THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

CANDIDATES' ITEMS RESPONSE ANALYSIS REPORT ON THE CERTIFICATE OF SECONDARY EDUCATION EXAMINATION (CSEE) 2023

WOODWORK AND PAINTING ENGINEERING

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074 WOODWORK AND PAINTING ENGINEERING

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FOREWORD

This report presents Candidates' Items Response Analysis (CIRA) on the performance of the candidates who sat for the Certificate of Secondary Education Examination (CSEE) 2023 in Woodwork and Painting Engineering subject. The report aims to provide feedback to all educational stakeholders on the factors that contributed to the candidates' performance in Woodwork and Painting Engineering.

The Certificate of Secondary Education Examination is a summative evaluation that measures learners' achievement after completing four years of study in secondary education. Ideally, it is designed to assess the education system's effectiveness and the candidates' learning in terms of knowledge gained and skills developed. It also evaluates the extent to which the candidates can utilize the knowledge and skills gained to solve the social, political, economic and technological challenges to enhance individual and national development. More importantly, the examination is used for screening purposes to identify candidates with outstanding academic merits to continue learning at the advanced secondary school level and other learning institutions.

This analysis shows justification for the candidates' performance in the Woodwork and Painting Engineering subject. The candidates who attained high scores had adequate knowledge and practical skills in the subject matter. However, candidates who scored low marks faced difficulties in responding to the questions due to inability to identify the question requirements, misinterpretation of those requirements, poor English language and improper application of acquired knowledge and skills of the tested concepts.

The National Examinations Council of Tanzania (NECTA) expects that the feedback provided in this report will shed light on the challenges for which education stakeholders should take proper measures to improve teaching and learning the Woodwork and Painting Engineering subject.

The Council appreciates the contribution of all who participated in preparing this report.

Dr. Said Ally Mohamed
EXECUTIVE SECRETARY

1.0 INTRODUCTION

This report analyzes the candidates' items responses in the Woodwork and Painting Engineering Certificate of Secondary Education Examination (CSEE). The examinationn adequately meets the requirements of the civil engineering syllabus for technical secondary school education issued in 2019. The paper was set by using format issued in 2022.

The examination paper had eleven (11) questions categorized into three sections: A, B, and C. Section A consisted of two (2) objective questions. Question one had ten (10) multiple-choice items and question two had six (6) matching items. Each item in multiple choice and matching items carried one (01) mark. Section B had six (6) short answer questions each carrying nine (9) marks. All questions in Sections A and B were compulsory. Section C had three (3) optional structured questions, each weighing 15 marks. Candidates were required to answer two (2) questions from this section.

A total number of 188 candidates sat for the Woodwork and Painting Engineering paper in 2023. Only 68 (36.36%) candidates scored the credit pass of grades B and C. The statistical analysis shows that 97 (51.87%) passed with a grade D, while 22 (11.77%) candidates failed by scoring grade F. This implies that the general performance in this subject was average.

Figure 1 shows the general distribution of scores and candidates' performance in the examination.

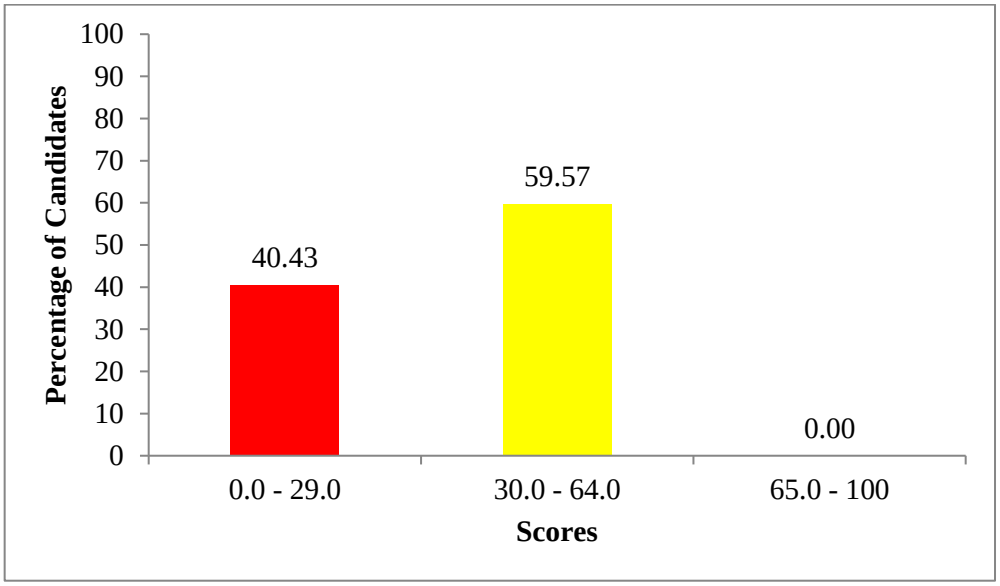


Figure 1: *The Candidates' General Performance in 2023*

The report analyzes candidates' responses regarding the requirements of the questions. In the course of analysis, brief notes are provided on what candidates were required to do and the reasons for their performance level. Samples of candidates' good and poor responses are also included in the form of extracts to illustrate the cases presented. Charts are also used to summarize candidates' performance in particular questions. The candidate's performance has been categorized into three groups: good, average and poor with the ranges of 65–100, 30–64 and 0–29, respectively. Green, yellow and red colours represent the three categories of the performance. Finally, the report presents a conclusion and recommendations for implementation.

2.0 ANALYSIS OF THE CANDIDATES' RESPONSES IN EACH QUESTION

2.1 SECTION A: OBJECTIVE QUESTIONS

2.1.1 Question 1: Multiple Choice Items

This question had ten (10) multiple-choice items from (i) to (x). It required candidates to choose the correct answer from among the five (5) given alternatives (A to E) and write the letter of the correct answer in the answer booklet provided. The items were constructed from ten (10) topics, namely *Introduction to painting; Safety Rules and*

Management; Water Paints; Signwriting and Stenciling; Oil Paints; Functional Requirement of Paints; Painting Techniques; Varnishes and Finishes; Ceiling and *Painting Materials.*

All 188 (100%) registered candidates attempted the question, of whom 14 (7.45%) candidates scored from 0 to 2 marks. The candidates who scored from 3 to 6 marks were 154 (81.91%), whereas 20 (10.64%) candidates scored from 7 to 10 marks. The performance of the candidates in this question is summarised in Figure 2.

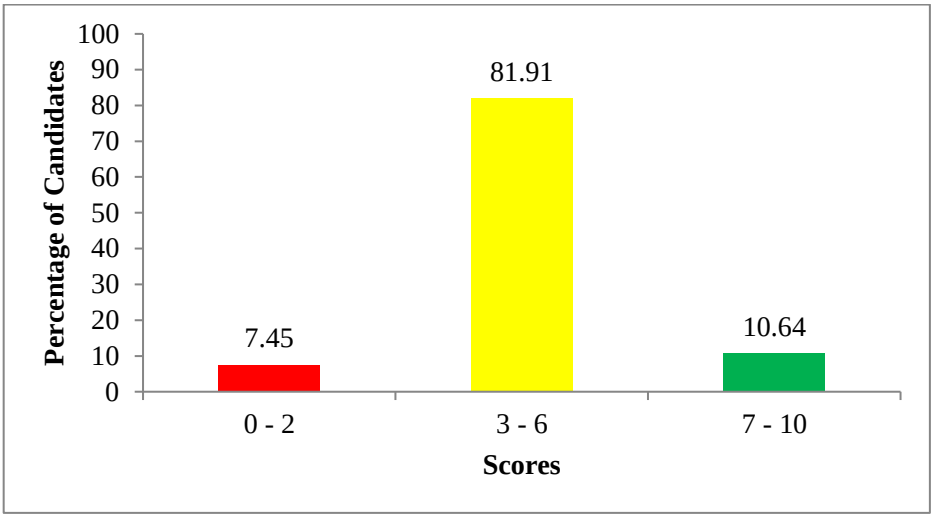


Figure 2: *The Candidates' Performance in Question 1*

Figure 2 shows that the candidate's performance in this question was good as 174 (92.55%) candidates scored average marks and above. The candidates who performed well in the question demonstrated a strong ability to apply knowledge of various topics to identify the correct answers among the given alternatives. The candidates attempted all items although not all of them were answered correctly. The items in which most candidates failed were item (v) from the topic of *Painting Technique* and item (vi) from the topic of *Varnishes and Finishes*. The analysis of candidates' responses also reveals that the majority of the candidates correctly selected item (ii) from the topic of *Safety Rules and Management* and item (iv) from the topic of *Oil Paints*. Performance in the rest of the items was on average. Strengths and

weaknesses of the candidates in choosing the correct answers in individual items are analyzed as follows:

Item (i) was set from the topic of *Introduction to Painting*. The candidates were required to identify painting materials that would be suitable for skirting. The question was:

You are required to paint a skirting surface of 1m wall height of your classroom. Which painting materials will be suitable for this work?

A Oil paint and distemper *B Water paint and distemper*
C Oil paint and stain *D Water paint and stain*
E Oil paint and water paint

The correct answer is E, *'Oil paint and water paint'*. Candidates who chose this alternative had sufficient knowledge of the types of paint and their uses. Oil paint provides durability and is suitable for surfaces that require resistance to wear and tear, such as skirting. On the other hand, water paint is easy to apply, dries quickly, and is suitable for indoor use.

Candidates who chose responses A, *'Oil paint and distemper'* and B, *'Water paint and distemper*' were incorrect because distemper is not suitable for a skirting surface as it's not resistant to wear and tear. Distemper paint tends to be less durable and less washable compared to oil or water paints.

Similarly, those who opted for responses C, *'Oil paint and stain'* and D, *'Water paint and stain',* also made incorrect choices. Stains are used for wood surfaces to enhance their appearance they might not provide the necessary coverage and protection for a skirting surface, especially if it requires frequent cleaning or is subject to high levels of wear and tear.

Generally, candidates who chose oil paint for its durability and water paint for its ease of application and quick drying time had a good understanding of the suitable paint for different surfaces.

Item (ii) was developed from the topic of *Safety Rules and Management.* It tested the candidates' ability to identify the use of

Personal Protective Equipment (PPE) to protect the mouth and nose. The question asked:

Which Personal Protective Equipment (PPE) is used to protect the mouth and nose?

A	*Dust - mask*	*B*	*Protectors*	*C*	*Hard hat*
D	*Stipples*	*E*	*Abrasive*		

The correct response is A, *'Dust mask'*. Most of the candidates managed to choose the correct answer showing that they have sufficient knowledge of personal safety rules and management. Dust masks are designed to filter out particles and provide respiratory protection in environments where there may be dust, pollen, or other airborne particles that could be harmful if inhaled.

However, a few candidates chose incorrect alternatives B, C, D, and E. Those who opted for alternative B, *'Protectors'* failed to recognize the ambiguity of this term which could refer to various types of protective equipment depending on the context. Similarly, those who chose alternative C, *'Hard hat'* seemed unaware that hard hat is designed to protect the head from falling objects, impacts, and electrical shock in hazardous work environments.

Furthermore, candidates who opted for alternative D, *'Stipples'* presented a total misunderstanding as stipples refer to a decorative painting technique and do not provide any form of personal protection. Additionally, a few candidates who selected alternative E, *'Abrasive'* overlooked its irrelevance, as abrasives are materials used for grinding, polishing, or smoothing surfaces through friction, rather than providing respiratory protection.

Therefore, candidates who correctly identified dust mask demonstrated an understanding of the appropriate Personal Protective Equipment (PPE) for respiratory protection in woodworking and painting environments.

Item (iii) was constructed from the topic of *Water Paints*. The item was designed to assess the candidate's ability to identify a base material suitable for decorative purposes. The question was:

Distemper was to be applied as a decorative material for ceilings. Which one of the following base materials would you suggest as suitable for this decorative purpose?

A	*Lime*	*B*	*Clay*	*C*	*Chalk*
D	*Cement*	*E*	*Grout*		

The correct response was C, *'Chalk'*. Candidates who selected this option recognized that chalk provides a smooth and porous surface suitable for applying distemper paint. This understanding demonstrates their knowledge of paint types and their compatibility with different surfaces.

However, alternatives A, B, D, and E were incorrect. Some candidates chose alternative A, '*Lime'* is not a suitable base material for applying distemper on ceilings. Some candidates selected alternative B, *'Clay'* may not provide the ideal surface for distemper paint because of its porosity and compatibility with distemper paint.

Candidates who opted for alternative D, *'Cement',* misunderstood its suitability as a base for distemper paint. Cement typically creates a non-porous surface, which may not bond well with distemper paint. Some candidates chose alternative E, *'Grout'.* Grout is used for filling gaps between tiles and does not provide a suitable surface for distemper paint application.

Item (iv) was extracted from the topic of *Oil Paints*. The item tested the understanding of the candidates on the application of oil paints to various surfaces. The candidates were required to select the correct response which identifies part of a building where oil-based paint will be used. The question asked:

Which part of building surfaces would you recommend to use oil-based paint?

A	*Wood sidings*	*B*	*Concrete and masonry*	*C*	*Brick wall*
D	*Aluminium sidings*	*E*	*Floors*		

The candidate who chose option A, *'Wood sidings'*, made the correct choice. They demonstrated their knowledge of oil paints by recognizing that oil-based paint is suitable for surfaces requiring durability and moisture resistance, such as wood sidings. This choice reflects an understanding of how oil-based paints can provide a protective and long-lasting finish on wooden surfaces.

However, the candidate who selected option B, *'Concrete and masonry'* made an incorrect choice. Oil paint is not recommended for these surfaces due to poor adhesion, lack of flexibility, limited moisture resistance, and potential durability issues.

Similarly, the candidate who opted for option C, *'Brick wall'* made an incorrect choice. Oil-based paint may not adhere well to porous brick surfaces. Option D, *'Aluminium sidings'* was also an incorrect choice. Oil-based paint can adhere to aluminum surfaces and provide durability it may not be necessary unless specific requirements for weather resistance exist.

Furthermore, the candidate who chose option E, *'Floors'* made an incorrect selection. While oil-based paint is not recommended on floors especially, in high-traffic areas due to wear and the need for frequent recoating.

In summary, the candidate who correctly identified option wood sidings demonstrated an understanding of the appropriate application of oil-based paint for surfaces requiring durability and moisture resistance.

Item (v) was set from the topic of *Painting Techniques.* It tested the candidates' ability in preparation and painting systems specifically identifying the behavior and treatment of various surfaces. The question was:

Suppose you are supervising painting work of window grills at your school. Identify the second operation for painting steel structure.

A	*Application of first undercoat*	*B*	*Cleaning and sandpapering*
C	*Stopping and filling*	*D*	*Application of primer coat*
E	*Application of finishing coat*		

The correct alternative is D, *'Application of primer coat'*. The candidates who chose this response had knowledge of the sequence of painting steps. Priming involves applying a primer coat to the surface before the application of the first and finishing coat. Candidates who chose alternatives A, '*Application of first undercoat';* B, *'Cleaning and sandpapering';* C, *'Stopping and filling'* and E *'Application of finishing coat'* did not respond correctly because in the sequence of painting steps, surface preparation includes cleaning and sandpapering which is the first step to ensure a clean and smooth substrate. However, the application of the primer coat typically follows surface preparation and precedes the application of the first and finishing coat. Stopping and filling may be part of surface preparation but are not necessarily distinct steps in the painting process.

Item (vi) was set on the topic of *Painting materials.* It tested the candidates' ability to identify the solution of painting material. The question asked:

A painting material in transparent solution of resinous substance with linseed oil, turpentine and alcohol solution was suggested as a finishing material in a certain constructed structure. Identify the solution of painting material to be used.

A	*Colloidal*	*B*	*Varnish*	*C*	*Cellulose*
D	*Emulsion*	*E*	*Graphite*		

The correct response among the given alternatives was B, *'Varnish'*. The candidate who chose this correct option understood that varnish is a transparent, resinous substance typically made by dissolving the resin in a solvent, with the addition of linseed oil and turpentine to improve flow and drying characteristics. Varnish is commonly used as a finishing material to enhance the appearance and provide protection to various surfaces.

However, candidates who opted for alternative A, *'Colloidal'* were incorrect. Colloidal paint is not consistent with the description provided in the question, as it involves pigment particles suspended in a colloidal

medium, such as water or oil, forming a stable dispersion. Similarly, those who chose alternative C, *'Cellulose'* made an incorrect selection. Cellulose paint, also known as cellulose lacquer, typically contains cellulose acetate butyrate (CAB) as a key ingredient. However, the description provided does not align with the typical composition of cellulose paint.

Option D, *'Emulsion'* was also an incorrect choice. Emulsion paint is used for interior and exterior wall surfaces; it does not contain linseed oil or turpentine, as described in the question. Alternative E, *'Graphite'* was not the correct option either. Graphite is used as a lubricant or component in pencils due to its lubricating and marking properties

Therefore, the candidate who correctly identified varnish demonstrated an understanding of painting materials and their typical compositions for finishing surfaces. Conversely, candidates who chose other options misunderstood the description provided or were not familiar with the properties and uses of the materials mentioned.

Item (vii) was developed from the topic of *Timber*. Candidates were required to identify different types of manufactured boards suitable for the type of joint. The question was:

Tongued and grooved are common joints used to construct triple flooring in order to provide a pleasant finish. Which material is suitable for this type of joint?

A	*Chip board*	*B*	*Fibre board*	*C*	*Heard board*
D	*Particle board*	*E*	*Solid board*		

The correct alternative was E, *'Solid board'*. Such candidates knew that solid board is the most suitable material for constructing triple flooring with tongue and groove joints. Solid boards typically made from hardwood or softwood, offer strength, durability, and stability, making them ideal for flooring applications. Additionally, solid boards can be machined to create precise tongue and groove profiles for a tight fit and a polished finish.

Alternative A, '*Chipboard',* B, '*Fibre board',* C, '*Heard board'* and D, '*Particle board'* was not correct because all of them are all engineered wood products commonly used in construction and furniture making but they are generally not preferred for tongue and groove joints in flooring due to their inherent characteristics.

Item (viii) tested the candidate's knowledge on the topic of *Painting Materials.* It tested the candidates' ability to integrate the knowledge of spreading capacity and volume of painting material. The question asked:

60 litres of water painting material having spreading capacity of 36 m^2/5 litres were applied to a certain room internally as a practical work. Estimate the internal area of the room surfaces to be covered by the supplied material.

A 436 m^2 B 438 m^2 C 434 m^2 D 432 m^2 E 440 m^2

Alternative D, '*432 m^2,* was the most correct response. Candidates who chose this response showed ability in the knowledge of estimating the area to be painted. These candidates calculated the spreading capacity per litre and hence total area to be covered which is obtained by multiplying the volume of paint material and spreading capacity.

Candidates who opted for alternatives A, *'436 $m^{2'}$,* B,'*438 m^2*' C, *'434 m^2*'and E,'*440 $m^{2'}$*, did not form any particular pattern. Such candidates were not conversant with the painting materials. As a result, they made their choices by guessing.

Item (ix) was set from the topic of *Functional Requirements of Paints*. The candidates were tested on the ability to identify and describe typical paint defects. The question was:

It has been reported that a newly painted surface has developed either bleeding or discoloration. Which statement can generalize these two defects?

A They form small depressions. B They form sandy surface.
C They form pale coating. D The coating does not bond.
E They form bubbles under the coating film.

The correct response was C, *'They form a pale coating'.* This statement accurately reflects the appearance of both bleeding and discoloration defects, as they result in a pale or inconsistent coating on the surface. Bleeding leads to the migration of underlying substances, resulting in discoloration.

The candidate who chose alternative A, '*They form small depressions'* indicated a perception that the defects result in small indentations or depressions on the surface. However, this choice does not align with the typical appearance associated with bleeding and discoloration defects, which often result in a pale or inconsistent coating. This suggests a potential misunderstanding of the characteristics of bleeding and discoloration in paint application. Similarly, the candidate who chose alternative B, '*They form a sandy surface,* may have misunderstood the typical appearance associated with bleeding and discoloration defects. Their choice indicates a perception of rough or gritty textures on the surface, which is not directly aligned with bleeding or discoloration issues.

Candidates who opted for alternative D, 'T*he coating does not bond,'* might have interpreted the defect as primarily related to adhesion issues. While poor adhesion can contribute to various paint defects, this choice does not specifically address the characteristics of bleeding or discoloration. Alternative E, '*They form bubbles under the coating film,'* may have been chosen by candidates who identified defects related to air entrapment or improper application. While these can sometimes be associated with bleeding or discoloration, the choice does not directly reflect the pale or inconsistent coating typically observed with these defects.

Generally, the option they form pale coating is chosen because it accurately reflects the common appearance of both bleeding and discoloration defects making it the most appropriate generalization for these defects on a newly painted surface. The other options do not directly relate to bleeding or discoloration or are not as universally applicable to both defects.

Overall, the choices made by the candidates offer insights into their perceptions and interpretations of the common defects encountered in paint application.

Item (x) tested the candidates' knowledge on the topic of *Signwriting and Stenciling.* The candidates were required to identify the process of writing residential building posters. The question was:

A certain municipal council is planning to prepare residential address posters. Which process is suitable for the task?

A	*Painting*	*B*	*Lettering*	*C*	*Signwriting*
D	*Decorating*	*E*	*Spraying*		

The correct answer was C, *'Signwriting'.* Candidates who chose the correct response demonstrated an understanding of various methods used for creating residential address posters. They recognized that signwriting involves creating signs or lettering by hand or using stencils, vinyl letters, or digital printing techniques. Signwriting offers the advantage of producing clear, legible, and professional-looking text suitable for signage purposes, including residential address posters.

Candidates who selected alternative A, '*Painting'* recognized that this method involves applying pigments or colors onto a surface using brushes, rollers, or sprayers. However, they may have overlooked its limitations for creating precise lettering, especially for smaller-scale projects like residential address posters, and its potentially time-consuming nature compared to other methods.

Those who opted for alternative B, '*Lettering'* understood that it involves creating letters, numbers, or characters by hand or using stencils. While suitable for precise control over letter size, style, and arrangement, candidates may have recognized its potential drawbacks, such as being labor-intensive, especially if done manually.

Candidates who chose alternative D, '*Decorating'* acknowledged that this method involves enhancing surface appearance using decorative techniques like stenciling or stamping. However, they may have

realized that such techniques may not prioritize creating clear and informative text required for residential address posters.

Alternative E, 'S*praying'* was chosen by some candidates, recognizing it as a method involving the application of paint or coatings using spray guns or aerosol cans. While efficient for covering large areas, candidates may have realized its challenges in achieving precise lettering, especially for smaller-scale projects like residential address posters.

In summary, candidates' choices provide insights into their understanding of the methods suitable for creating residential address posters. The correct choice of signwriting reflects an understanding of its advantages in terms of efficiency, precision, and customization for producing clear and professional-looking text.

2.1.2 Question 2: Matching Items

This question was constructed from the topic of *Adhesive*. Candidates were required to match the uses of adhesives described in List A with adhesives in List B by writing a letter of the correct response beside the item number in the answer booklet provided. The question tested the candidates' understanding of the types of glues. It stated that:

*Match the uses of adhesives described in **List A** with adhesives in **List B** by writing a letter of the correct response beside the item number in the answer booklet provided.*

List A		***List B***	
(i)	*Is used as a bond between plastic and porous surfaces.*	*A*	*Epoxy resin*
		B	*Contact resin*
(ii)	*Is used as a bond between wood and metal surfaces.*	*C*	*Animal resin*
		D	*Phenol formaldehyde resin*
(iii)	*Is used as a bond between laminates and wood surface.*	*E*	*Casein resin*
(iv)	*Is used as a bond between fibre board and metal surface.*	*F*	*Resorcinol formaldehyde resin*
(v)	*Is used as a bond between plastic*	*G*	*Polyvinyl acetate resin*

List A	List B
laminate surfaces. *(vi) Is used as a bond between rubber surfaces.*	*H Nitro-cellulose resin*

Statistics show that 188 candidates attempted this question. Out of those candidates, 156 (82.98%) scored from 0 to 1 mark. Students who scored from 2 to 3 marks were 32 (17.02%). Moreover, no candidates scored from 4 and 6 marks. Figure 3 summarizes the candidates' performance in Question 2.

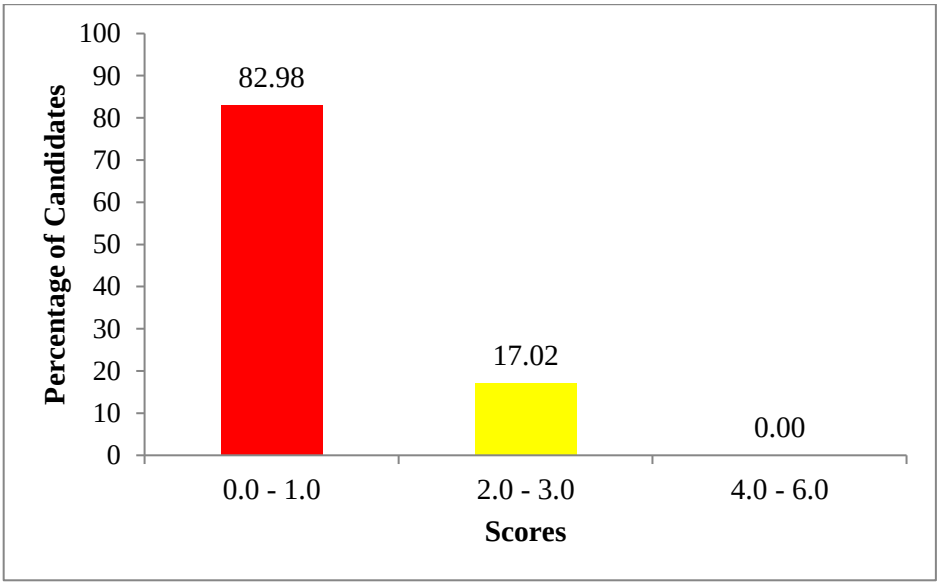


Figure 3: *The Candidates' Performance in Question 2*

The scores indicate that the candidates' performance was poor as 156 (82.98%) candidates scored from 0.0 to 1.0 mark out of 6 marks. Among the candidates with weak performance, 103 (54.79%) scored 0. The analysis of the candidates' responses shows that most of the candidates performed well in item (ii) and failed in the rest of the item. The analysis of performance of candidates in each of the items in this question is as follows:

In item (i), the candidates were required to provide a suitable response which matches correctly with the statement '*Is used as a bond between plastic and porous surfaces',* The correct response was H, '*Nitro-*

cellulose resin'. Nitro-cellulose resin acts as an adhesive for bonding plastic to porous surfaces because of its excellent adhesion properties and fast-drying nature. When applied to surfaces, it forms a strong bond that adheres well to both plastic and porous materials, such as wood or paper.

Item (ii) required the candidates to write the letter of the item, which matched correctly the phrase *'Is used as a bond between wood and metal surfaces.* The appropriate response was H, '*epoxy resin'*. Epoxy resin serves as an adhesive for bonding wood and metal surfaces. Epoxy adhesives have strong bonding capabilities, chemical resistance, and durability. They form a tough and durable bond between wood and metal, making them suitable for various applications such as construction, woodworking, and metalworking.

Item (iii), required the candidates to give the adhesive which matched correctly with the statement '*Is used as a bond between laminates and wood surface'.* The correct option was G, *polyvinyl acetate resin.* Polyvinyl acetate resin (PVA) adhesives have strong bond strength, ease of use, and versatility when applied between laminates and wood surfaces. This adhesive is used in woodworking, furniture making, and construction industries for laminating wood surfaces and attaching laminates to wood substrates. Some of the candidates matched with C, '*animal resin',* and these candidates were not aware that animal resin is used as an adhesive in woodworking, musical instrument making, and bookbinding. Animal resin offers a strong initial tack and is reversible with heat and moisture, making it suitable for applications where disassembly or repair may be necessary.

In item (iv), the candidates were required to provide a suitable response which matched correctly with the statement '*Is used as a bond between fibre board and metal surface'.* The appropriate response was E, '*casein resin'*. Casein resin is used as an adhesive for bonding fiberboard and metal surfaces. Casein adhesives are derived from milk protein and have excellent adhesive properties, particularly for porous materials like fiberboard. They also adhere well to metal surfaces, providing a strong and durable bond. This makes casein resin suitable

for applications where fiberboard needs to be bonded to metal surfaces, such as in furniture making, carpentry, and cabinetry.

In item (v), the candidates were required to give the adhesive which matched correctly the statement '*Is used as a bond between plastic laminate surfaces'*. The correct response was C, *'phenol formaldehyde resin'*. Phenol formaldehyde resin is used as an adhesive for bonding plastic laminate surfaces. Phenolic adhesives offer high heat resistance and excellent bonding strength, making them suitable for laminating applications where durability and resistance to heat and moisture are essential. They form strong bonds with both plastic laminates and substrate materials, ensuring a reliable and long-lasting bond.

In item (vi), the candidates were required to provide a suitable response, which matches correctly with the statement '*Is used as a bond between rubbers surfaces,* and the correct response was B, 'c*ontact resin'*. Contact adhesives are applied to both surfaces being bonded, left to partially dry, and then brought into contact with each other. They form an instant bond upon contact making them suitable for materials like rubber that require immediate adhesion. Contact adhesives provide a strong and flexible bond, suitable for various applications where rubber surfaces need to be bonded together.

2.2 SECTION B: SHORT ANSWER QUESTIONS

This section consisted of six (6) short answer questions; each question weighed nine (9) marks. The score ranges used for grading the performance of candidates in each question in this section are indicated in Table 1.

Table 1: Score Ranges for Grading Candidates' Performance in Questions 3 to 8.

Scores range	General Performance
0.0 - 2.5	Weak
3.0 - 5.5	Average
6.0 – 9.0	Good

2.2.1 Question 3: Timber

This question had two parts: (a) and (b). In part (a), candidates were tested on the ability to recall different methods of treating and preserving timber from early deterioration. In part (b), candidates were tested on remembering and understanding based on various timber defects and the effect of timber defects. The question stated:

(a) Suppose you are asked to store new supplied timber for the daily production uses in the school carpentry shop, explain how you will keep them free from early deterioration. Give six points.

(b) Two common timber defects are wet rot and dry rot that can occur if timber is not well stored. How does each of the defects affect timber?

The analysis shows that 188 (100%) candidates attempted the question of whom 65 (34.57%) candidates scored from 0 to 2.5 marks. Candidates who scored from 3 to 5.5 marks were 96 (51.06%) while 27 (14.37%) candidates scored from 6 to 9 marks. Figure 4 summarizes the candidates' performance in Question 3.

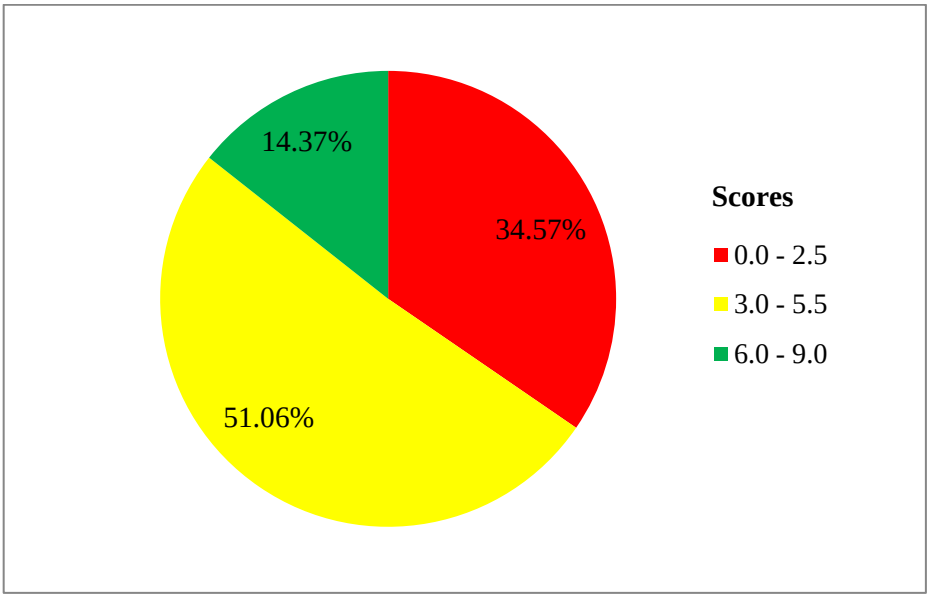


Figure 4: *The Candidates' Performance in Question 3*

Figure 4 indicates that the general performance of candidates in this question was good as 123 (65.43%) candidates scored average marks

and above. The analysis shows that these candidates responded to both parts (a) and (b) of the question. In part (a), they effectively explained the measures necessary to prevent the deterioration of timber especially when used on a daily basis. Candidates were required to provide correct responses, such as; ensuring that the surface where the timbers are placed is free from moisture, either by drying the floor or inserting a spacer between the timber and floor; ensuring all timbers are well seasoned and covering them to prevent alternation between dry and wet states. Additionally, ensuring there is no growth of vegetation around the stored timber, treating the timbers with wood preservatives to eliminate insects, avoiding bad storage by not placing extra load on top of them, ensuring all spacers are of equal size and equally spaced and allowing air circulation by providing enough space.

Candidates who scored higher marks managed to answer part (b) of the question, these candidates demonstrated a sufficient understanding of timber preservation and defects. These candidates remembered that wet rot and dry rot are two distinct types of fungal decay that affect timber. Wet rot occurs in environments with high moisture content, leading to the gradual weakening of the timber structure. On the other hand, dry rot developed in wood with lower moisture levels and spreads rapidly, causing extensive damage. Both types of rot result in structural damage if left untreated. Extract 1.1 shows a sample of correct responses provided by one of the candidates.

3 I will prevent them p from early deterioration by

(i) I will store timber in a dry conditions or on a dry places. timber are stored on a dry place so that to prevent them for defects.

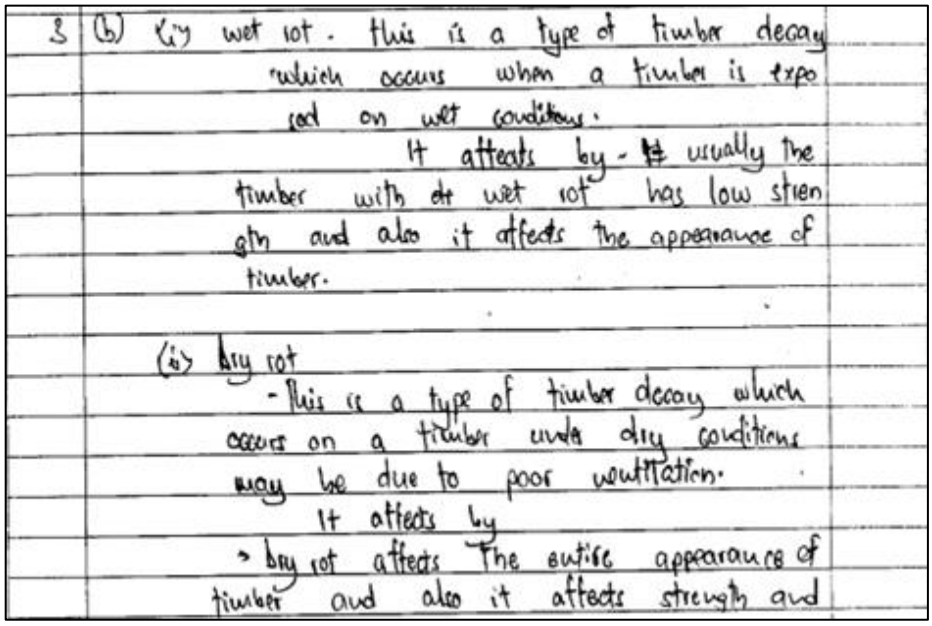
(ii) I will store timber ~~over ground~~ not in dire ct contact with ground timber are stored on a place whe re they do not come into contact with ground.

(iii) I will apply wood preservatives on it thus, i will apply wood preservatives to prevent them from decaying or warping.

(iv) I will store timber on spare which has pro per ventilation (proper ventilated) i will store timber on places which has good ventilation to prevent de caying.

(v) I will store timber in a place which is free from moisture and insects timber should be stored on places free from insects

(vi) I will store timber in a place which is not direct to sunlight to prevent shrinkange and splitting. the timber should be stored in a place which is free from direct sunlight to prevent


3 (b) (i) wet rot. this is a type of timber decay which occurs when a timber is exposed on wet conditions.
It affects by - usually the timber with wet rot has low strength and also it affects the appearance of timber.

(ii) dry rot
- this is a type of timber decay which occurs on a timber under dry conditions may be due to poor ventilation.
It affects by
- dry rot affects the entire appearance of timber and also it affects strength and

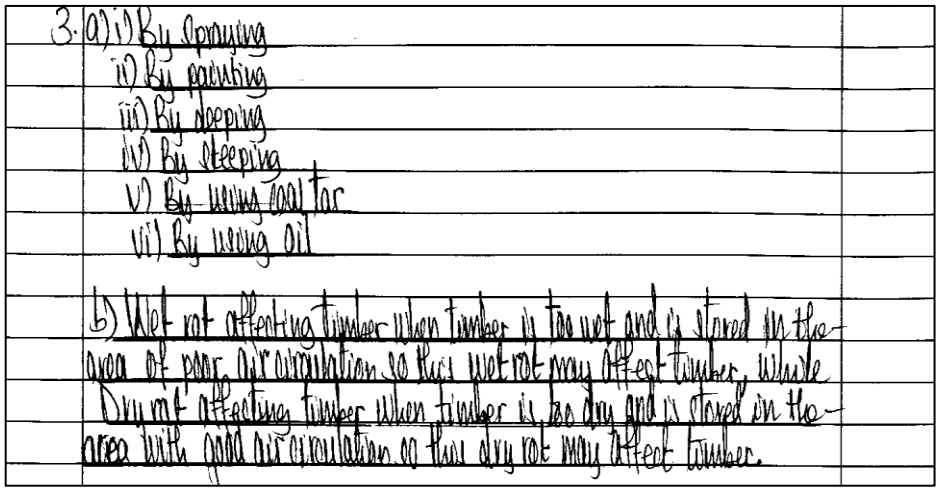
Extract 1.1: A sample of correct responses to Question 3

Extract 1.1 shows a sample of responses from a candidate who managed to explain how to keep newly supplied timber from deterioration when used daily in part (a). S/he also explained the effects of wet and dry rot on timber.

Further analysis reveals that 65 (34.57%) candidates performed poorly by attaining a score range of 0 to 2.5 marks. The majority of these candidates who scored low marks misinterpreted the requirement of the question. For example, in part (a) one of the candidates wrote *'brush method, dipping method, and pressure impregnation method'*. These are methods of applying preservatives to timber. However, another candidate wrote *'coal tar, creosote, and chemical salts'* which are preservative chemicals and not methods of keeping timber from deterioration as required from the questions.

The majority of candidates failed to give correct responses to part (b) of the question, they responded this question by either explaining other types of defects that were not asked for or using the terms dry and wet in relation to timber or season to give their explanation. Many of the candidates who scored 0 marks decided to write anything concerning timber, regardless of the requirements of the question. This is attributed

to the insufficiency of knowledge of timber. This is justified by a response from one of the candidates, as shown in Extract 1.2.


3. a) i) By spraying
ii) By painting
iii) By dipping
iv) By steeping
v) By using coal tar
vi) By using oil

b) Wet rot affecting timber when timber is too wet and is stored in the area of poor air circulation so that wet rot may affect timber, while Dry rot affecting timber when timber is too dry and is stored in the area with good air circulation so that dry rot may affect timber.

Extract 1.2: A sample of incorrect responses to Question 3

Extract 1.2 shows a sample of responses from one of the candidates who wrote about the type of preservatives and their method of application in part (a), and described the storage of timber in a dry or wet state, resulting in zero marks.

2.2.2 Question 4: Workshop Orientation

The candidates were required to provide nine criteria to be used to assess the design of the new proposed workshop layout.

The analysis shows that 188 (100%) candidates attempted the question, of whom, 63 (33.51%) candidates scored from 0 to 2.5 marks. The candidates who scored from 3 to 5.5 marks were 48 (25.53%), whereas 77 (40.96%) candidates scored from 6 to 9 marks. Figure 5 shows the performance of the candidates in this question.

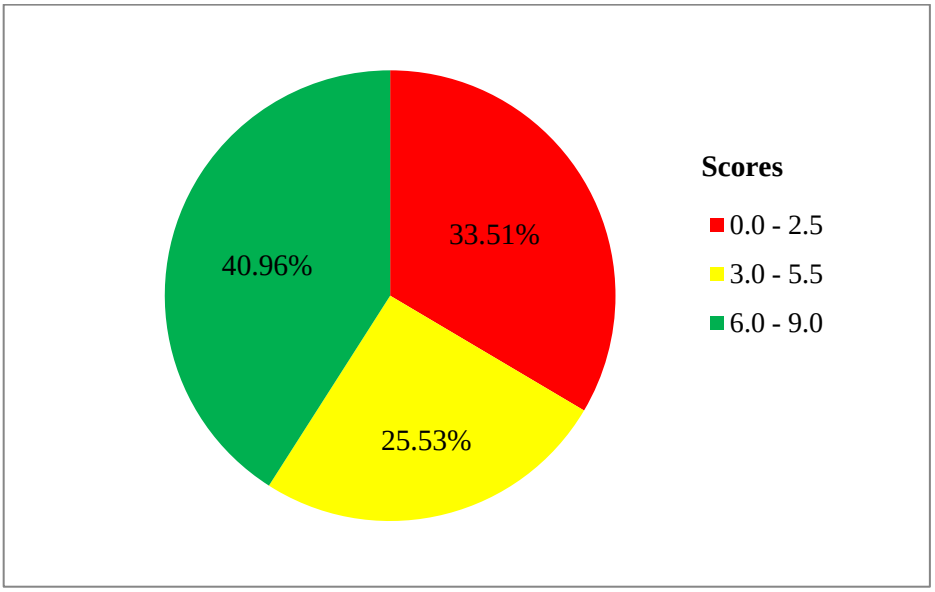
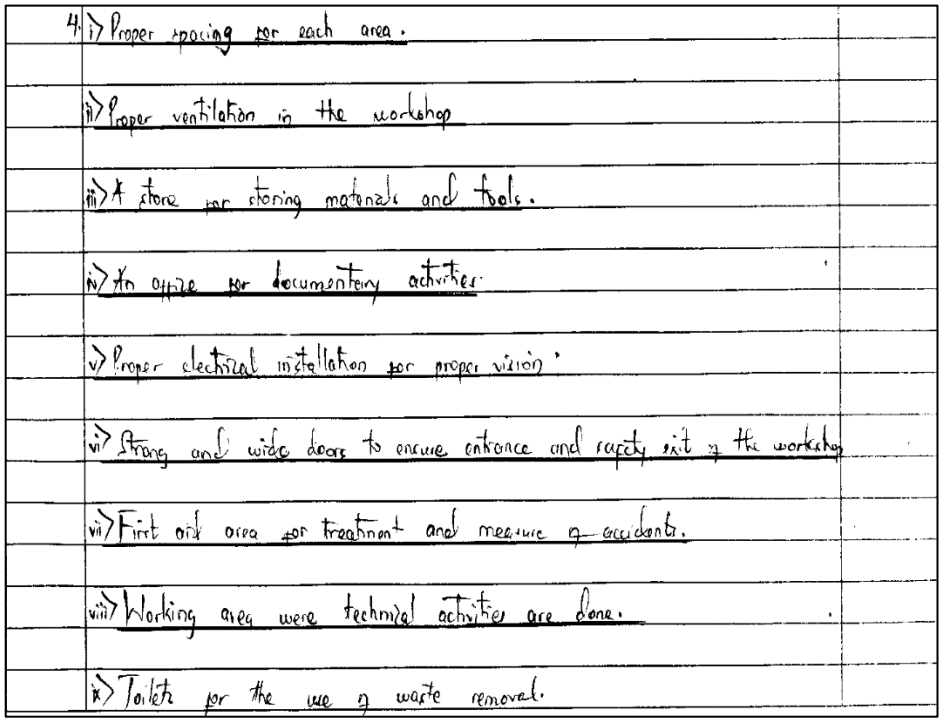


Figure 5: *The Candidates' Performance in Question 4*

Figure 5 shows that 125 (66.49%) candidates scored 3 marks and above which is an indicator of a good performance. Such candidates were relatively able to provide criteria to be used to assess the new proposed workshop layout. Their score was determined by how many of their answers were accurate.

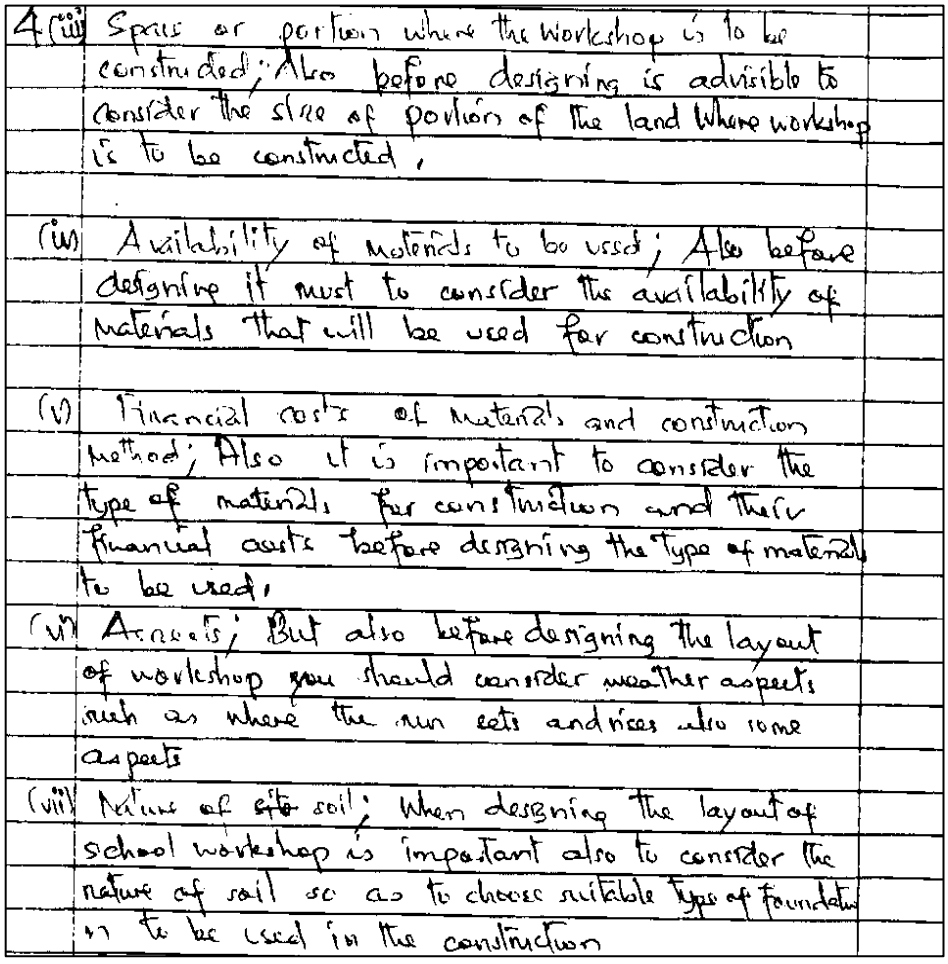
Candidates were supposed to write the criteria for assessing a new workshop. These include ensuring that the size of the workshop or firm aligns with the intended production activities. There should also be adequate space available to accommodate all required machines and operations. The layout must also accommodate the appropriate number and types of machines within the available floor space. Furthermore, a system for chip and dusty excretion should be incorporated into the design, along with provision for a tool room dedicated to tool and machine maintenance. A clear indication of the location and size of storage and racking facilities within the layout is necessary. Lighting arrangements in the workshop must be suitable and adequate and provisions for a suitable and sufficient power supply must be included to support the workshop's operations. Extract 2.1 presents a sample of the correct response to this question.



Extract 2.1: A sample of correct responses to Question 4

Extract 2.1 shows a sample of responses from one of the candidates who managed to provide nine criteria used to assess the design of the new proposed workshop layout and hence scored full marks.

Further analysis reveals that 63 (33.51%) candidates performed poorly, after attaining scores ranging from 0 to 2.5 marks. These candidates failed to provide at least three correct answers out of the nine. Some of them repeated answers to the same question. Candidates who scored 0 marks wrote illogical and irrelevant answers or skipped the question altogether. Responses given by the candidates in this category indicate that they lacked practical knowledge and skills in workshop layout. Extract 2.2 provides a sample of a candidate's poor responses.



Extract 2.2: A sample of incorrect responses to Question 4

Extract 2.2 shows a sample of responses from a candidate who explained the factors to consider when designing the workshop building instead of factors relevant for checking the layout of the workshop.

2.2.3 Question 5: Spraying and Spray Equipment

This question had two parts: (a) and (b). In part (a), candidates were required to identify possible causes of the following faults that occurred during painting work: defective spray pattern; electrical failure; fluid leakage; dry needle packing; dirty air cap and spluttering. In part (b), candidates were required to propose the proper means of repairing the faults in (a).

This question is intended to test candidates' ability to address the causes of faults that arise during spraying process and provide the corrective action to fix the errors

The question was attempted by 188 (100%) candidates whose scores were as follows: 180 (95.74%) candidates performed poorly as they scored from 0 to 2.5 marks; 8 (4.26%) candidates scored average from 2 to 3.5 marks and none of the candidates performed well as no score from 6 to 9 marks. Figure 6 summarizes the overall performance in the question.

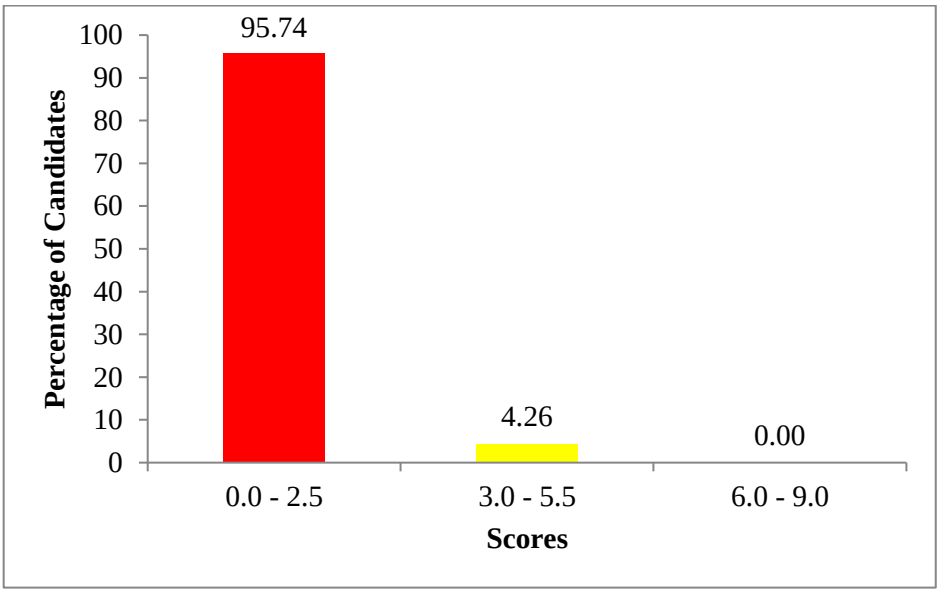


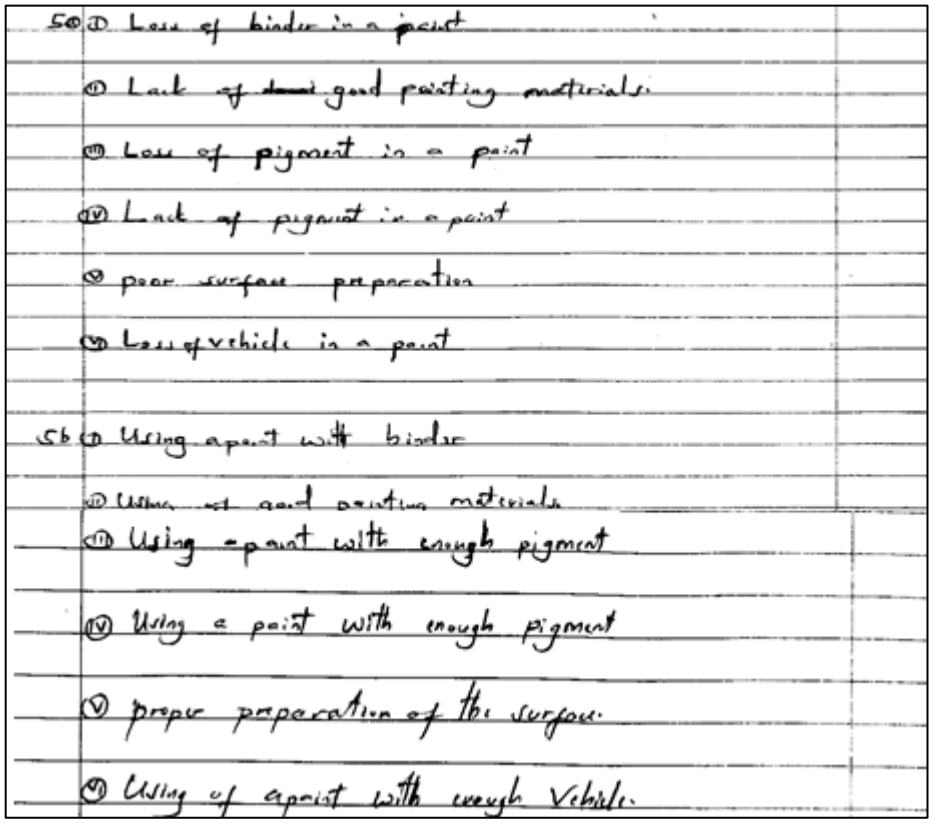
Figure 6: *The Candidates' Performance in Question 5*

Figure 6 shows that the candidates' performance in this question was weak since 180 (95.74%) candidates scored below average. Data analysis shows that among the candidates who scored low marks, 134 (71.27%) scored 0. Father analysis reveals that the majority of candidates who scored low marks faced difficulties in answering all the parts of the question. The majority of the candidates provided irrelevant answers as they misunderstood the question. For example, in part (a) the majority failed to identify possible causes of the faults that occurred during painting work. Some of the wrong responses were such as part

(i) *rough surface to be slayed,* other in part (iii) *poor storage of spray equipment and* in part (vi*) usage of wrong spray*.

In part (b), some of the wrong means of repairing the faults in part (a) were such as part (i) *make sure the surface to be sprayed is well planned* and in part (iii) *make sure you use the required spray needed by the surface.* Such meaningless responses are indicators that the candidates were not conversant with spraying and spray equipment topic. If they had covered the topic well, they could have given causes of the faults that occurred during painting work in part (a) including (i), Fluid leakage is caused by missing or broken fluid needle spring, (ii), (iii), and Defective spray pattern is caused by preventing coating from assuming the correct pattern. (iv), Dry needle packing is caused by fluid leaking or dripping from the gun. (v), Dirty air cap is caused by faulty spray pattern and (vi) Spluttering is caused if the coating has trouble being released from the gun tip smoothly.

In part (b), the appropriate means of repairing the faults in (a) were as follows: To rectify a defective spray pattern in part (i), clean the dirty cap or tip and remove any obstructions in the air cap before resuming. For electrical failure in part (ii), a qualified electrician is required to repair the machine. In part, (iii) Repair fluid leakage by replacing damaged components and checking the needle size for cleanliness and correctness. To fix dry needle packing in part (iv) lubricate it with mineral oil and check the packing nut for tightness, adjusting if necessary. Address a dirt air cup in part (v) by removing and cleaning it with a suitable thinner or solvent and in part, (vi) Resolve spluttering by cleaning the gun and ensuring the pressure is set correctly. Extract 3.1 is a sample of incorrect responses from the candidate's script.



Extract 3:1 A sample of incorrect responses to Question 5

Extract 3.1 shows a sample of the incorrect responses from candidates who presented paint and its contents to answer all parts of the question.

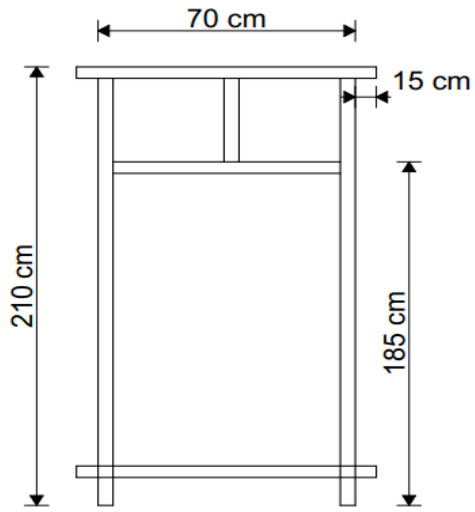
2.2.4 Question 6: Doors and Windows

This question had three parts (a), (b) and (c). In part (a), candidates were required to prepare the cutting list. In part, (b) they were required to calculate the cost of frames, and (c) to identify the best joint to fit the parts of doorframes. The question was as follows:

(a) An office manager went to the workshop with a sketch sample of fan light story door frame which is made by using Mninga timber as shown in the figure below. Prepare the cutting list according to the manager's desire.

(b) If one frame cost Tsh 108,000 for materials, Tsh 12,000 for labour charge and Tsh 40,000 for transport for all frames of the

client. How much the manager does should pay for the four frames.



(c) What is the best joint should be used to fix the following parts during frame manufacturing?

(i) Jambs to head.

(ii) Mullion to head and transom.

A total of 188 (100%) candidates attempted the question, of which 113 (60.11%) candidates scored from 0 to 2.5 marks. Candidates who scored from 3 to 5.5 marks were 61 (32.45%), whereas 14 (7.44%) scored from 6 to 9 marks. The performance of the candidates in this question is summarised in Figure 7.

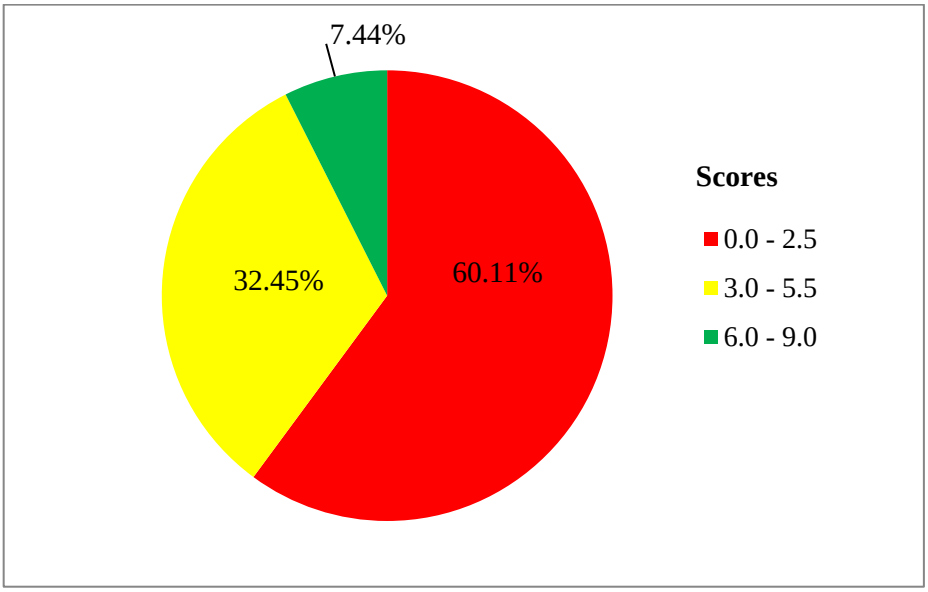


Figure 7: *The Candidates' Performance in Question 6*

The general performance of candidates in this question was average, as depicted in Figure 7. The majority of candidates, scoring from 3 to 5.5 marks in part (a) of the question managed to prepare a cutting list with missing parts of its content. A complete cutting list should include part numbers, descriptions, and number of pieces per frame, dimensions of parts, materials, and remarks. In part (b), candidates were able to calculate the material cost of one door and thus the total cost of all doors. However, most of them failed to identify the labour charge that should be taken for each door and overlooked the inclusion of transport charges for all doors.

Nevertheless, the 14 (7.44%) candidates who scored from 6 to 9 marks had enough knowledge on preparing cutting lists and calculating the cost of materials for timber components. These candidates were able to prepare the cutting list for all four doors as required. Additionally, they calculated the total cost, although they failed to mention the specific joints to be used for fixing parts of the doorframe in part (c) of the question. In part (c)(i), the best joint for fixing jambs to the head is through mortise and tenon, and in part (c)(ii), the best joint for fixing mullion to the head and transom is stub/stopped tenon joint. Extract 4.1

provides a sample of correct responses from one of the candidates in this category.

6 (a)

S/N	Item	Size	Quantity	Remark
1	Head	100cm long	1	Hard wood (Mininga)
2	Jambs	210cm Long	2	Hard wood (mininga)
3	Mullion	40cm long	1	Hard wood (mininga)
4	Transom	70cm long.	1	Hard wood (mininga)
5	Threshhold	100cm long	1	Hard wood (mininga)

(b) Soln

Data given

material cost = 108,000

Labour charge = 12,000

Transport = 40,000 for all frames

Total construction of 1 frame = 108,000 + 12,000

= 120,000/=

Cost for 4 frames = 4 × 120,000/=

= 480,000=

Total cost for 4 frames = 480,000/= + 40,000

= 520,000/= Tshs

∴ The manager should pay 520,000 Tshs for 4 door frames.

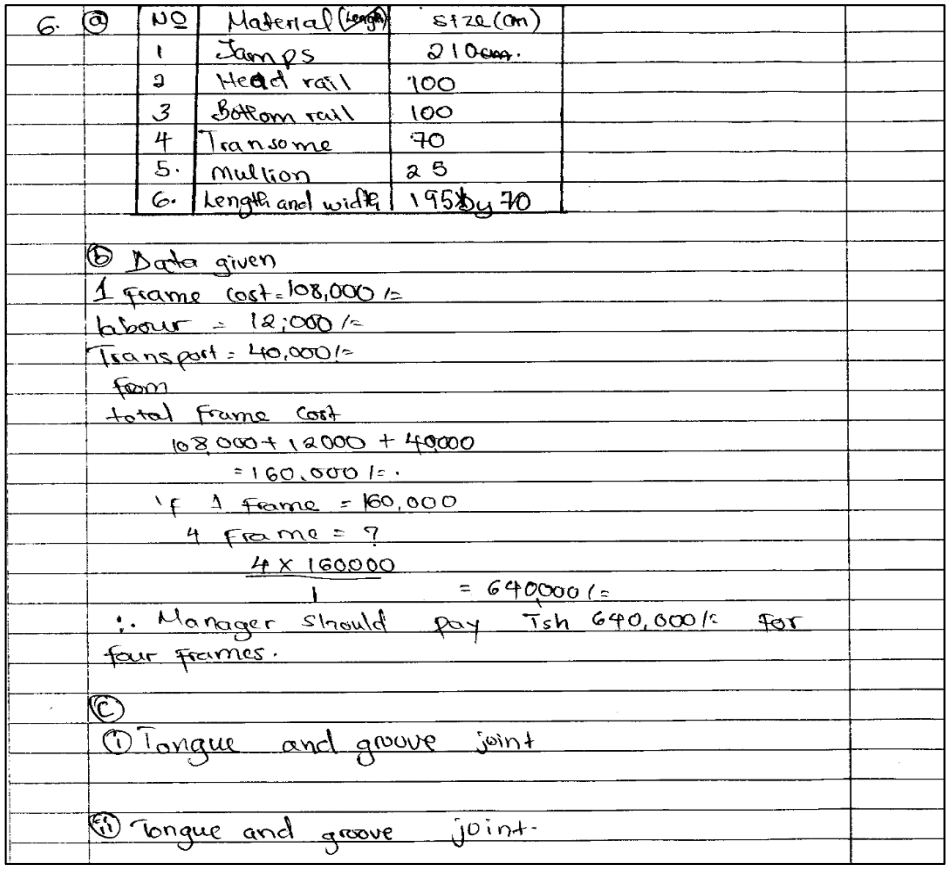
6 (c) (i) Tongued joints / Tenon joints

(ii) Tenon joints

Extract 4.1: A sample of correct responses to Question 6

Extract 4.1 provides a sample of responses from one of the candidates who, in part (a), successfully prepared the cutting list for a doorframe, and in part (b), calculated the total cost that the manager should pay for the four frames and in part (c), managed to mention the best joint that should be used for fixing jambs to head as well as mullion to head and trasom.

Despite the average performance by most of the candidates, 113 (60.11%) candidates performed poorly. Most of these candidates who scored low marks provided irrelevant responses in all parts of the question, most likely as a result of insufficient knowledge on the preparation of the cutting list, preparation of the cost of woodwork components and joining of timber components. Others misinterpreted some parts of the question requirements as shown in extract 4.2.



6. (a)

NO	Material	SIZE (cm)
1	Jamps	210
2	Head rail	100
3	Bottom rail	100
4	Transome	70
5.	Mullion	25
6.	Length and width	195 by 70

(b) Data given

1 frame cost = 108,000 /=

labour = 12,000 /=

Transport = 40,000 /=

from

total frame cost

108,000 + 12000 + 40000

= 160,000 /=.

If 1 frame = 160,000

4 Frame = ?

$\frac{4 \times 160000}{1}$ = 640000 /=

∴ Manager should pay Tsh 640,000 /= for four frames.

(c)

(i) Tongue and groove joint

(ii) Tongue and groove joint.

Extract 4.2: A sample of incorrect responses to Question 6

Extract 4.2 shows responses by a candidate who wrote an incomplete cutting list in part (a) and successfully wrote the data required in part (b) but failed to calculate how much the manager should pay for four frames. In part (c) he/she gave the wrong type of joint to join the frame member.

2.2.5 Question 7: Painting Materials

The question required candidates to estimate the amount and cost of painting materials. The question stated*:*

A classroom with 21m length, 11m width and 3.7 m height is required to be painted on all four surfaces of walls internally with three coats. The classroom has six 5 m by 2.5 m windows for light and air circulation with an entrance door of 1.2 m by 2.5 m. Given that, the cost of one litre of painting materials is Tshs 6500. Estimate the amount and cost of painting materials if the spreading capacity is 36m^2/5litres.

The analysis shows that 188 (100%) candidates attempted the question. Out of these, 115 (61.17%) scored from 0 to 2.5 marks. Candidates who scored from 3 to 5.5 marks were 28 (14.89%), while 45 (23.94%) candidates scored from 6 to 9 marks. Only 10 (5.32%) candidates scored 6 marks in the question. Figure 8 summarizes the candidates' performance in this question.

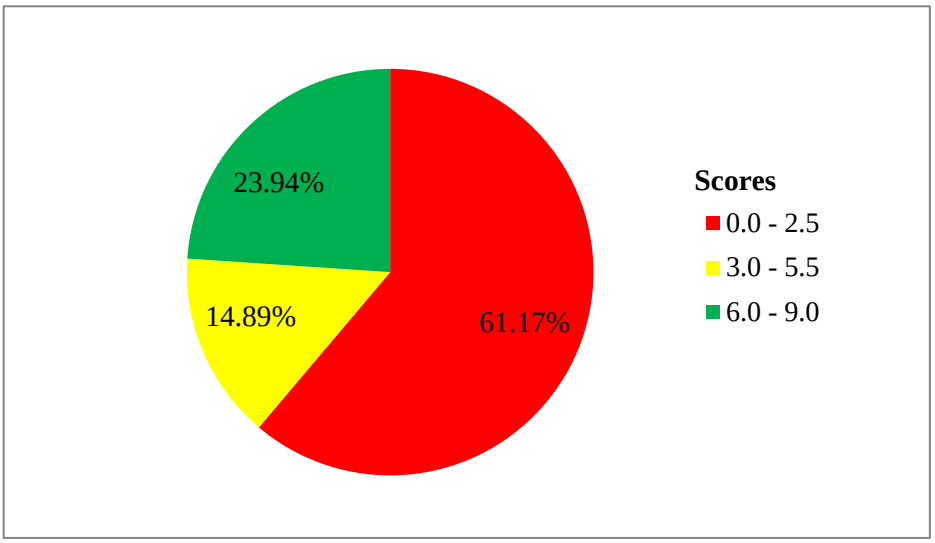
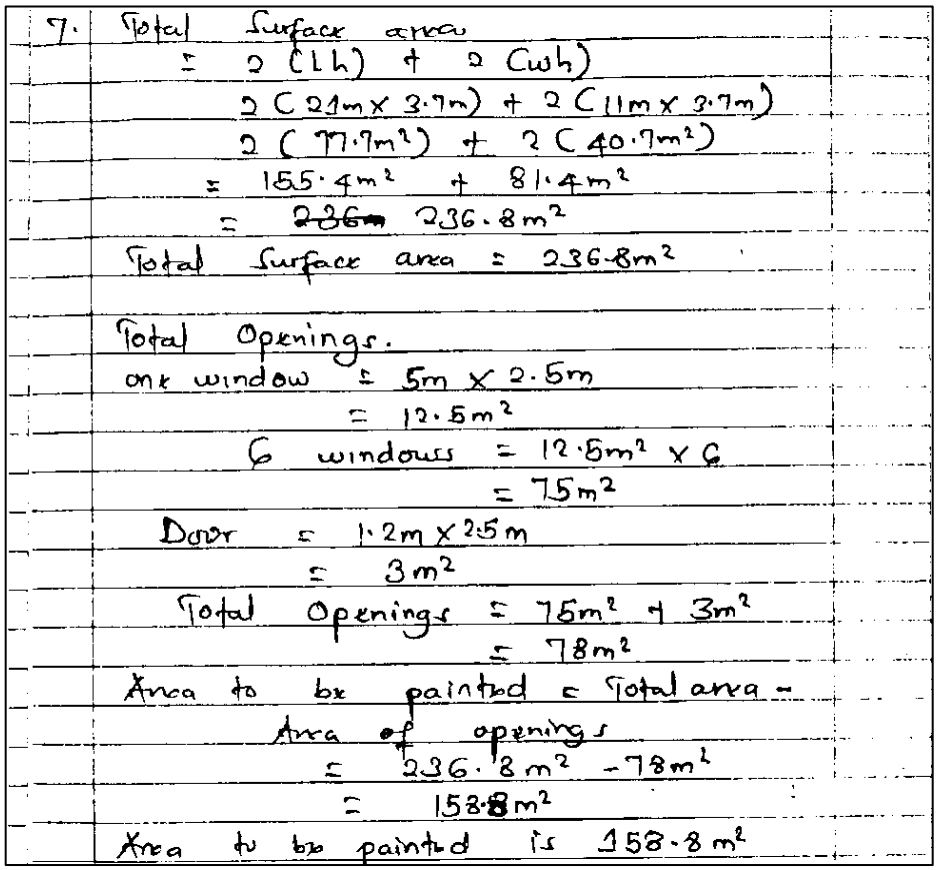


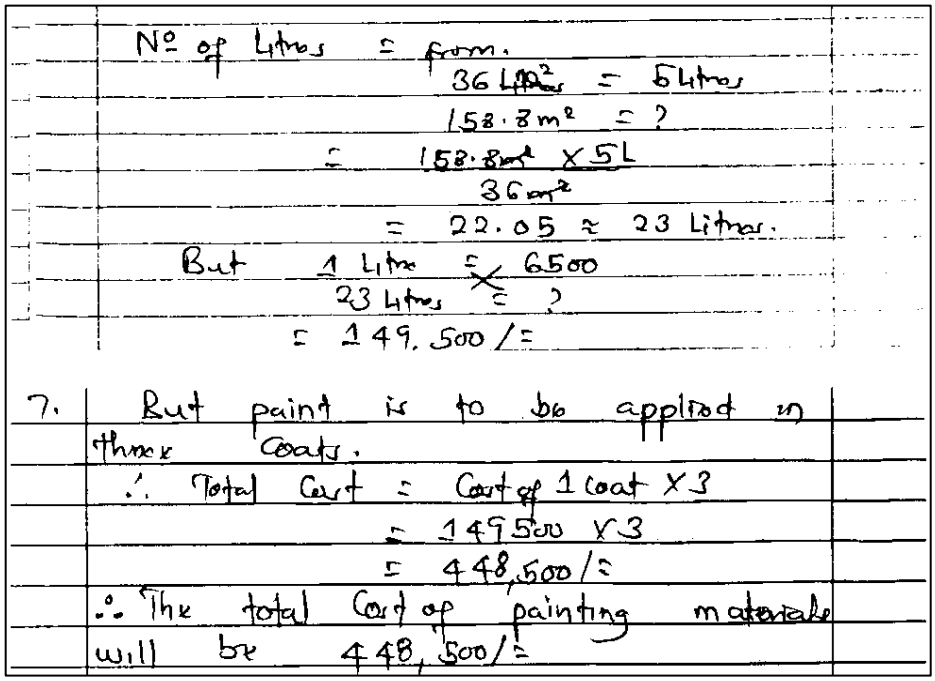
Figure 8: *The Candidates' Performance in Question 7*

The general performance of candidates in this question was average as depicted in figure 8. Candidates who managed to score from 3 to 5.5 marks were able to compute the total area of the class walls by multiplying the circumference and height of the class. Additionally, by subtracting the areas of the openings, they were able to determine successfully the area that needed paints.

Candidates who scored higher marks (6 to 9 marks) showed a deeper comprehension of the topic. They determined the required quantity of painting materials for the overall area that needed to be painted and hence multiplied by the cost of one litre to obtain the total cost of materials. This indicates that candidates in this category had enough knowledge of the topic of painting materials, as seen in Extract 5.1.


7. Total surface area
= 2 (lh) + 2 (wh)
2 (21m × 3.7m) + 2 (11m × 3.7m)
2 (77.7m²) + 2 (40.7m²)
= 155.4m² + 81.4m²
= 236.8m²
Total surface area = 236.8m²

Total Openings.
one window = 5m × 2.5m
= 12.5m²
6 windows = 12.5m² × 6
= 75m²
Door = 1.2m × 2.5m
= 3m²
Total Openings = 75m² + 3m²
= 78m²
Area to be painted = Total area - Area of openings
= 236.8m² - 78m²
= 158.8m²
Area to be painted is 158.8m²



Extract 5.1: A sample of correct responses to Question 7

Extract 5.1 is a sample of responses from one of the candidates who was able to follow the procedures of calculating the cost of painting materials.

Despite the average performance of most of the candidates, 115 (61.17%) candidates performed poorly. The candidates who scored low marks just wrote the data required to calculate the area of the walls of the room as well as areas of a door and windows. These candidates had inadequate knowledge of painting materials that could at least enable them to follow procedures and calculate the cost of materials.

Further analysis shows that candidates who scored 0 marks provided irrelevant answers that were completely out of context. Such meaningless responses indicate that these candidates were not familiar with the topic of painting materials. They covered the topic adequately, they would have been able to follow procedures and calculate the required amount of painting materials. Extract 5.2 provides a sample of the incorrect responses provided by the candidates.

7 Data given

length of class room 21m

Width of Class room 11m

Height of class room 3·7m

Window dimension

5m x 2·5m (Their 8ix)

Door dimension

1·2m x 2·5m

Cost of one litre of painting material is 6500Tsh

Spreading capacity is $36m^2$ /5 Litres.

1st To find the area of surface to be painted.

Area of the room

21m x 11m x 3·7m

3·7m x 2 31m² Area of the whole room

854·7 M^3 Total area of a room.

2nd To find the area of Openings like door and windows

Windows area

(5m x 2·5m)6

75m²

Doors area

1·2m x 2·5m

3m²

Windows area + Doors area

75m² + 3m²

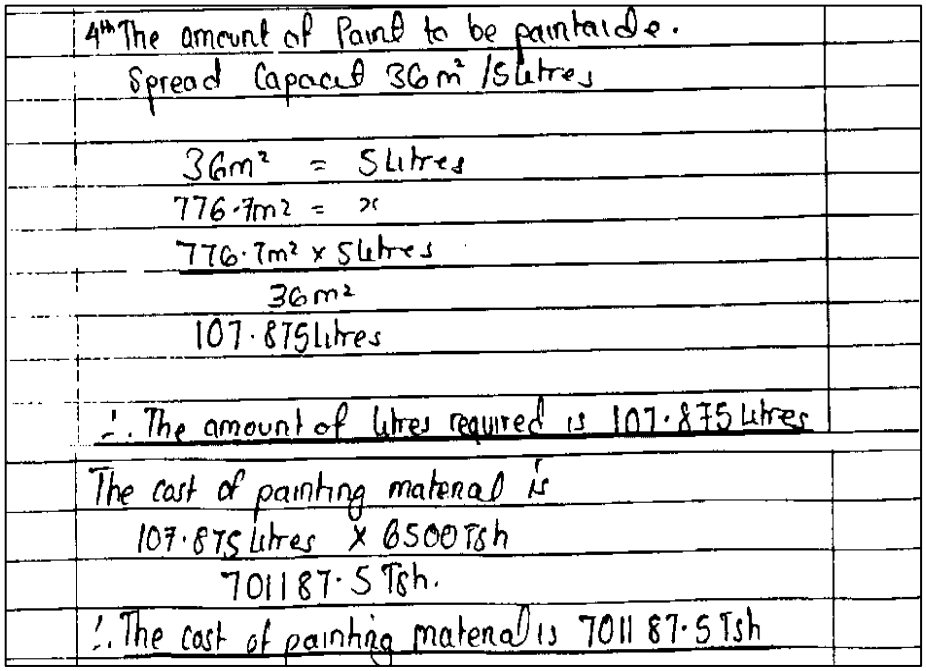
78m²

3rd To Subtract area of total room to the area of Windows and Doors

854·7m² - 78m²

776·7m²

∴ The area to be painted is 776·7m².



Extract 5.2: A sample of incorrect responses to Question 7

Extract 5.2 provides an example of a candidate's response who successfully recorded the given data for the question and accurately calculated the areas of doors and windows. However, they failed to compute the circumference of the room and hence failed to complete the remaining part of the question.

2.2.6 Question 8: Roofs

The question required candidates to describe the following terms as used in roof construction: battens, cleat, common rafters, purlins, fascia board and rafter. It is intended to test candidates' ability to recall the functions of all members of the roof structure.

The question was attempted by 188 (100%) candidates, of whom 93 (49.47%) candidates scored from 0 to 2.5 marks. Further data analysis indicates that 82 (43.62%) candidates scored from 3 to 5.5 marks, while 13 (6.91%) candidates scored from 6 to 9 marks. Figure 9 illustrates the candidates' performance in this question.

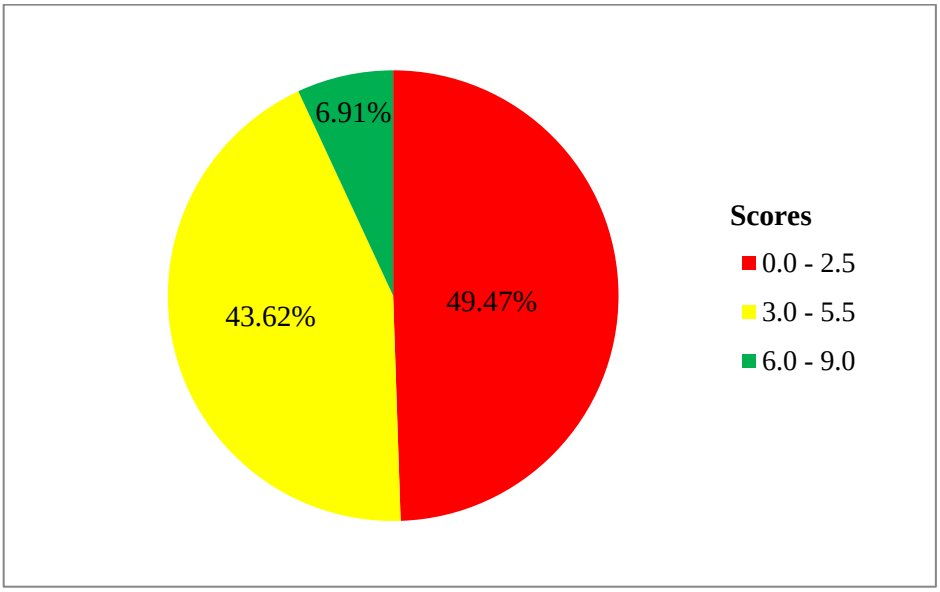


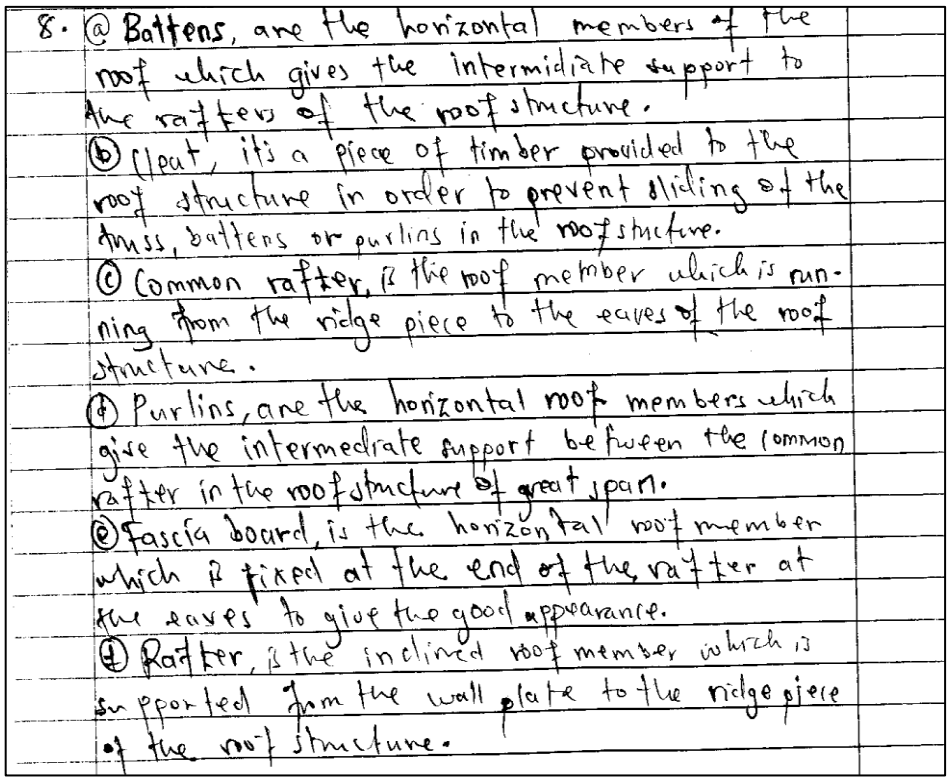
Figure 9: *The Candidates' Performance in Question 8*

Figure 9 indicates that the general performance of candidates in this question was average, as 95 (50.53%) candidates scored average marks and above. The analysis shows that candidates who scored average marks were able to respond to some of the items alternating from part (a) to part (f).

Most of the students in these categories managed to describe item (c) common rafter as a specific type of rafter used in roof construction extending diagonally from the top plate of a wall to the ridge board or beam at the peak of the roof. Additionally, they were able to define item (e) Fascia board as a wooden plank or board fixed to the feet of the common rafters at the eaves. Similarly, they understood item (f) a rafter as any sloped structural member supporting the roof, including common rafters as well as other types such as hip, valley, and jack rafters. However, these candidates failed to explain item (a) battens and mixed up between member (b) cleat and (d) purlins.

Further analysis reveals that candidates who scored from 6 to 9 marks had sufficient knowledge of roof trusses. These candidates managed to correctly explain item (a) battens as thin strips of wood, which are nailed to the rafters to support the roof ceiling, as well as item (b) Cleat

as short sections of wood, which are fixed on the principal rafter of trusses to support the purlins. Furthermore, they understood item (d) purlins as horizontal wooden members laid on principals to support common rafters when the span is large. Such candidates were knowledgeable and skilled in the topic of roof trusses. Extract 6.1 shows a sample of correct responses provided by one of the candidates.

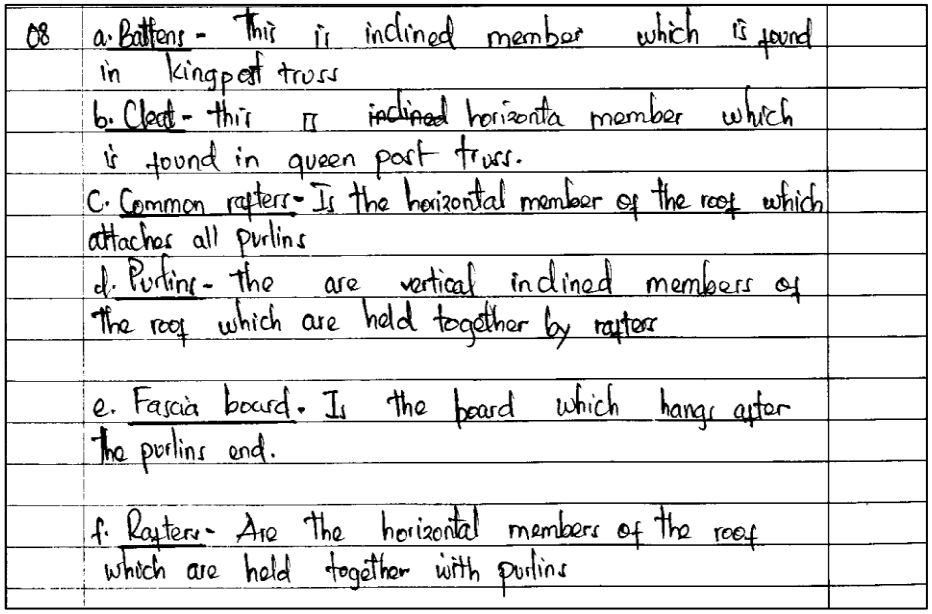

8. (a) Battens, are the horizontal members of the roof which gives the intermidiate support to the rafters of the roof structure.
(b) Cleat, it's a piece of timber provided to the roof structure in order to prevent sliding of the truss, battens or purlins in the roof structure.
(c) Common rafter, is the roof member which is running from the ridge piece to the eaves of the roof structure.
(d) Purlins, are the horizontal roof members which give the intermediate support between the common rafter in the roof structure of great span.
(e) Fascia board, is the horizontal roof member which is fixed at the end of the rafter at the eaves to give the good appearance.
(f) Rafter, is the inclined roof member which is supported from the wall plate to the ridge piece of the roof structure.

Extract 6.1: A sample of correct responses to Question 8

Extract 6.1 shows a response from one of the candidates who described the following terms as used in roof construction: battens, cleat, common rafters, purlins, fascia board and rafter.

Further analysis reveals that 93 (49.47%) candidates performed poorly by attaining the score range of 0 to 2.5 marks. Such candidates managed partially to describe one or two roof terms in the question for example one candidate wrote (a) battens *'these a timber or steel boards that are fixed to rafter horizontally'*, and other wrote in part (d) purlins

'*are horizontal timber members laid below the rafters to enhance support attachment to the tie beam'*. The majority of the candidates, who scored a 0 mark, chose to write anything concerning roofs in their responses regardless of the requirements of the question. This was attributed by insufficient knowledge and skills in the topic of roofs. This is justified by a response from one of the candidates, as shown in Extract 6.2


08
a. Battens - This is inclined member which is found in kingpost truss
b. Cleat - this is inclined horizonta member which is found in queen post truss.
C. Common rafters - Is the horizontal member of the roof which attaches all purlins
d. Purlins - the are vertical inclined members of the roof which are hold together by rafters
e. Fascia board - Is the board which hangs after the purlins end.
f. Rafters - Are the horizontal members of the roof which are hold together with purlins

Extract 6.2: A sample of incorrect responses to Question 8

Extract 6.2 shows a response from one of the candidates who failed to comprehend the question and hence wrote anything concerning roofs.

2.3 SECTION C: STRUCTURED QUESTIONS

This section consisted of three questions; candidates were required to attempt only two questions. Each question carried fifteen (15) marks. The score ranges used for grading the performance of candidates in this section are indicated in Table 2.

Table 2: Score Ranges for Grading Candidates' Performance in Questions 9, 10 and 11.

Scores Range	General Performance
0.0 – 4.0	Weak
4.5 – 9.5	Average
10.0 – 15.0	Good

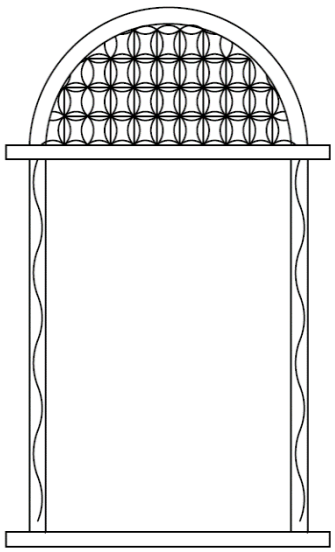
2.3.1 Question 9: Temporary Support

This question had two parts: (a) and (b). In part (a), candidates were required to identify and describe factors considered in selecting material for the construction of a formwork. In part (b), candidates were required to construct a formwork for arches. The question was as follows:

(a) (i) What are the four common materials that are used to construct formwork?

(ii) Describe the five factors that must be considered in selecting materials for 93 *the construction of a formwork.*

(b) Construct a formwork for arches at the wall opening to fix a curved solid frame provided in the figure showing struts, lagging, bearer, ribs, tie and gussets.



The question intended to test candidates' knowledge and ability to recall different materials used to construct formwork, apprehension of factors considered for selecting these materials and finally applications of knowledge to construct a formwork for arches.

A total of 164 (87.23%) of all the candidates attempted the question, of whom 68 (41.46%) candidates scored from 0 to 4 marks. The candidates who scored from 4.5 to 9.5 marks were 94 (57.32%), whereas only 2 (1.22%) candidates scored from 10 to 15 marks. The performance of the candidates in this question is summarised in Figure 10.

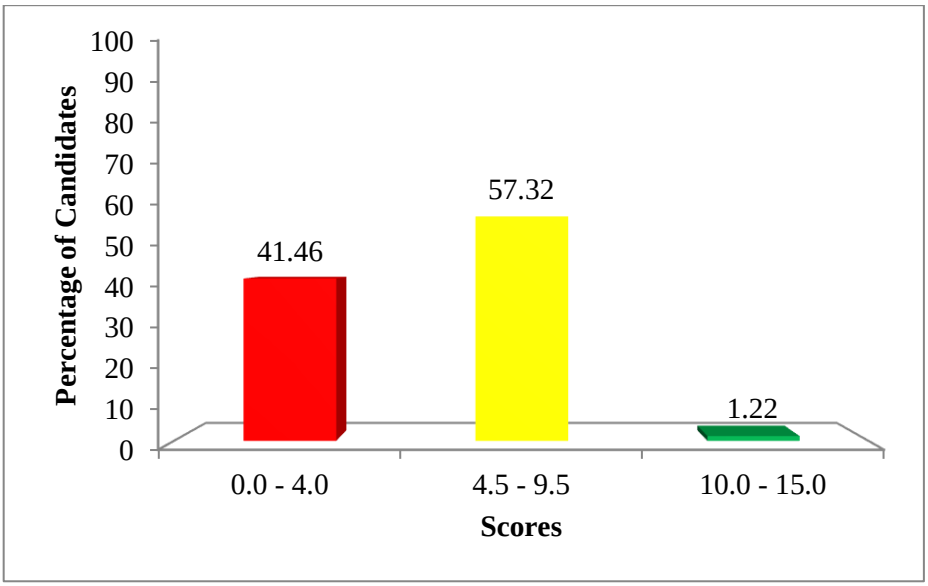
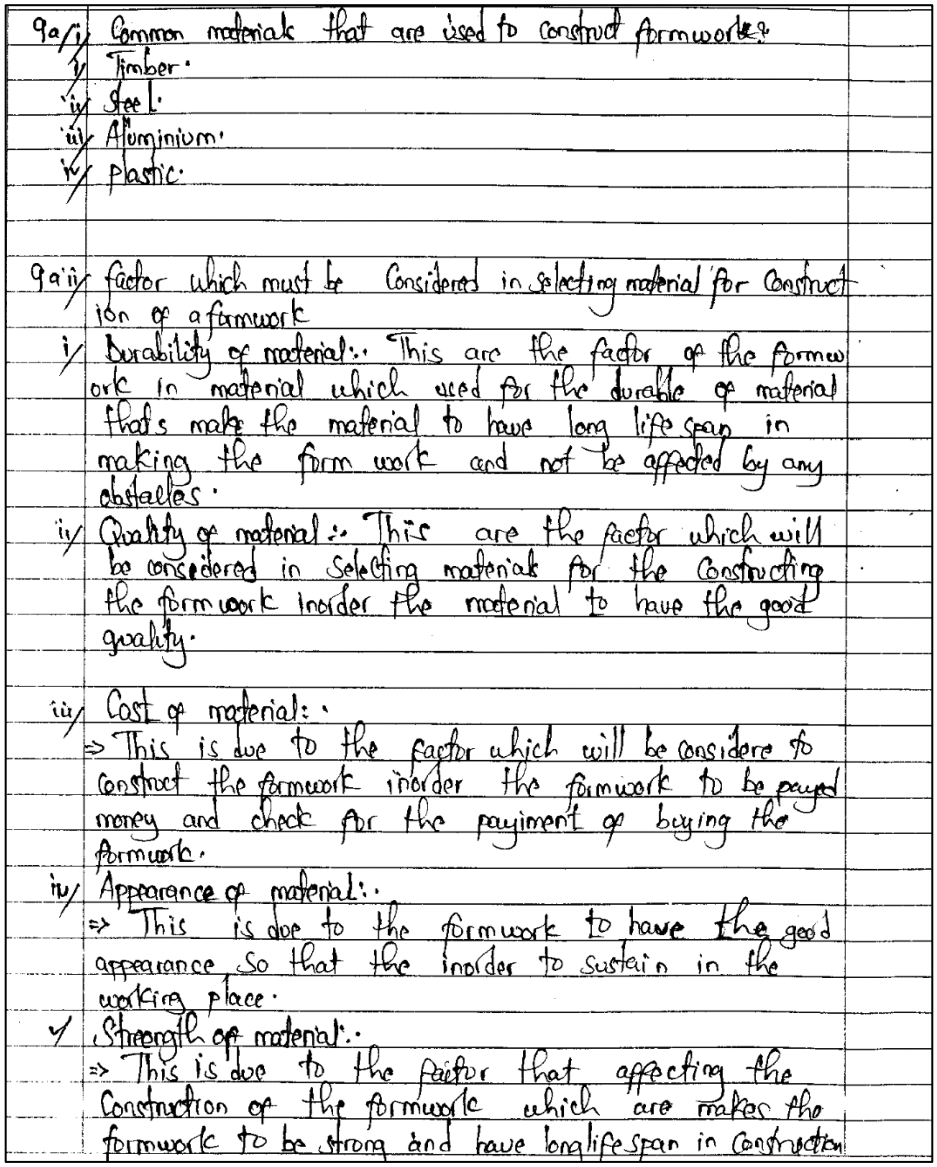


Figure 10: *The Candidates' Performance in Question 9*

Figure 10 shows that 96 (58.54%) candidates scored 4.5 marks and above which indicates average performance. The analysis shows that candidates who scored average marks were able to respond to both parts (a) and (b) of the question. In part (a), section (i) they correctly listed materials used to construct formwork which include; timber, plywood, hardboard, steel, marine board, and aluminium. Similarly, in part (a), of section (ii) they described factors considered in selecting materials for the construction of formwork based on criteria such as strength, economic use, ease of handling, making, and erecting, facilities for adjustment, levelling, easing, and striking, the quality of

finishing required, and availability of materials. However, the majority of these candidates failed to attempt part (b) of the question.

A few candidates scored higher marks (10 – 15). These candidates were able to draw the required formwork but failed to locate some members of the formwork resulting in variations in marks. Extract 7.1 illustrates a sample of the correct responses presented by a candidate who failed the question.

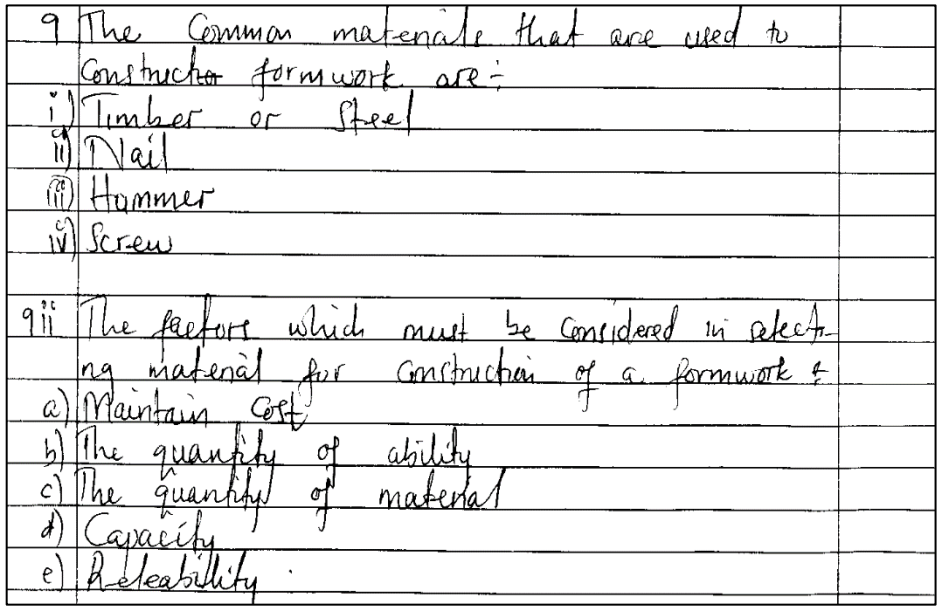

9a/i/ Common materials that are used to construct formwork:-
i/ Timber.
ii/ Steel.
iii/ Aluminium.
iv/ plastic.

9a/ii/ factor which must be Considered in selecting material for Construction of a formwork
i/ Durability of material:- This are the factor of the formwork in material which used for the durable of material that's make the material to have long life span in making the form work and not be affected by any obstacles.
ii/ Quality of material:- This are the factor which will be considered in selecting materials for the Constructing the formwork inorder the material to have the good quality.
iii/ Cost of material:-
=> This is due to the factor which will be considere to construct the formwork inorder the formwork to be payed money and check for the payiment of buying the formwork.
iv/ Appearance of material:-
=> This is due to the formwork to have the good appearance so that the inorder to sustain in the working place.
v/ Strength of material:-
=> This is due to the factor that affecting the Construction of the formwork which are makes the formwork to be strong and have longlife span in Construction

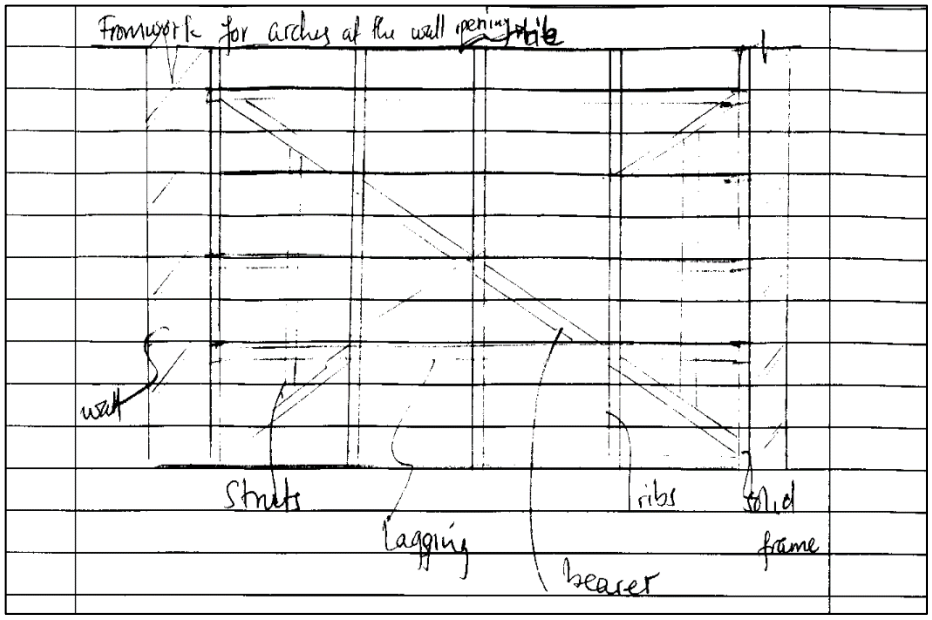
Extract 7.1: A sample of correct responses to Question 9

Extract 7.1 shows a response from a candidate who was able to identify materials used for constructing formwork in part (a) (i). He/she also described factors considered in selecting materials for the construction of a formwork in part (a) (ii).

On the contrary, 68 (41.46%) candidates performed poorly by attaining a score range of 0 to 4 marks. Such candidates provided incorrect responses in almost all parts of the question. For example, in part (a)(i) many of the candidates wrote types of equipment and materials used in the construction of timber formwork such as *'claw hammer, nails, marking gauge* and *screws*. Some of the candidates wrote materials that are used to form an arc for example concrete. Similarly, in part (a)(ii), candidates failed to describe adequately factors to consider when selecting formwork materials, with many responses lacking depth and clarity. Furthermore, the majority of these candidates neglected to attempt part (c) of the question entirely, indicating a significant gap in understanding or inability to apply knowledge to practical tasks. Extract 7.2 illustrates a sample of the incorrect responses presented by a candidate who failed the question.


9 The Comman materials that are used to Construction formwork are:-
i) Timber or Steel
ii) Nail
iii) Hammer
iv) Screw

9ii The factors which must be considered in selecting material for Construction of a formwork is
a) Maintain Cost
b) The quantity of ability
c) The quantity of material
d) Capacity
e) Reliability.



Extract 7.2: A sample of incorrect responses to Question 9

Extract 7.2 shows a response from a candidate who wrongly interpreted the question and wrote the tools required to use on manufacture in part (a) and drew a frame of a partition wall instead of framework for arches of the wall opening in part (b) of the question.

2.3.2 Question 10: Timber

The question required to justify with six points the statement "to dry timber in the furnace is the best method than to expose the timber to air." The objective of the question was to test candidates' ability to argue or defend between the two methods of seasoning by considering the advantages of each method.

The analysis shows that 175 (93.09%) candidates attempted the question of whom, 45 (25.71%) candidates scored from 0 to 4 marks. The candidates who scored from 4.5 to 9.5 marks were 90 (51.43%), whereas 40 (22.86%) candidates scored from 10 to 15 marks. Figure 11 presents the candidates' performance in this question.

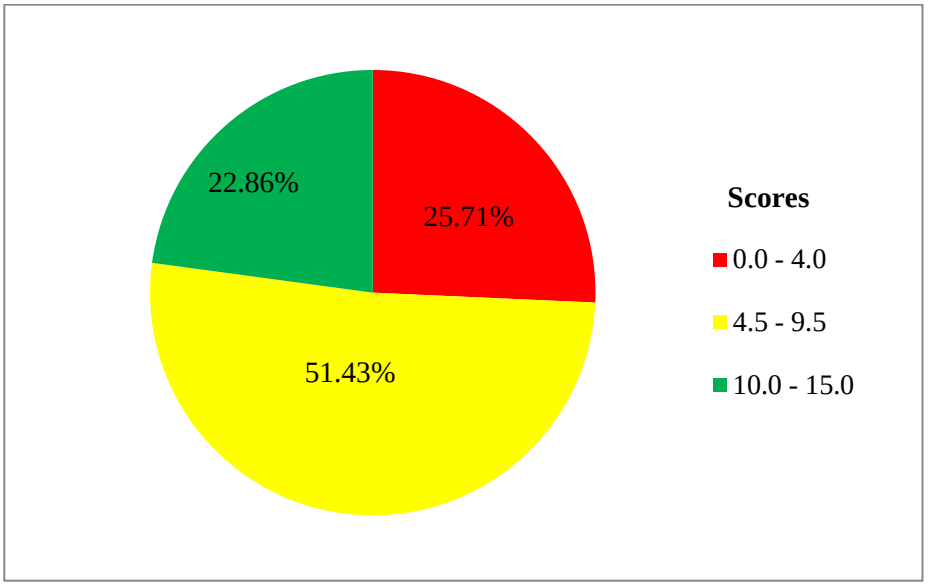


Figure 11: *The Candidates' Performance to Question 10*

Generally, the performance of candidates was good because 135 (77.14%) candidates scored average and above marks as illustrated in Figure 11. These candidates scored high marks because they had sufficient knowledge of timber seasoning. Such candidates justified the statement *'to dry timber in the furnace is the best method than to expose the timber to air'* as methods of timber seasoning. The statement *'dry timber in the furnace'* represents kiln (artificial) seasoning while *'expose the timber on air'* represents natural (air) seasoning. These candidates managed to give advantages of kiln seasoning against natural seasoning based on: seasoning time, space efficiency, consistent moisture levels, durability, strength, and final quality. Extract 8.1 shows a sample of the good responses provided by a candidate.

10. Drying timber in the furnance, Is the method that involve the use of the furnance in the drying of Timber in Timber drying, To dry timber in the furnance is the best method than to expose the timber in Air" The following the justification of this sentense by Providing the Importances of drying timber in the furnance.

Increases timber durability, By using the method of drying timber in the furnance it helps in the increasing of timber durability which enable it to stay for a long period of time and last long compared when using to expose timber in air which does not increase timber durability.

Improves and Provides Strength to timber, the drying of timber in the furnance helps the improve and provision of suitable Strength to timber which makes the timber to be very strong and also to be very strong in resistance to all weathered condition.

It is very more accurate, One of the importance of drying timber in the furnance is it helps the timber to be more accurately in performing its function by the use of high knowledge in making the timber accurate in functioning.

Avoid timber from Attack of Insects and Fungi, The drying timber in the furnance method helps the timber to be avoided from the Attack of insects and fungi which may destroy the timber such as termites and brings deterioration.

10. It is faster, The drying of timber in the furnance it is faster compared to the exposion of timber on air which means it saves times and requires only small / little time for accomplishment to make timber ready for functioning.

Increases timber flexibility and Appearance, Using of furnance in drying of timber helps in increasing the flexibility of performing work in timber and increases the appearance which enables to Look good and pleasant appreciatable for use.

Generally, The Use of furnance in drying of timber is more usable and required compared to the exposing the timber on air method because of many reasons which suistams the access of construction work using timber.

Extract 8.1: A sample of correct responses to Question 10

Extract 8.1 is a response from one of the candidates who managed to give advantages of artificial seasoning against natural seasoning.

On the contrary, 45 (25.71%) candidates performed poorly by attaining a score range of 0 to 4 marks. Such candidates failed to provide adequate justification for the statement 'drying timber in the furnace is the best method compared to exposing the timber to air' they also provided repetitive answers.

Nevertheless, candidates who scored 0 marks, mistakenly provided the advantages of air seasoning as advantages of kiln seasoning, for example one of the candidates wrote *it is a cheap method compared to kiln seasoning, it dries the timber slowly with natural air circulation*, and *it does not need any additional knowledge in order to dry the timber.* Other candidates prefer to write anything concerning timber. For example, one of the candidates wrote that: *timber preservation, kilning, dipping and electrical drying boiling* all are out of context on timber seasoning. Several factors that might have been attributed to the failure of candidates including poor understanding of the subject matter, wrong interpretation of the question and so on. Extract 8.2 shows a response by a candidate who was not able to respond to the question correctly.

iii/ Applied by both skilled and unskilled people, that method it does not need any additional knowledge in order to dry the timber.

iv/ It prevents the checking defects, Due to the slowly drying of the timber the defects are reduced and the chance of getting the defects is reducted.

v/ Applied on both rural and urban areas, that it done on any places that the presence of air that enables to be performed on rural and urban areas.

vi/ Its Easy to apply than kiln seasoning, In that method there is no complications such as the regulation of heat as compared to the kilo seasoning.

10. Kiln Seasoning – Is the types of timber seasoning that involve the drying of timber by using heat or electrical heat while.

Air seasoning – Is the type of timber seasoning which involve the drying of timber by using the free air circulation on the timber.

The following are advantages of using the air seasoning method:-

i/ It dry the timber slowly with natural air circulation, that it causes the timber to reduce the presence of the defects.

ii/ It's a cheap method compared to kiln seasoning, Because that method it does not involve the use of electrical power to dry.

Extract 8.2: A sample of incorrect responses to Question 10

Extract 8.2 is a response from one of the candidates who mistakenly provided the advantages of air seasoning as advantages of kiln seasoning.

2.3.3 Question 11: Furniture

This question had three parts (a), (b) and (c). In part (a), candidates were required to describe ways of joining the timber to produce enough width surfaces for different uses. In part, (b) they were required to classify materials that can be used to produce pleasant timber surfaces and (c) to examine important parts of a drawer with specific joints which is used when manufacturing a drawer at the workshop. The question was as follows:

(a) Timber can be converted on limited size in width and length, but can be jointed to produce large, smooth and pleasant surfaces. With the help of sketches, describe four ways of joining the timber to produce enough width surfaces for different uses.

(b) Classify six materials that can be used to produce pleasant timber surfaces.

(c) Examine four important parts of drawer with specific joint which is used when manufacturing a drawer at the workshop.

The question intended to test candidates' understanding of making, assembling and finishing joints on timber to produce a desired type of furniture as the end product.

The question was attempted by 37 (19.68%) candidates, of whom 32 (86.49%) candidates scored from 0 to 4 marks. Further data analysis indicates that 5 (13.51%) candidates scored from 4.5 to 9.5 marks, while no candidates scored from 4 to 6 marks. Figure 12 illustrates the candidates' performance in this question.

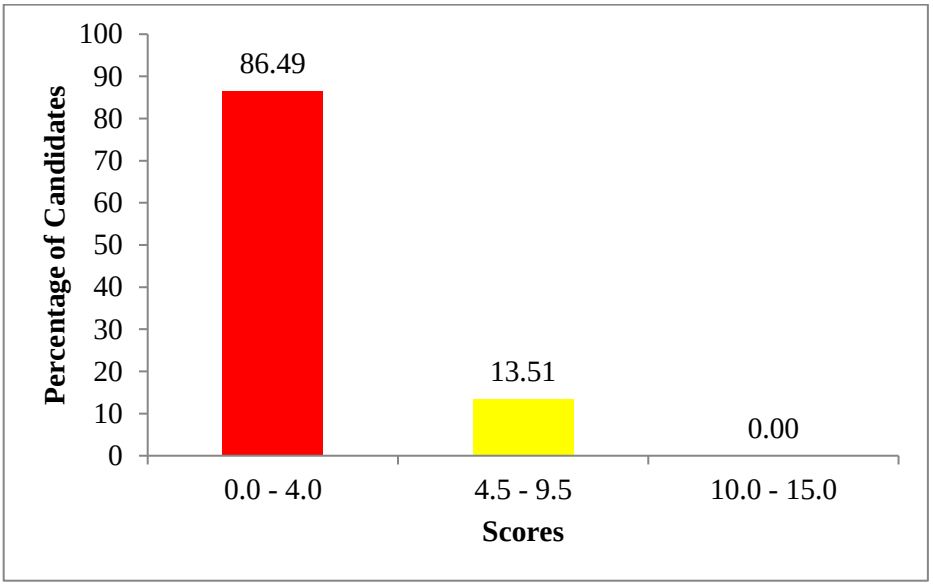


Figure 12: *The Candidates' Performance in Question 11*

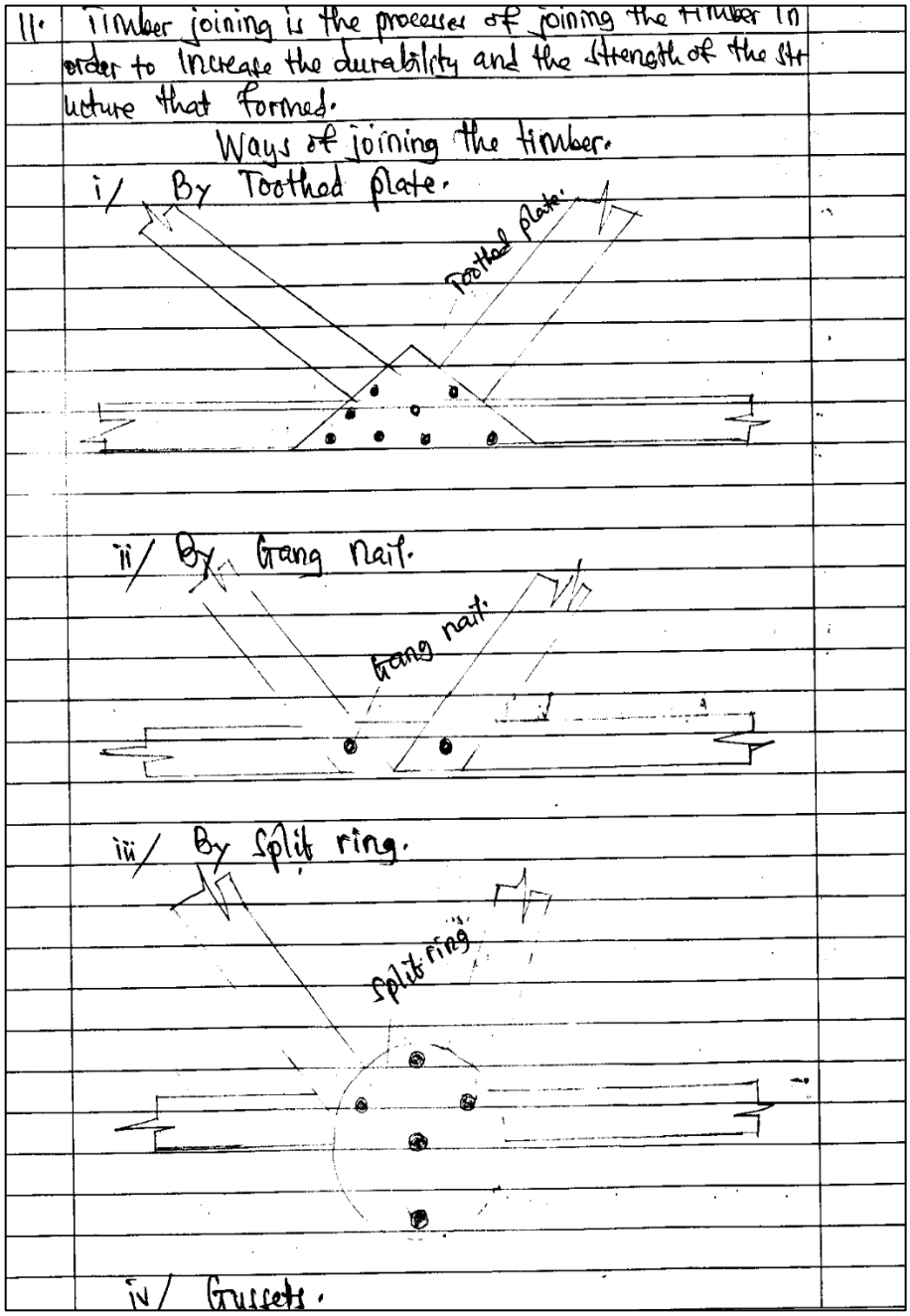
Figure 12 reveals that the candidate's performance in this question was weak as 32 (86.49%) candidates scored below average. Data analysis shows that among the candidates who scored from 0 to 4 marks 16 (43.24%) scored 0. Only 5 (13.51%) scored average marks ranging from 4.5 to 9.5. Those candidates who scored average marks partially described ways of joining the timber to produce wide surfaces for various uses with sketches in part (a) the joint required were Dowel/Butt joint Cross tongued joint, Slot screwed joint, Tongued and grooved joint. They also classified materials used to create pleasant timber surfaces such as wood filler, sand or garnet paper, wood sealer, polish/shellac, varnish, wood paints, and stain, in part (b).

Additionally, in part (c), they partially examine important aspects of the drawer, including specific joints used during its manufacture at the workshop. The correct response was supposed to detail that the face or front side should be joined by a lapped or lapped dovetail joint into their sides. The double sides should be joined by a housing joint with their backside and the backside should be joined by a butt joint with their bottom, while the bottom sheet is fixed in the grooves of the front and side face.

Further analysis revealed that the majority of candidates who scored low marks faced difficulties in answering all parts of the question. Most of them misinterpreted the question resulting in irrelevant responses. For example, in part (a) the majority failed to describe four ways of joining the timber to produce enough width surfaces for different uses with a sketch. They sketch the following joints *gang nails, toothed plates, split rings, and gussets* which are used in construction and carpentry for connecting timber components in structural applications like roof trusses, floor joists, and framing systems.

In part (b), some of the wrong classifications of materials to be used for producing pleasant timber surfaces were such as *chipboard, fibre board, solid board and ceiling board,* which are types of engineered wood products commonly used in construction and carpentry. Others wrote *chisel, saw, gauge and mallets.* These are tools, which could be used to make a joint.

Additionally, candidates failed in part (c), to examine four important parts of the drawer with a specific joint, which is used when manufacturing a drawer at the workshop. Candidates failed to identify the part of drawer and hence failed to mention the type of joint used. For example, one of the candidates wrote parts of a drawer as top rail, bottom rail, edges and panels. These responses are indicators that the candidates were not conversant with the topic of furniture making. Extract 9.1 shows a sample of incorrect responses to Question 11.



Extract 9.1: A sample of incorrect responses to Question 11

Extract 9.1 shows a sample of the incorrect responses from candidates who drew joints intended for joining timber truss roof members in part (a) of the question.

3.0 ANALYSIS OF THE CANDIDATES' PERFORMANCE IN EACH TOPIC

A total of 18 topics were examined in the Woodwork and Painting paper. The analysis shows that the candidates had a good performance in twelve topics, an average performance in four topics and performed poorly in three topics.

The topics that were well performed include those tested in the multiple-choice items of question one, achieving a performance of 92.55%. These topics include Introduction to Painting, Safety Rules and Management, Water Paints, Signwriting and Stenciling, Oil Paints, Functional Requirement of Paints, Painting Techniques, Varnishes and Finishes, Ceiling and Painting Materials. The performance was also good in the topics of Timber (69.86%) tested in Questions 3 and 10 as well in the topic of Workshop Orientation (66.49%) tested in Question 4. The high level of performance in these topics can be attributed to candidates possessing adequate knowledge and the correct interpretation of the requirements of the questions.

The four topics in which the candidates performed averagely were: Temporary Support (58.54%), tested in Question 9, Roofs (50.53%) tested in Question 8, and Doors and Windows (39.89%), tested in Question 6. The average performance in these topics is an indicator that the candidates lacked sufficient knowledge to perform above average in these topics.

The candidates demonstrated poor performance in the topics of Adhesive (17.02%), Furniture (13.51%) and Spraying and Spray equipment (4.26%), which were tested in Questions 2, 5, and 10 respectively. The analysis indicates that the candidates' inability to identify the question requirements, misinterpretation of those requirements, and improper application of acquired knowledge and skills were the causes of this poor performance in these topics.

A summary of the detailed analysis of the candidate's performance in each topic is presented in the Appendix, whereas, green, yellow, and red colours represent good, average, and weak performances respectively.

4.0 CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

The analysis of the candidates' performance was done in all questions examined in Woodwork and Painting Engineering, for CSEE 2023. Generally, the performance of candidates in Woodwork and painting Engineering was average, as only 112 (59.57%) candidates were able to score pass mark and above.

Candidate's performance in questions 1, 3, 4 and 10 was 'good' while the performance in questions 6, 7, 8 and 9 was 'average'. The poorly performed questions were 2, 5 and 10.

Poor performance of the candidates might be attributed to the failure of the candidates to interpret the tasks of the questions correctly, partial attempt of the questions, inadequate knowledge of the topics tested, lack of practical skills, poor command of the English language and inadequate site practice.

Drawing equipment and more involvement of students in industrial practical works are required to improve the performance of the prospective candidates' performance. These will help them learn by doing, hence improving their logical and technical understanding of the subject matter.

4.2 Recommendations

The following recommendations can enhance the teaching-learning process, by improving candidates' performance in future examinations:

(a) Students have to be instructed on how to respond to structured questions and how to react on the action verbs used in the examination questions.

(b) Students should be encouraged to read relevant materials and practice to widen their knowledge, especially in areas where most candidates demonstrated inadequacy of knowledge and practice.

(c) Students have to be motivated to learn using a variety of learner-centered teaching methods. These include study trips, discussions, demonstrations, brainstorming, and practical work.

(d) Students should participate more in practical because they learn better by seeing and doing. Hence, the woodwork and painting engineering Workshop should be equipped with all equipment, tools and materials to facilitate learning by doing.

(e) To enhance their English language proficiency, students ought to engage deeply with the English language program. This involves immersing themselves in listening to and watching English programs, reading English texts, practicing writing in English, and actively speaking the language.

Appendix

Analysis of the Candidates' Performance in Different Topics

S/N	Topic	Question Number	Percentage of the Candidates who Scored 30% and above	Remarks
1	Introduction to painting; Safety Rules and Management; Water Paints; Signwriting and Stenciling; Oil Paints; Functional Requirement of Paints; Painting Techniques; Varnishes and Finishes; Ceiling and Painting Materials.	1 (Multiple Choice Items)	92.55	Good
2	Timber	3& 10	71.29	Good
3	Workshop orientation	4	66.49	Good
4	Temporary support	9	58.54	Average
5	Roofs	8	50.53	Average
6	Doors and windows	6	39.89	Average
7	Painting materials	7	38.83	Average
8	Adhesive	2	17.02	Poor
9	Furniture	11	13.51	Poor
10	Spraying and spray equipment	5	4.26	Poor