in a good arrangement of process and by good handwriting

(c) Describe the use of the following tools:

(i) Plumb bob

Are tools which are Fixed on the ground shows boundary of an area which should not be used for some time while doing survey activities in that area

(ii) Line ranger

used to measure direct measurement by establishing intermediate point in a straight line between two end points

(iii) Pages

Instrument plotted on the ground in which chain or other measuring instruments pass through them to measure distance or sometimes are plotted to mark point of measurement

(iv) Ranging poles

Are sharp poles of ranging rod that help ranging rod to fixed on the ground

(v) Arrows

Are Fixed on the ground to mark a point or station during survey work

(vi) Plasterers laths

used to bind or join broken equipment during survey work

d) (i) Calculate the number of links 20cm in the length for a 30m metric chain.

$$\text{number of link (bays)} = \frac{\text{Chain length}}{\text{distance each measured point}}$$

$$= \frac{30\text{ m}}{0.2\text{ m} \to 20\text{ (m)}}$$

$$= 150$$

∴ Number of link 20cm in 30m chain is 150

(ii) Differentiate between back sights from foresight.

Back sight is the sight of thing at the back side

while

Foresight is the sight of things at the fore or foward side

(iii) Define the following:

Closed traverse

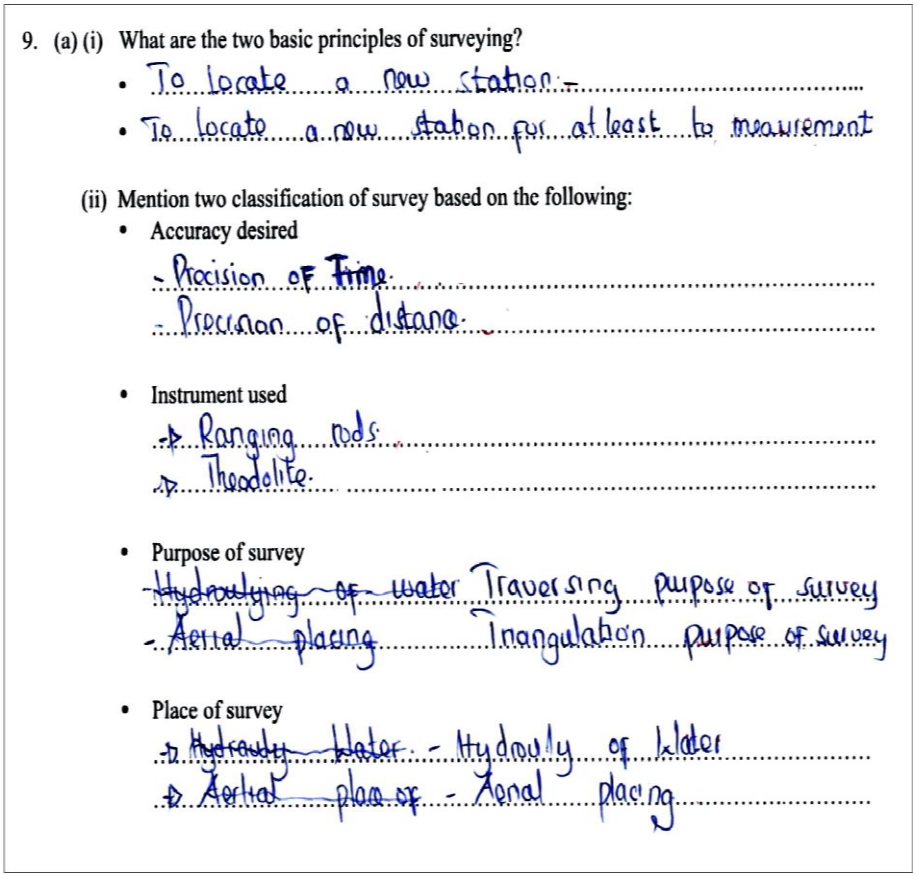
is the type of traversing in which series of survey lins of known length and direction are connected and form closed circuit

Extract 9.1 A sample of a student's script with a good response on some areas of the question.

However, 78.57% of the students failed to provide correct answers in some parts of the question. Instead, they provided irrelevant answers which could not conform to the demand of the question. Others misinterpreted the requirement of the question and hence they did not

score good marks. Their poor response indicated that they lacked knowledge on the basic surveying tools, instruments and surveying principles. Extract 9.2 provides the sample of a script for the student who produced a poor response for the whole question.

Extract 9.2



9. (a) (i) What are the two basic principles of surveying?

- To locate a new station -
- To locate a new station for at least to measurement

(ii) Mention two classification of survey based on the following:

- Accuracy desired
  - Pracision of Time.
  - Precision of distance.
- Instrument used
  - Ranging rods.
  - Theodolite.
- Purpose of survey
  - Hydraulying of water Traversing purpose of survey
  - Aerial placing Triangulation purpose of survey
- Place of survey
  - Hydraulic water - Hydrouly of water
  - Aerial place of - Aerial placing

(b) Explain four requirements of good field notes.

(i) Legible

(ii) Comprehensive

(iii) Concise

(iv) Performed in good plan lettering and etc.

(c) Describe the use of the following tools:

(i) Plumb bob

⇒ Used for to support all bad liquid and stay at the damp

(ii) Line ranger

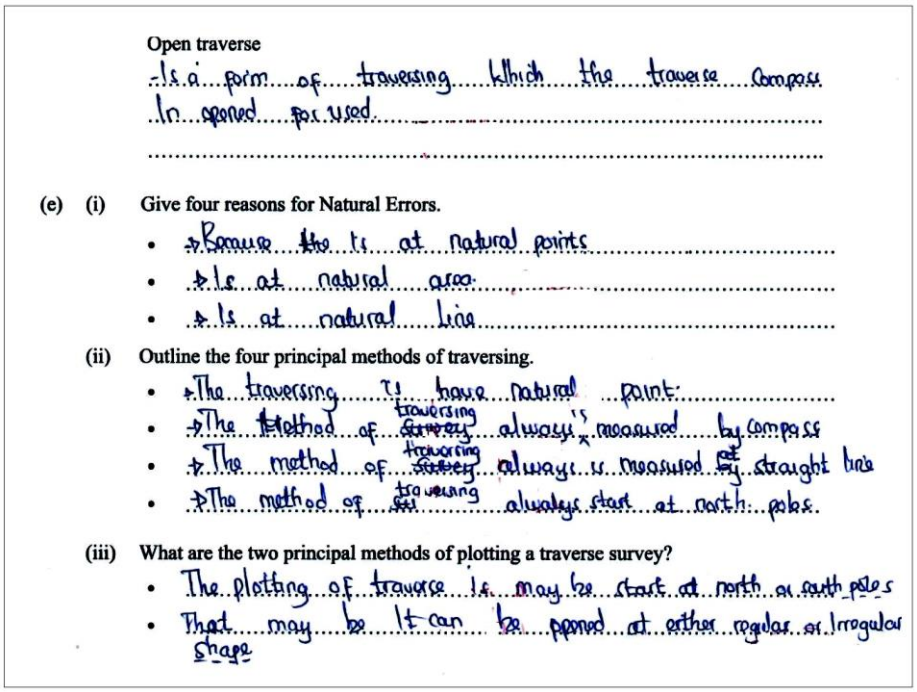
⇒ Is a ranger that used at to rang the line in straight

(iii) Pages

⇒ Is used to take the report and to work for safe at either file or book

(iv) Ranging poles

⇒ Is the ranging used at shows either the straight line and to locate a stations



Open traverse

- Is a form of traversing which the traverse compass is opened for used

(e) (i) Give four reasons for Natural Errors.

- Because the is at natural points
- Is at natural area
- Is at natural line

(ii) Outline the four principal methods of traversing.

- The traversing is have natural point
- The method of traversing always is measured by compass
- The method of traversing always is measured by straight line
- The method of traversing always start at north poles

(iii) What are the two principal methods of plotting a traverse survey?

- The plotting of traverse is may be start at north or south poles
- That may be it can be opened at either regular or Irregular shape

Extract 9.2 sample of script of a student who produced a poor response on some areas of the question.

2.2.2 Question 10: Carpentry and Joinery

This question was attempted by 86 students who specialized in Carpentry and Joinery. The topics covered in this question included *tools, equipment and machines, timber and joints.* The question was divided into five parts (a), (b), (c), (d) and (e), which required the students to demonstrate their knowledge in using relevant tools, equipment and plants/machinery to produce different components of wood structure. The question read as follows:

10 (a) Briefly describe the following various types of joints which are used in wood work.

(i) Lengthening joint
(ii) Widening joints
(iii) framing joints
(iv) angle or corner joints

(b) Define the following terms as used in carpentry and joinery.

(i) Sawing (ii) Planning (iii) Rebating
(iv) Nosing (v) Batten (vi) Housing

(c) (i) What is timber?
(ii) Mention five uses of timber
(iii) What are the factors which determine the quality of timber?

(d) (i) Classify a timber as used in engineering works.
(ii) Define the term 'conversion' as used in the timber.
(iii) Categorize the methods of timber conversion.
(iv) What are the defects of timber?
(v) Enumerate two common categories of timber defects

(e) (i) Demonstrate three uses of jig saw or scroll saw.
(ii) Identify the common works performed by the following processes;
- Three main processes involved in the manufacture of joinery work
- Four common saw milling processes.

The question was attempted by 84 (100%) students who specialized in this area. A total of 7 (8.3%) students scored 0. Moreover, 69.10% of the students scored below average while the remaining 22.60% of the students scored average marks. There was no student who scored above average. That shows that the general performance for this question was poor. Table 11 and Figure 10 illustrate the students' performance in this question.

Table 11: The trend of students' performance in question 10

Score	Remark	Students	
		Number	Percentage (%)
0-17.5	Weak	65	77.40
18-38.5	Average	19	22.60
39-60	Good	0	0.00
Total		**84**	**100**

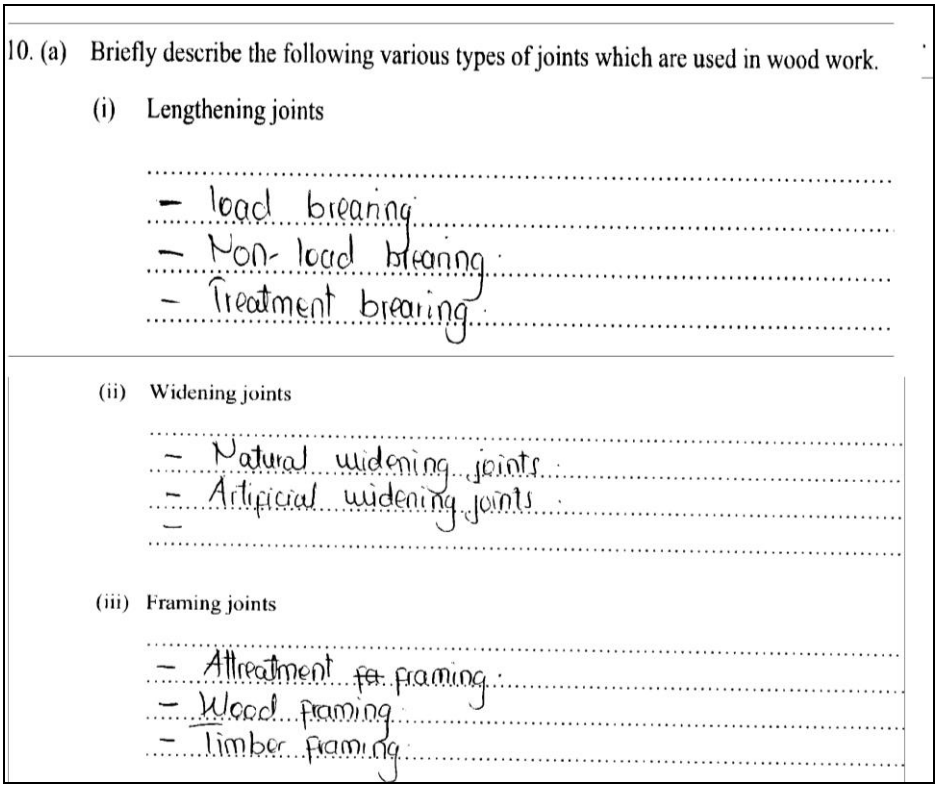
Figure 11: General students' performance in question 10

Poor performance in this question indicates that majority of the students lacked knowledge in their field of specialization especially in the questions that needed them to demonstrate practical skills. Students

who scored poorly failed all parts of the question. It seems more emphasis should be given a practical part so as to enable the students to acquire the practical skills needed if that is done, those students will be able to understand the subject matter and answer the questions properly. However, some of the students who attempted this question wrote relevant responses in some parts but failed in other parts.

Extract 10.1 provides a sample of responses given by a student who failed this question completely and extract 10.2 presents a sample response for a student who produced relevant answers for some parts of this question.

Extract 10.1


10. (a) Briefly describe the following various types of joints which are used in wood work.

(i) Lengthening joints

- load breaning
- Non- load bleaning
- Treatment brearing

(ii) Widening joints

- Natural widening joints
- Artificial widening joints

(iii) Framing joints

- Attreatment ~~fa~~ framing
- Wood framing
- timber framing

(iv) Angle or corner joints

- First Plan corner joints
- Second Plan corner joints
- Third Plan corner joints

(b) Define the following terms as used in carpentry and joinery.

(i) Sawing

Sawing is the types of timbering to produce the timber conversion

(ii) Planning

Planning is the types of timbe to help know our the ~~car~~ carpentry and joinery

(iii) Rebating

(iv) Nosing

Is the types of timber conected atreatment of the timber

(v) Batten

Is the wood where by using the timber, Paper back, blark and pith:

(vi) Housing

Are made up of the timber in which the atre atment

(c) (i) What is a timber?

Timber is a wood that collection treatment of the boark, blark, paper, sleeping:

(ii) Mention five uses of timber:

- Back
- Blak
- Root
- Annual
- Pith

(iii) What are the factors which determine the quality of timber:

factors which determine the quality of the timber are the timber are produce a timber ward to conected the collection atreatment on the housing:

(d) (i) Classify a timber as used in engineering works.

Timber as used in engineering works is used to loa d beaing and non- load bearing in the building.

(ii) Define the term `conversion´as used in the timber.

Conversion as used in the timber is the wood that to collection the attreatment of an manufacture of joinery work.

(iii) Categories the methods used for timber conversion.

(iv) What are the defects of timber?

Defects of timber is the wood by using a manufactu re board of the conversion.

(v) Enumerate two common categories of timber defects.

- Soft wood timber
- Hard wood timber

(e) (i) Demonstrate three uses of Jig saw or scroll saw.

- Help to produce the timber
- Help to collection of paper
- Help to conversion of wood

(ii) Identify the common works performed by the following processes:

- Three main processes involved in the manufacture of joinery work.
  - Manufacturing body
  - Manufacturing wood timber

Extract 10.1 sample of script of a student who produced a poor response in some areas of the question.

Extract 10.2

10. (a) Briefly describe the following various types of joints which are used in wood work.

(i) Lengthening joints

Is the classification of joint used to increases the length of timber using the special method like end butt joint, Splayed joint, Halflapped joint and Laminated joint

(ii) Widening joints

Is the classfication of ~~timbe~~ joint in which the timber are joined to increases the width of timber by using either Rebate joint, edge butt joint, Tongue and groove joint and Loose tongue joint.

(iii) Framing joints

Is the class of joint in which ~~in which~~ two or more timber are joined in order to make junction of timber to change the direction. ~~or angle~~ example briddle joint

(iv) Angle or corner joints

Is the class of joint in which two or more timber are joined to make junction or angle in order to change the direction of timber.

(b) Define the following terms as used in carpentry and joinery.

(i) Sawing

Is the process of ~~Smoothing~~ cutting timber by using the saw.

(ii) Planning

Is the process of smoothing the timber by using plane.

(iii) Rebating

Is the process of parting the timber using chisel or gauges in order to make the trench.

Extract 10.1 sample of script of a student who produced a good response on some areas of the question.

2.2.3 Question 11: Brickwork and Masonry

This question was set based on the brickwork and masonry subject. Specifically, the question came from the *brick and block making*, *mortar*, *bonding and concrete* topics. The question was divided into five parts (a), (b), (c), (d) and (e), which required students to

demonstrate their knowledge on the basic principles and skills of building a house. The question read as follows:

11. (a) Explain the four types of mortar which are used in brick masonry.

(b) Differentiate between the following:

(i)	Stretcher	Header
(ii)	King closer	Queen closer
(iii)	Stretcher course	Header course
(iv)	Stretcher bond	Header bond
(v)	Face	Facing
(vi)	Racking back	Tooting

(c) (i) Mention two common types of concrete.
(ii) Explain the two common methods of mixing concrete.

(d) (i) Mention three constituents of a good bricks earth with its percentages.
(ii) Why brick masonry sometimes preferred over other types of masonry? Give four reasons.

(e) (i) Explain the following phases as applied in the concrete technology.
- First phase (initial set)
- Second phase (final set)
- Third phase

(ii) Briefly explain the four common ingredient of cement concrete.

This question was attempted by 419 students who specialized in this area. Out of those, 111 students (26.5%) scored 0. Moreover, 131 students (31.3%) got scores that ranged from 1 to 17.5 marks, 134 students (32 %) had scores that ranged from 18 to 38.5 marks and 43 students (10.2 %) %) got scores that ranged from 39 to 60 marks. The overall performance was, therefore, moderate. Table 12 and Figure 11 analyse the performance of the students for this question.

Table 12: The trend of student's performance in question 11

Scores	Remarks	General Students Performance	
		Number	Percentage (%)
0 – 17.5	Weak	242	57.8
18 – 38.5	Average	134	32
39 – 60	Good	43	10.02
	Total	**419**	**100**

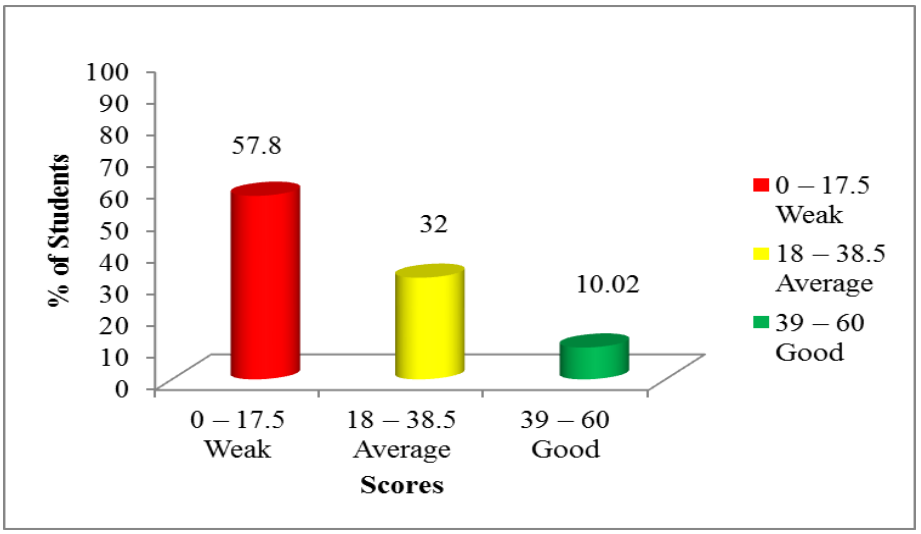


Figure 10: General student's performance in question 11

The analysis of the students' performance in this area of specialization shows that the question was moderately performed since 42.2 percent of the students were able to explain the four types of mortar, differentiate various brickwork terminologies, to mention two common types of concrete and to explain the two common methods of mixing concrete. This means that such students had good knowledge on the basic principles and skills of building a house. Extract 11.1 provides a sample of the best response from one of the students' scripts.

Extract 11.1

11. (a) Explain the four types of mortar which are used in brick masonry.

- Lime mortar: It is type of mortar formed when mixing lime and sand and addition of small amount of water to facilitates it. It is fat lime is 1:2 to 1:4. It used as bonding material.
- Cement mortar: It is types of mortar formed when mixing sand and cement and addition of small amount of water to facilitate mixture. It is ratio is 1:2 to 1:8. It is as binding of material.
- Gauged mortar: It is types of mortar formed when mixing lime and cement and addition of water to facilitate the mixture. It is ratio is 1:1:8.
- Clay mortar: It is a kind of mortar used for binding brick of wall or plastering the wall. It usually formed by mixing clay and addition of water.

(b) Differentiate between the following:

(i)	Stretcher	Header
	Is the long length face of the brick or blocks	Is the width face of a brick or blocks.
(ii)	King-closer	Queen-closer
	Is the type of closer in which the portion obtain when cutting half width of brick and half length of brick is removed.	Is the types of closer in which the is cutted lengthward into two equal half or halves.
(iii)	Stretcher course	Header course
	Is the course with all brick laid on stretcher face.	Is the course with all brick laid with headers face.
(iv)	Stretcher bond	Header bond
	Is type of bonding in which all brick laid in stretcher face.	Is the type of bonding in which all brick laid in headers face.
(v)	Face	Facing
	Is the front view of the wall with good appearance.	Is the construction of wall by using stone and brick but with good appearance.

(vi)	Racking back	Toothing
	Is the process of setting back the each successive course by 5mm eg. a wall.	Is the space between two courses of the construction wall at end which tends to be like tooth.

(c) (i) Mention two common types of concrete:

- Reinforcement concrete - 1:2:4.
- Mass concrete - 1:3:6.

(ii) Explain the two common methods of mixing concrete.

- By hand: This is usually done by hand, by follow the following procedure.
  1) Measure sand and cement.
  2) Then mix the mixture well -
  3) Add gravel to the mixture of sand and cement and mixing them by two batching.
  4) Final put water to the mixture of sand, gravel and cement to fabricate it.
- By Machine: It is commonly used in large site. Instrument or machine we is called concrete mixer. Some used in large site are called continously mixer work continously. While other are used in small site called Batch mixe In small site involve use of hopper drum, where concrete is put first, cement and then follow sand with additions of water to facilitate the mixture.

(d) (i) Mention three constituents of a good bricks earth with its percentages.

- Refractory clay: It is a constituents of brick which make it resit to high temperature
- Silty: It is also used when mixing with water to make it cohesion to it particles.

(ii) Why brick masonry sometimes preferred over other types of masonry? Give four reasons.

- Building that use bricks is not very expensive when construct it.
- The material eg clays, cement are easily available in the surroundings. Suit commonly used by people.
- It can take place in both town and rular area because it very resistance to any climate.
- It is simple to perform it without necessarily have advanced education.

(e) (i) Explain the following phases as applied in the concrete technology.

- First phase (initial set)

  This is occurs when the concrete is added with water and take place when 30 minutes after mixing it. So is a advice to placing concrete before this 30 minutes.

- Second phase (final set)

  This is take place within 24 hours before curing of concrete in order to allow ~~first~~ ingredient of concrete to be well packed to each other and without air void. In this phase water is now dried in same how.

- Third phase

  This is take place after 24 hours and during curing of concrete which mean is the place of continously dump the concrete to enable allow it ~~to~~ to get or gain more strength when harden it 7days to 28days depending on weather

(ii) Briefly explain the four common ingredient of cement concrete.

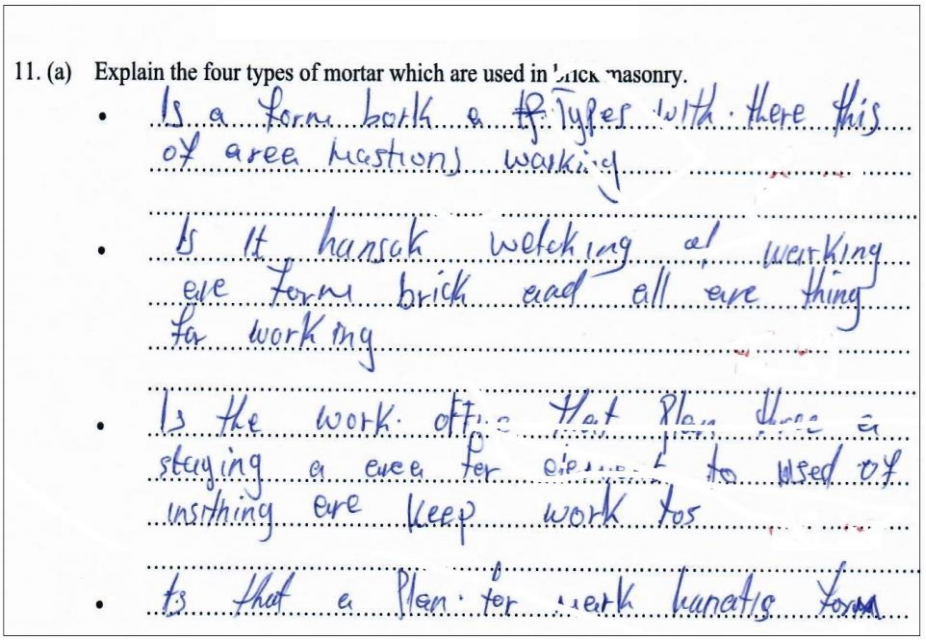
- Cement: This used as binding material of gravel which make the concrete stick together.
- Fine ~~ag~~ aggregate: This used to improve the strength of concrete: because small particles less than 2.00mm.
- ~~Fine~~ Course aggregate: Have same function used to improve the strength of concrete. This are bigger particle with about 5mm.
- Water – is added in the concrete in order hychration to take place. When you add water concrete set of 30minutes

Extract 11:1 A sample of a script of a student who produced good responses for the larger part of the question.

On the other hand, 57.8% of the students failed because they provided irrelevant answers, omitted or misinterpreted some questions. In part (a), for example, some students failed because they did not have the

skills and knowledge that could enable them to answer the question properly. A good example is that of a student who was required to explain the types of mortar used in brick masonry. Instead of doing that, the student wrongly mentioned timber mortar, concrete mortar and basement mortar as the types of mortar. The term "Timber mortar" was not correct because mortar is used to bind masonry units and wood glues are suitable for binding timber products. In addition, the term "concrete mortar" was not correct, since concrete is a mixture of cement, fine aggregate and coarse aggregate and water is added to facilitate the mixing. The presence of coarse aggregate renders it inappropriate to act as mortar. Also the term "basement mortar" was not correct because basement is part of a building below the ground level. This shows that the student did not understand the question. In part (b), some of the students failed because they seemed to have not understood the demands of the question. Students were required to differentiate brickwork terms. Instead, they wrongly explained the uses of brickwork tools. Their poor responses indicate that they lacked knowledge on the basic principles and skills of building a house. Extract 11.2 shows a sample of a poor response from one of the students' scripts.

Extract 11.2


11. (a) Explain the four types of mortar which are used in brick masonry.

- Is a form bork a 4 Types with there this of area mastions working
- Is it hansak welching of working eye form brick and all eye thing for working
- Is the work of... that Plan ... a staying a eyee for ... to used of insthing eye keep work tos
- ts that a Plen for work hunatis form

~~brick~~ brick are form stool sand office work keep gravel element ... for insithing

(b) Differentiate between the following:

(i)	Stretcher	Header
	Is the work plan form are that following to with are	hols bahals hyals area fulny hayals maths wodny full size ...
(ii)	King-closer	Queen-closer
	Is closer are a parts work fering	Is that hyalay wuts auts paly myauls mattar setcuts
(iii)	Stretcher course	Header course
	Is the stecher state are charing of brick	harts thrge fual eve satuls hydul cnea brick efrats
(iv)	Stretcher bond	Header bond
	this harts patartu haupa sand petals cuntal wats caheuts	handa hyal bonding back palnit saulm
(v)	Face	**Facing**
	Is farting are hayats ewcis lutals	rounding zuve lufats caytiats

(vi)	Racking back	Toothing
	Is are kinging that a work	Stool thing are to fungals your a work tool

(c) (i) Mention two common types of concrete:

- The is a nuton lelaugs
- Typer are morck nuton

(ii) Explain the two common methods of mixing concrete.

- Is the food that v.f work state are following to returny salnas the brick area
- Is the hepal watirk pelyud sany ares nats hual water saks weapul nuly nuyfa refate element sclyul ~~[illegible]~~ your stool

(d) (i) Mention three constituents of a good bricks earth with its percentages.

- stinny are good
- rentayes to brick good

- Is that Fetry Salm bur goal are to Rats full mark keeping eree

(ii) Why brick masonry sometimes preferred over other types of masonry? Give four reasons.

- Is that hurrick of water Sumel to e enea
- wohats hy hil fulpe Pelny are
- Is work following are brick
- Is a Plan bahyals Fuby galed

(e) (i) Explain the following phases as applied in the concrete technology.

- First phase (initial set)

  Is the Capal hyals fuy Sumep ll pul ef hyalb following balitalls funpleru eree fulcelleins

- Second phase (final set)

  cound Types stool hutron hels Chy unlnes Matrir funtul Solemy pallyncls Cellnls

- Third phase

  Is the Fahyeng of Suyalten Sunrdre are Salm Pelunals reahy Paf Salng Sruchy brick ere eath Pleng +

(ii) Briefly explain the four common ingredient of cement concrete.

- Stahy water Paper nals hypals eve hyall by hulmping
- whas huuls halls hawals Pehal of heupa salpg
- Isl Cuing for e following brick hyalny eree work stool
- that hulpy Puhas Ehaly Guwals Pedhyals nuls neufes

Extract 11:2 A sample of a script of a student who produced a poor response for whole part of the question.

2.2.4 Question 12: Painting and Signwriting

The question was set from the area of painting and sign writing and the topics it covered included *paint and painting materials, painting techniques and texture finishers*. It comprised parts, (a), (b), (c), (d) and (e). The question read as follows:

10 (a) (i) All paint materials are subjected to vigorous testing before used. Suggest six paint testing to be performed by manufacturers to ensure the quality of paints.

(ii) Explain the following general constituents that the paint is made up:

- A base
- A vehicle
- A drier

(b) Describe the following terms as used in panting works.

(i) Priming (ii) Stopping
(iii) Under coatings (iv) Finishing coat

(c) (i) What is 'paint strip'?

(ii) Explain the procedures followed when painting the new iron and steel work

(d) (i) Enumerate four characteristic of a good varnish.

(ii) Why is thinner is added in a paint?

(iii) List two types of materials used as thinners.

(e) (i) Describe the following :

- Masking tape
- Tenting

(ii) Mention five areas which will need to be protected when working in domestic properties.

(iii) Name four areas which will need to be protected when working in commercial properties.

The total marks allocated for this question were 60. The question was attempted by 8 students. Three (3) students (37.5%) scored 0. Meanwhile, two (2) students (25%) got scores that ranged from 1 to 17.5 marks. Moreover 2 students (25 %) got scores which ranged from 18 to 38.5 marks and one student (12.5%) got scores ranging from 39 to

60 marks. The general performance of this question was poor as stipulated in Table 13 and Figure 12.

Table 13: The trend of student's performance in question 12

Scores	Remarks	General Students Performance	
		Number	Percentage (%)
0 – 17.5	Weak	5	62.5
18 – 38.5	Average	02	25
39 – 60	Good	1	12.5
	Total	**08**	**100**

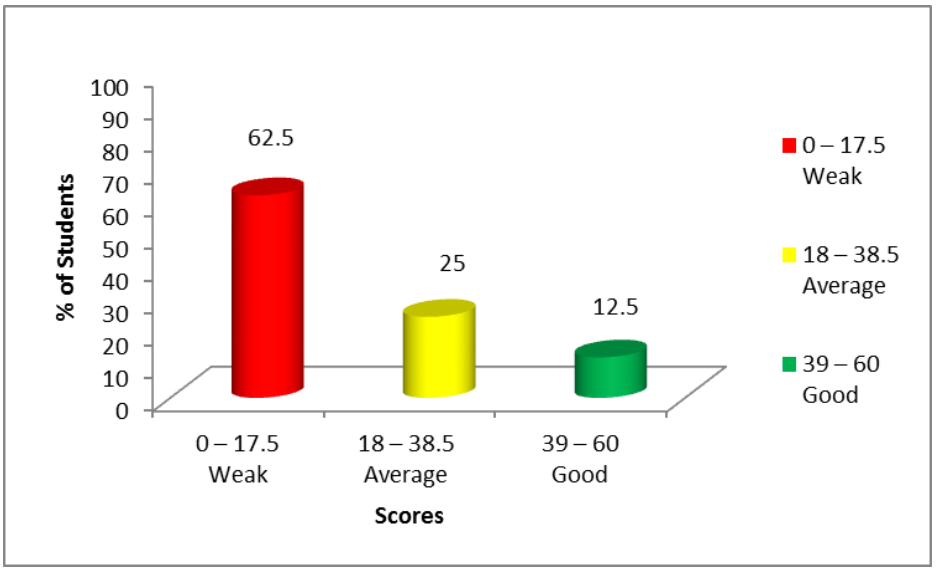


Figure 11: General student's performance in question 12

The students' performance for this question was poor as only 37.5 % of the students provided correct answers. This shows that these students had basic knowledge on painting and decorations. Extract 12.1 shows a sample of a good response to this question.

Extract 12.1

12. (a) (i) All paint materials are subjected to vigorous testing before used. Suggest six paint testing to be performed by manufacturers to ensure the quality of paints.

- it should be tested its opacity and hiding power
- it should be tasted its spreading capacity on surface
- it should be tasted its consistency (Fluidity)
- it should be tasted its drying speed and time
- it should be tasted its capacity to cover a given area (of painting)
- it should be tasted its durability and strength to bond with surface

(ii) Explain the following general constituents that the paint is made up:

- 'A base
  Is a solid Material which forms a body of the paint Material.

- A vehicle
  Is a substance (always liquid) added to paint so as to enable to spread easily in surface (increase spreading capacity)
- A drier
  Is a solid or Liquid Material added to paint so as to hastern drying of paint Material on surface

(b) Describe the following terms as used in painting works.

(i) Priming
It's a process of applying coat on an object firstly. such as painting or Varnishing

(ii) Stopping
Is a process of removing hard puffe, old paint film, glue and dirty and other deposit on surface to be painted. Just by usa of Stopping knffe

(iii) Under-coatings
This are ~~coating~~ applied Under/below Surface of a given material Mainly for protection either of rust, decay or water seepage.

(iv) Finishing coat

is a final coat (film) to be applied on surface always is hard, with elastic skin for protective work and Decoration.

(c) (i) What is 'paint strip'?

This is a tool used to remove old paper wall, Paint film and loosely attached deposit on surface before painting.

(ii) Explain the procedures followed when painting the new iron and steel work.

(i) First of all ensure surface is wall clean and free from foreign material and dirties also wall sanded and filled.

(ii) Take brush (Flat wall brush) or curved roller and paint material and place brush or curved roller in paint container and apply on surface of iron.

(iii) Continue painting untill it is wall spread and cover all surface of iron.

→ Not use much paint in brush use medium amount and not too fast or slowly in surface for good coating film.

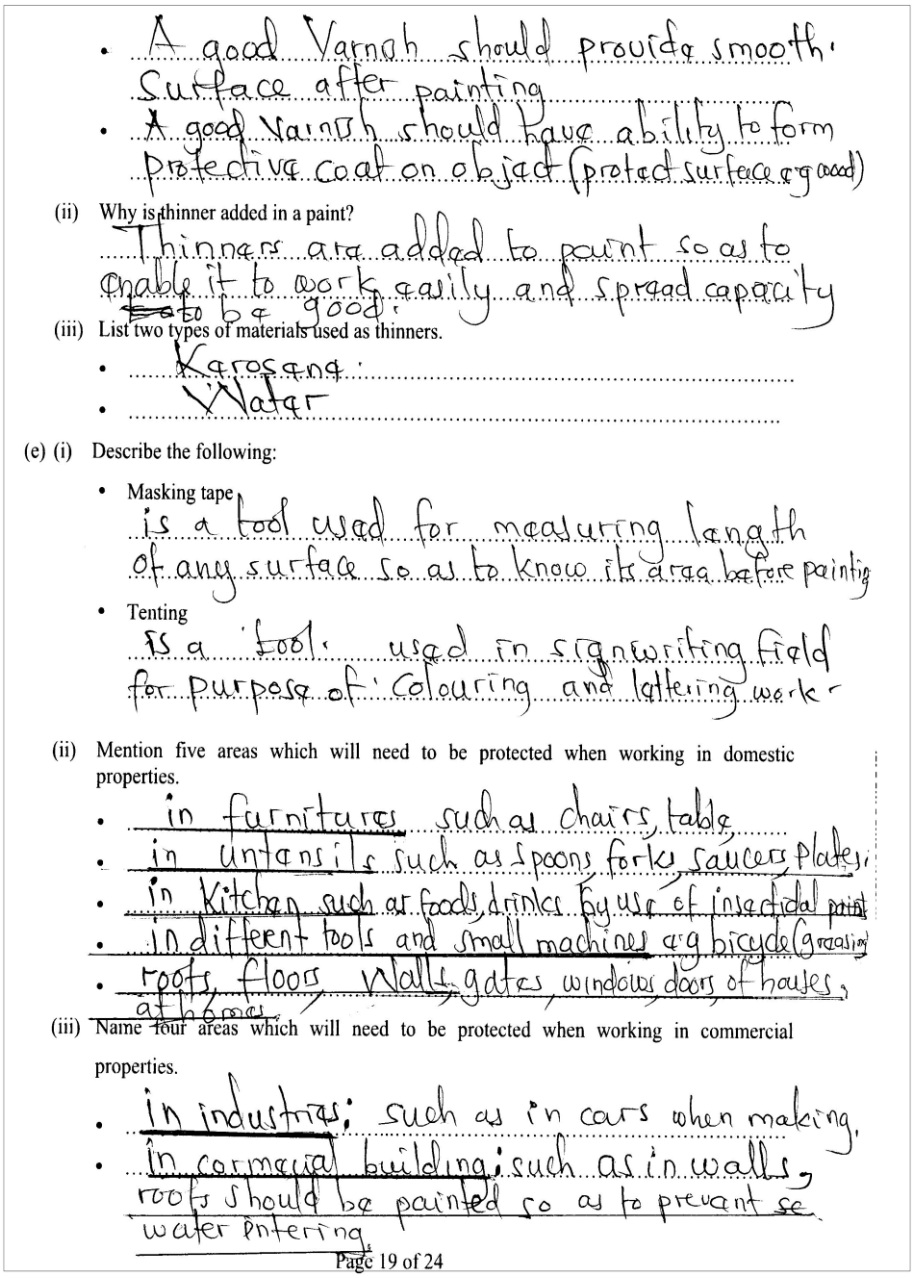
(iv) Allow the surface to dry wall.

→ This is the first coat to be applied (primer) Soo need second coating.

(v) after drying also paint another coat (Paint film) on surface also allow to dry wall. Your iron will be ready for use.

(d) (i) Enumerate four characteristics of good varnish.

- Should dry hard and With high glosse.
- A good Varnish should improve With age.



- A good Varnish should provide smooth Surface after painting
- A good Varnish should have ability to form protective coat on object (protect surface e.g wood)

(ii) Why is thinner added in a paint?

Thinners are added to paint so as to enable it to work easily and spread capacity ~~to be~~ good.

(iii) List two types of materials used as thinners.

- Karosene
- Water

(e) (i) Describe the following:

- Masking tape
  is a tool used for measuring length of any surface so as to know its area before painting
- Tenting
  is a tool used in signwriting field for purpose of colouring and lettering work.

(ii) Mention five areas which will need to be protected when working in domestic properties.

- in furnitures such as chairs, table
- in untensils such as spoons forks, saucers, plates,
- in Kitchen such as foods, drinks by use of insectidal paint
- in different tools and small machines e.g bicycle (greasing)
- roofs, floors, walls, gates, windows, doors of houses, ~~at home~~

(iii) Name four areas which will need to be protected when working in commercial properties.

- in industries; such as in cars when making,
- in commercial building; such as in walls, roofs should be painted so as to prevent ~~se~~ water entering

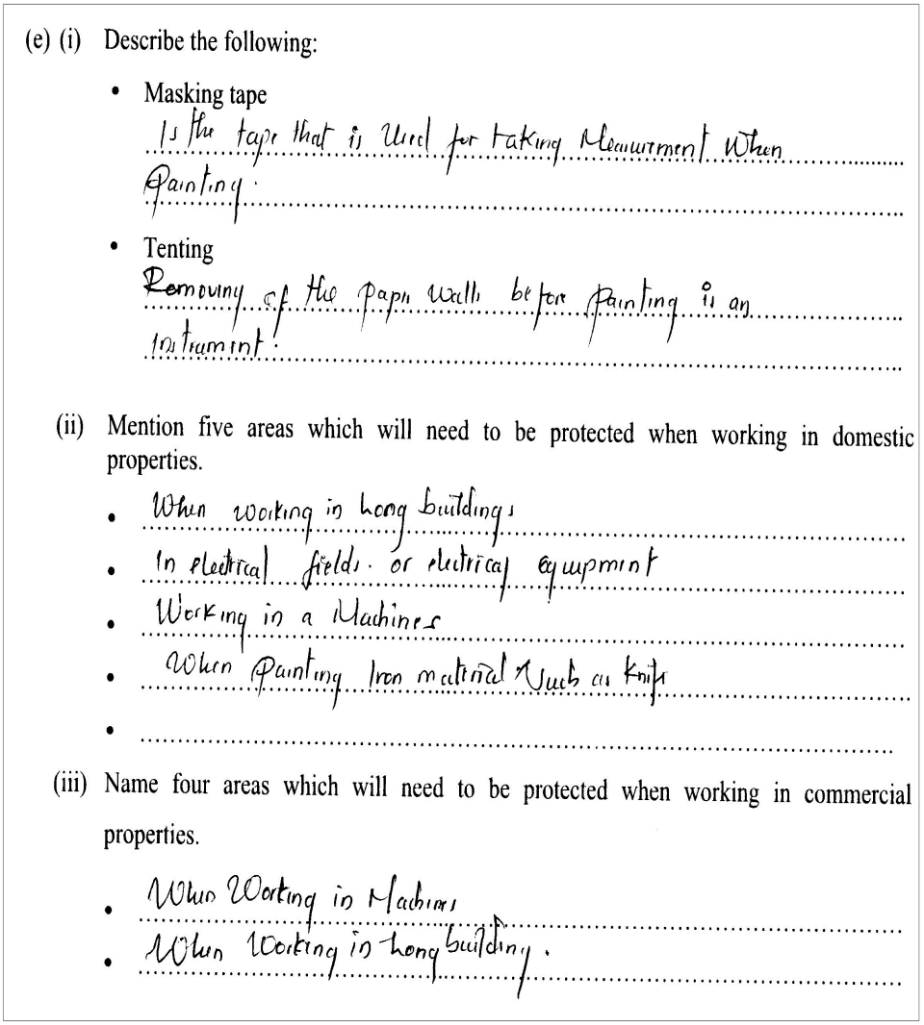
Page 19 of 24

Extract 12.1 sample of a script of the student who produced a good response in some areas of the question.

However, 62.5% of students showed that they had not adequately acquired basic knowledge on painting and decorations. Most of them omitted some parts of this question. The few who attempted this question produced irrelevant responses. For example, in part (e) (i) the question wanted the students to describe the term ‘masking tape.’ For

this, students were supposed to respond by saying that 'masking tape is a cloth or paper tape backed with adhesive. It is stuck over any part of work to protect it from being painted.' Instead, they described masking tape as a tool for measuring the length of work. These students failed to differentiate masking tape from a measuring tape. Hence, they did not understand the demand of the question. Extract 12.2 provides a sample of a response of this category.

Extract 12.2


(e) (i) Describe the following:

- Masking tape
  Is the tape that is Used for taking Measurment When Painting.
- Tenting
  Removing of the paper walls before painting is an instrument.

(ii) Mention five areas which will need to be protected when working in domestic properties.

- When working in long buildings
- In electrical fields. or electrical equipment
- Working in a Machines
- When Painting Iron material Such as knife
-

(iii) Name four areas which will need to be protected when working in commercial properties.

- When Working in Machines
- When working in long building.

Extract 12.2 A sample of a script of the student who produced a poor response in some areas of the question.

2.2.5 Question 13: Plumbing

This question was attempted by students who opted plumbing as their area of specialization. The question was composed from the topics which included *introduction and workshop arrangement, safety and regulations, materials, bending and pipes works*. The question was divided into five parts (a), (b), (c), (d) and (e).The question read as follows:

13. (a) (i) Explain the meaning of the following safety terms:
    - House keeping
    - Risk assessment.

    (ii) Briefly the action to be taken for an unsafe area when attending a victim of accident.

    (iii) Safety terms and precaution measures to be taken to avoid hazard.
    - Tripping
    - Burns

(b) (i) What are plumbing services?

(ii) Briefly explain five duties of a plumber.

(c) (i) What is the main advantage and disadvantage of lead piping?

(ii) What are the advantages of polythene piping over the metal piping?

(d) (i) Mention bending machines which are supplied in various forms suitable for all types of metal pipes ferrous or non-ferrous metal, thin and thick walled.

(ii) State the components of a domestic service connection.

(iii) Differentiate plumbing water supply and plumbing drainage system.

(e) (i) What is volume?

(ii) Calculate the quantity of water in contained in which has a diameter of 38mm and a length of 7.5m.

The question was attempted by 113 students. Out of them, 37.2% scored 0. On other hand, 8.80% scored average marks and 0.9% scored above average and one student scored all the 60 marks allotted. The general performance for this question was poor. The trend of student's performance in this question is as summarized in Table 14 and Figure 13.

Table 14 the trend of students' performance in question 13

Score	Remark	Students	
		Number	Percentage (%)
0-17.5	Weak	102	90.30
18-38.5	Average	10	8.80
39-60	Good	01	0.90
Total		**113**	**100**

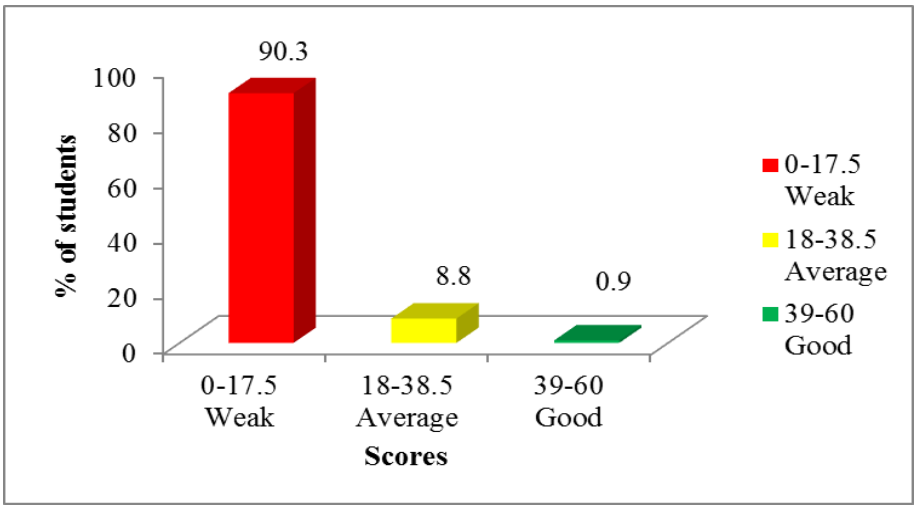


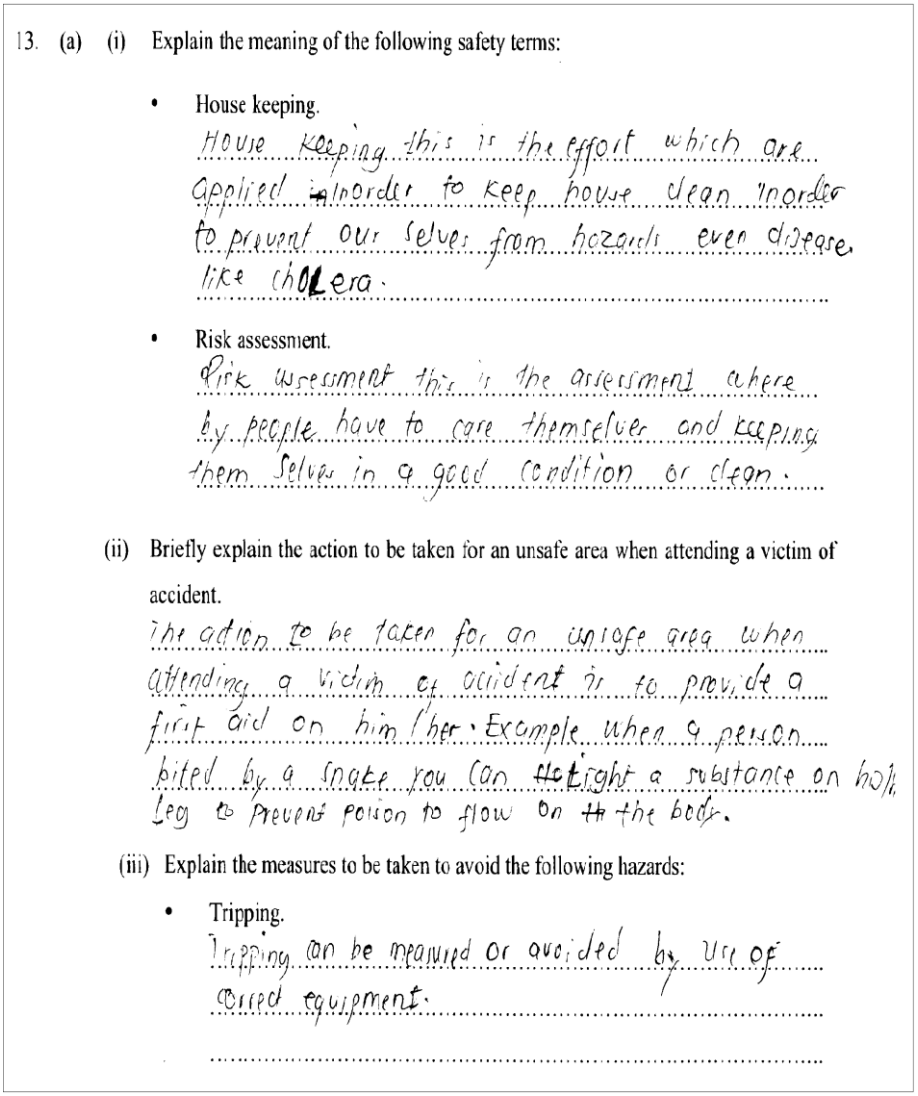
Figure 12: General Students Performance in Question 13

The analysis of the students' performance in this question shows that the performance was poor because only 9.7% of the students could provide the correct response for this question. However, there were students who scored average and above average marks. These students had good knowledge on plumbing as their area of specialization.

Students who performed well were able to provide relevant answers in some parts of this question few students omitted some parts of the question but majority of them failed because they did not produce

relevant responses. The students failed to recall the knowledge obtained in plumbing skills, although they wrote a lot of things to answer the question. Those explanations were unacceptable according to the demand of the question. Moreover, the students failed to make simple calculations which required them to calculate the volume occupied by 38mm diameter of a pipe with 7.5m height. Extract 13.1 shows the sample of a script of a student who wrote some explanations which were not acceptable according to the demand of the question.

Extract 13.1



13. (a) (i) Explain the meaning of the following safety terms:

- House keeping.

House keeping this is the effort which are applied inorder to keep house clean inorder to prevent our selves from hazards even disease like cholera.

- Risk assessment.

Risk assessment this is the assessment where by people have to care themselves and keeping them selves in a good condition or clean.

(ii) Briefly explain the action to be taken for an unsafe area when attending a victim of accident.

The action to be taken for an unsafe area when attending a victim of accident is to provide a first aid on him/her. Example when a person bited by a snake you can ~~tie~~ tight a substance on hoh leg to prevent poison to flow on ~~th~~ the body.

(iii) Explain the measures to be taken to avoid the following hazards:

- Tripping.

Tripping can be measured or avoided by use of correct equipment.

- Burns.

  Burns should be avoided by use of correct equipment for soldering, people should be care of their work, people should stop risk taking.

(b) (i) What are plumbing services?

plumbing services are services by which plumber provide to people of different places.

(ii) Briefly explain five duties of a plumber.

- **Water supply** – plumbers are the ones who supply water to people of different community.
- **Construction of pipes** - plumber are the ones who construct pipes of different types that can be used to supply water.
- **Social service provision** - In social service provision plumbers ensure that people who paid the bill have to get services like water.
- **construction of W/C** (water closet) in toilets: In construction of water closset plumbers are use various types of materials to construct this.
- **collection of taxes of bills**: plumber collects taxes of bills of water from people that can help them to pay loans for government revenue.

(c) (i) What is the main advantage and disadvantage of lead piping?

lead piping has got some advantage and disadvantages. lead piping supply water to various places for a long period of time. lead piping got rust

(ii) What are the advantages of polythene piping over the metal piping?

polythene piping has got advantage over the metal piping because polythene pipes are pipes which are in plastic form so can supply water to various places while water are clean. but Metal piping can supply water for a long ~~ter~~ period of time ~~as~~ with rust. and rust is dangerous to the human health.

(d) (i) Mention the bending machines which are supplied in various forms suitable for bending all types of metal pipes ferrous and non-ferrous, thin and thick walled.

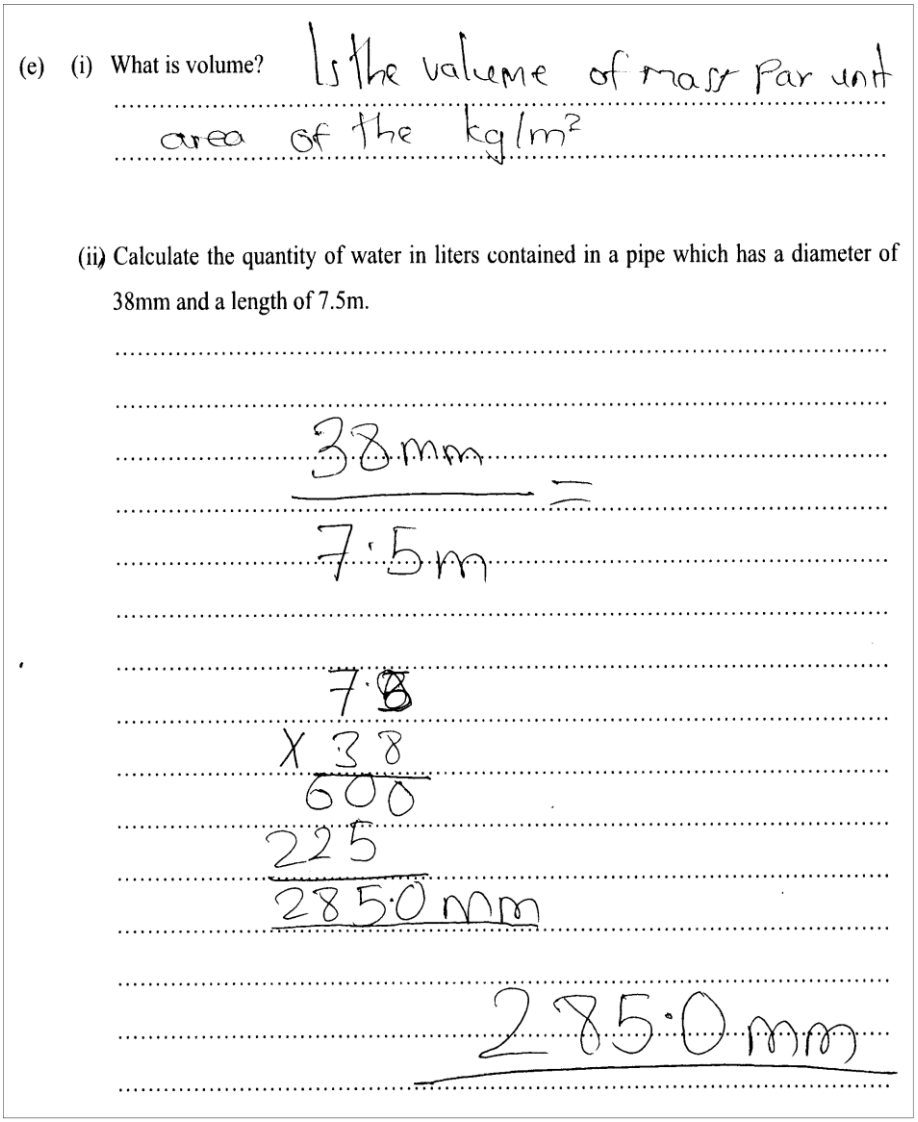
- Pipe bender machine.
- Bending machine former

(ii) State the components of a domestic service connection.

The components of a domestic service connections are in toilets, in kitchen, in bathroom, water in another use of domestic

(iii) Differentiate between plumbing water supply and plumbing drainage system.

the different between plumbing water supply and plumbing drainage system is plumbing water supply these are duties of plumbers to supply water to different places. while plumbing drainage system these are system constructed by plumber in toilets.



Extract 13.1 A sample of the script of a student who produced a poor response on all parts of the question.

Despite the poor performance for this question, only one student obtained good marks in this question. This student scored good marks because he/she was able to give correct answer in many parts of the question. Also, he/she followed the instruction of the question on calculating the required quantity of water in litres contained in a pipe and correctly converted the cubic meters obtained into litres as instructed in the question. Extract 13.2 shows the script of the student who scored high marks.

Extract 13:2

13. (a) (i) Explain the meaning of the following safety terms:

- House keeping.

Are the principles that used to keep yourself away from dan gerous or accidents since there is good and proper arrangement of things in the workshop or working area.

- Risk assessment.

Are the things that provide a great chance of facing with accident example when welding without protective shield.

(ii) Briefly explain the action to be taken for an unsafe area when attending a victim of accident.

Provide help to the victim and remove him or her into safe place. inorder to bring encouragement to the victim Also to protect him or her from other dangers

(iii) Explain the measures to be taken to avoid the following hazards:

- Tripping.

Avoid improper arrangement of tools or equipment in working area also the floor should not be slippery and must be rough and clean

- Burns.

All flames which are not in use should be keept off also a person should not heat painted pipes into open fire

(b) (i) What are plumbing services?

Are the duties that a person with plumbing skills should provide to the other people. Plumbing service are the services that concerned mainly with pipe work, sanitation, drainage, water or gas supply.

(ii) Briefly explain five duties of a plumber.

→ Installation of pipes for cold and hot water supply also gas supply on the Building.
→ Provision of essential information about quality water control.
→ Management of waste from the building
→ fixing of waste and sanitarment on the building
→ Provision of controll of heating vessels on the building
· also welding, soldering, brazing and roof weathering work in order to increase heat (thermal) insulation in the building.

(c) (i) What is the main advantage and disadvantage of lead piping?

Advantage of lead pipe is that it can be used in gas supply while its disadvantage is that it dissolve in water to form plumbo solvency which is in Reddish colour and can be harmful to the human body.

(ii) What are the advantages of polythene piping over the metal piping?

Polythene pipe is longer than metal pipe where by it is 15cm long.
Polythene pipe can easily bend by spring method while metal pipe bend by large bend which reduce hard necessity tube.
Polythene pipe is least costly compared to metal pipe.
Polythene pipe can not get rust while metal pipe get rust

(d) (i) Mention the bending machines which are supplied in various forms suitable for bending all types of metal pipes ferrous and non-ferrous, thin and thick walled.

~~It include heating of pipe to reduce its hardness and then~~ It does not require heating where by a machine is used to bend the pipe.

(ii) State the components of a domestic service connection.

Plain Socket → connect two pipes.
Reducing bush → Reduce the diameter of pipe.
Elbow → change direction of pipe.
Polythene / galvanized mild steel pipe → Vessels where by water is flow
Cross tee and tee → for supply of water in different direction

(iii) Differentiate between plumbing water supply and plumbing drainage system.

Plumbing water supply deals with clean and safe water from the source like Rivers, springs or wells where by the water can be used in the different activities' while drainage system is the removal of waste and soil water from different source or use fac. ware like in toilet, bathroom and washing sheds in order to be treated for future use or to maintain proper health hygine of user.

(e) (i) What is volume?

is the quantity of space that an object occupies. ~~exam~~ and determined in cm^3 or m^3

(ii) Calculate the quantity of water in liters contained in a pipe which has a diameter of 38mm and a length of 7.5m.

$\pi r^2 h$

Data.

$D = 38mm$. $r = 19mm$

Length = 7.5m.

Volume = $\pi r^2 h$

$\frac{22}{7} \times 19 \times 19 \times 7500$.

$3.14 \times 7500 \times 361$

23550×361.

$8501550 mm^3$.

~~0.08 - 0.850155~~

$0.00850155 m^3$

Solution: $1m^3$.

$x = 0.00850155 m^3$

$\frac{1m^3 x}{1m^3} = \frac{0.00850155 m^3 \times 1000 L}{1m^3}$.

$x = 8.50155$ litres.

Quantity of water is 8.50155 litres.

Extract 13:2 A sample of a response by a student who produced relevant response in most parts of this question.

3.0 ANALYSIS OF THE STUDENTS' PERFORMANCE IN DIFFERENT TOPICS

The topics covered in the Civil Engineering paper for FTNA 2018 included: *Construction materials, Site preparation, Foundation, Scaffolding and Shoring and Walls* in the compulsory section of the paper as well as optional parts of the assessment. In the surveying field, the topics tested included *Introduction to Surveying laboratory, Surveying Instruments, Chain surveying and Chain and Compass Traversing*. For Carpentry and Joinery, the topics tested included *Tools, equipment and Machines, Timber and Joints.* For the Brickwork and Masonry field, the topics tested included *Bricks and blocks making, Mortar, Bonding and Concrete*. As for the Painting and Signwriting field, the topics tested included *Tools, equipment, plants and brushes, Paint and Painting material, Painting technique, Water paint and Texture finishes.* Lastly, in field of Plumbing the topics included, *Safety, Tools, Equipment's and plants, Materials, Bending and Threading and pipe fitting*. The students' performance per topic was analysed by computing the percentage of an average score in all the questions under one topic. The average score of questions in each topic are grouped into three classes namely weak (0 – 29), average (30 – 64) and good (65 – 100).

The students' performance per topic is presented below:

3.1 In *Construction materials, Site preparation, Foundation, Scaffolding and Shoring* and *Walls* (multiple choice items), there was one item from each topic. The performance in these topics was good as the percentage of students who scored the pass mark and above was 74.8 percent of all valid students.

3.2 Based on *Walls* (matching items), students were required to match descriptions against corresponding parts. The performance in this question was generally moderate as 54.05 percent scored the pass mark and above.

3.3 As for true/false questions based on *Walls* as a topic students were required to recall the facts from the statements. The performance for this question was generally good as 84.14 percent scored the pass mark and above.

3.4 The question on *Foundation,* the performance was poor as only 10.1 percent of the students were able to score the pass mark and above. This could be attributed to inadequate knowledge on the topic.

3.5 For the question based on *Construction materials,* the performance was generally good as 10.7 percent of the students scored the pass mark and above.

3.6 As for the question based on *Walls,* the performance was poor as only 9.26 percent of the students were able to score a pass mark and above. This could be attributed to inadequate knowledge on the topic.

3.7 The question based on *Scaffolding and Shoring,* the performance was generally poor as 6.40 percent of the students scored the pass mark and above.

3.8 Based on surveying, the topics tested included *Introduction to surveying laboratory, Surveying Instruments, Chain surveying and Chain and Compass Traversing.* The performance for these was generally poor as 21.43 percent of the students scored the pass mark and no student scored above the pass mark.

3.9 As far as Carpentry and Joinery is concerned, the topics tested included *Tools, equipment and Machines, Timber and Joints.* The performance was generally poor as 22.60 percent of the students scored a pass mark and no student scored above the pass mark.

3.10 The field of Brickwork and Masonry had the topics which included *Bricks and blocks making, Mortar, Bonding and Concrete*. The performance for this was generally average as 42.02 percent of the students scored the pass mark and above.

3.11 Painting and Signwriting field contained the topics which included *Tools, equipment, plants and brushes, Paint and Painting material, Painting technique, Water paint and Texture finishes*. The performance for those questions was generally average as 37.5 percent of the students scored the pass mark and above.

3.12 The field of Plumbing had topics which included Safety, *Tools, Equipment's and plants, Materials, Bending and Threading and pipe*

fitting. The performance was generally poor as 9.7 percent of the students scored the pass mark and above.

4.0 CONCLUSION

The general performance of students in the Civil Engineering paper for 2018 Form Two National Assessment (FTNA) was average.

The analysis of the students' performance shows that out of the thirteen questions asked, eight were performed poorly and the other five questions were performed well. The students performed well in questions 1, 2, 3, 11 and 12. They had average performance or poor performance in questions 4, 5, 6, 7, 8, 9, 10 and 13. Poor performance in these questions indicates that the students had insufficient knowledge on the topics that were supposed to be covered at the level of form two in different subjects of specialization including Surveying; Carpentry and Joinery and Plumbing. See Appendix B which shows the performance on each question through charts in three categories; poor, average, and good.

The analysis of students' performance per question indicated in percentages shows that questions on Surveying, Carpentry and Joinery and Plumbing were poorly performed by more than 75% of the students who attempted them. On the other hand, questions 1, 2, 3 and 5 had the performance of 37 to 84 percent as reflected in Appendices A and B.

This analysis shows that various stakeholders including students, parents, teachers, guardians, educational policy makers and the Government has a lot of work to do if the performance is to be improved. This report has shown is summary areas that demonstrated poor mastery and therefore they need emphasis to improve the performance. It is expected that this report will act as a catalyst for action.

5.0 RECOMMENDATIONS

5.1 Recommendations for Students

Based on the performance observed in this analysis, the following recommendations are worth making for students.

(a) Since it was observed that some students failed to adhere to the demands of the questions they attempted, it is recommended that future students be encouraged to read carefully the instructions before they can answer the questions.

(b) Because there are areas where students demonstrated lack of knowledge, it is advised that the future students be encouraged to search; practise and read relevant books/media in order to widen their knowledge.

6.1 Recommendations for Teachers

(a) To improve performance, teachers should be encouraged to set enough exercises and tests for their students before such students sit for the national assessment.

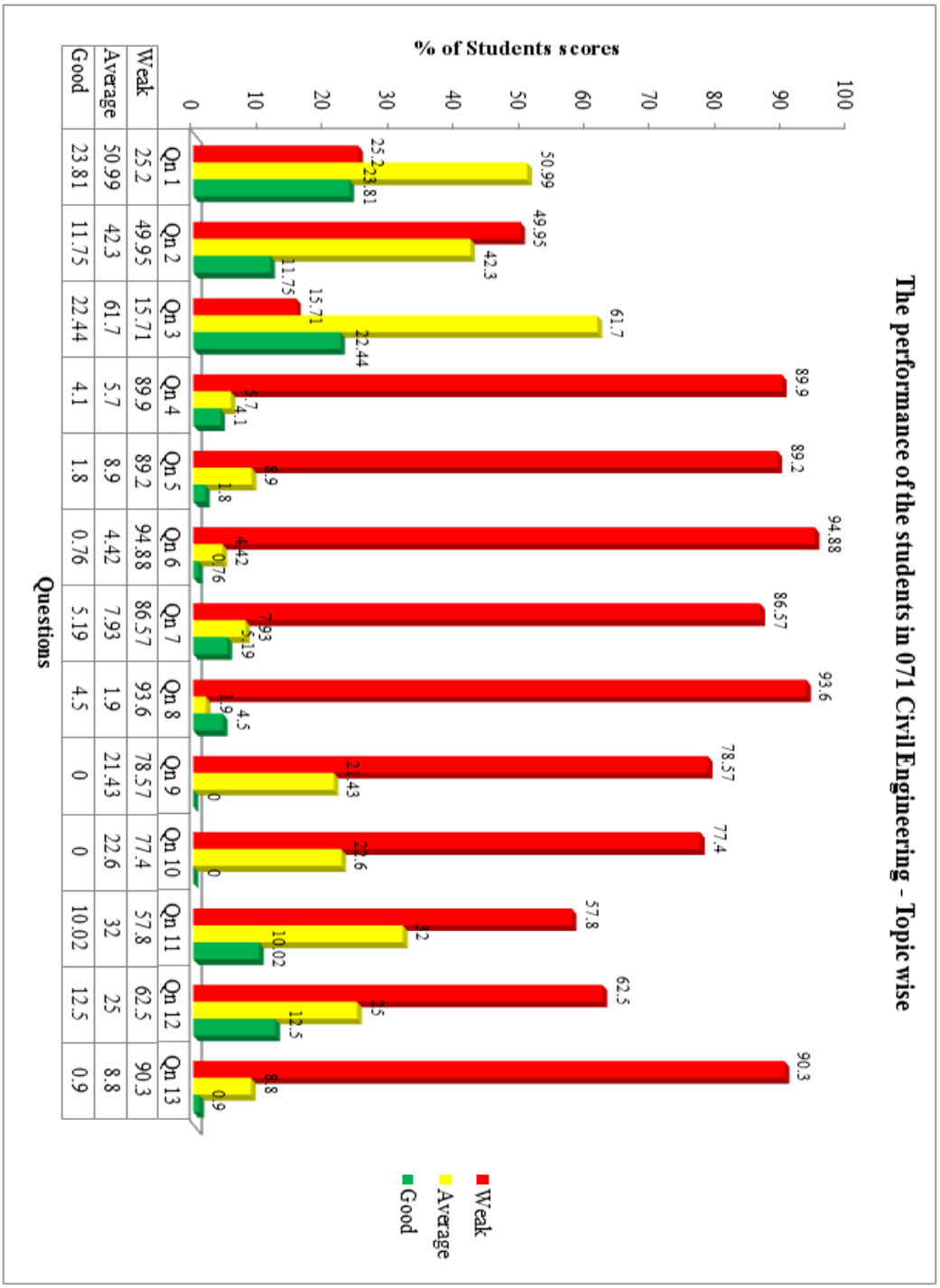
(b) Since students demonstrated all signs of having no knowledge on aspects that require prior practicals, it is recommended that practical skills be provided to students so that they can relate theories and practical and hence acquire the expected competences.

Appendix A

Analysis of the Students' Performance Question-Wise

S/N	Topic	Question Number	Percentage of Students who Scored 30% or More	Remarks
1	Walls	3 (True or false Items)	84.14	
2	Foundations, Scaffolding, Walls, Materials (Timber)	1 (Multiple Choice Items)	74.8	Good
3	Walls	2 (Matching Items)	54.05	Average
4	Brick and block making, mortar, bonding and concrete	11	42.02	Average
5	Paint and painting materials, painting techniques and texture finishers	12	37.50	
6	Tools, equipment and machines, timber and joints	10	22.60	Weak
7	Introduction, surveying instruments, chain surveying, chain and compass traversing	9	21.43	Weak
8	Walls - Arches	7	13.12	Weak
9	Construction Material	5	10.70	Weak
10	Foundations	4	9.80	Weak
11	Safety, Tools, Equipment's and plants, Materials, Bending and Threading and pipe fitting.	13	9.70	Weak
12	Scaffolding	8	6.40	Weak
13	Walls	6	5.18	Weak

Appendix B



	Qn 1	Qn 2	Qn 3	Qn 4	Qn 5	Qn 6	Qn 7	Qn 8	Qn 9	Qn 10	Qn 11	Qn 12	Qn 13
Weak	25.2	49.95	15.71	89.9	89.2	94.88	86.57	93.6	78.57	77.4	57.8	62.5	90.3
Average	50.99	42.3	61.7	5.7	8.9	4.42	7.93	1.9	21.43	22.6	32	25	8.8
Good	23.81	11.75	22.44	4.1	1.8	0.76	5.19	4.5	0	0	10.02	12.5	0.9