THE UNITED REPUBLIC OF TANZANIA MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

CANDIDATES' ITEM RESPONSE ANALYSIS REPORT ON THE CERTIFICATE OF SECONDARY EDUCATION EXAMINATION (CSEE) 2021

ARCHITECTURAL DRAUGHTING

# CANDIDATES' ITEM RESPONSE ANALYSIS REPORT ON THE CERTIFICATE OF SECONDARY EDUCATION EXAMINATION (CSEE) 2021 

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## FOREWORD

The National Examinations Council of Tanzania is pleased to issue the Candidates’ Items Response Analysis (CIRA) report in Architectural Draughting for Certificate of Secondary Education Examination (CSEE) in 2021. The analysis provides feedback to the candidates, teachers, parents' policy makers, and other education stakeholders on how the candidates responded to the items.

The Certificate of Secondary Education Examination marks the end of the four years of ordinary secondary education. It is a summative evaluation, which among other things, shows the effectiveness of the education system in general and the education delivery system in particular. Basically, the candidates' responses to the examination questions are strong indicators of what the education system was able or unable to offer to the candidates.

The analysis presented in this report is intended to contribute to understanding the possible reasons behind the candidates' good and poor performance in the Architectural Draughting subject. The reasons for good performance includes sufficient knowledge of the content in the topic tested and correct interpretation of the questions. The reason for some candidates' poor performance include failure to interpret correctly the tasks of questions, partial attempt of the questions, inadequate knowledge on the topics tested, lack of drawing skills, poor command of English language, and inadequate site practice.

The feedback provided will enable educational administrators, school managers, teachers, candidates and other stakeholders to assess their teaching and learning environments. It will also help them identify proper measures to be taken in order to improve the candidates' performance in future.

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


Dr Charles E. Msonde

## EXECUTIVE SECRETARY

### 1.0 INTRODUCTION

This report provides an analysis of the performance of the candidates who sat for the Certificate of Secondary Education Examination (CSEE), conducted in November 2021 in the Architectural Draughting subject. The examination paper was set according to the 2019 examination format developed from the 1994 Civil Engineering syllabus for Secondary School Education.

The examination paper had 13 questions which were categorised into three sections A, B, and C. Section A consisted of one (1) objective question, with ten items weighing 1 mark each. Section B had 10 short answer questions each carrying 6 marks. All questions in sections A and B were compulsory. Section C had two (2) optional structured questions, each weighing 30 marks. The candidates were required to answer one (1) question from this section.

The total number of 340 candidates sat for Architectural Draughting in 2021. Among these, only 155 (45.6\%) candidates scored the credit pass grades, B and C. The statistics shows that $133(39.1 \%)$ passed with grade D, while 52 $(15.3 \%)$ candidates failed by scoring grade F. This implies that the general performance in this subject was good. However, when the results are compared with that of 2020 , an increase of 17.4 per cent was observed as in 2020 the number of candidates who passed were 218 ( $67.3 \%$ ).

Figure 1 shows the general distribution of scores and candidates' performance in the 2021 examination.


Figure1: The Candidates' Performance in 2021

This report analyses the candidates' responses in regard to the demands of the questions. A brief note on what the candidates were required to do, and the reasons for their performance are provided. The samples of candidates’ good and poor responses are also inserted as extracts to illustrate the cases presented. Charts are also used to summarize the candidates' performance in a particular question. The analysis categorizes the performance as good, average and poor in the ranges of $65-100,30-64$ and $0-29$ respectively. Green, yellow and red colours are respectively used to represent these groups of performance. Finally, the report presents conclusion and recommendations.

### 2.0 ANALYSIS OF THE CANDIDATES' PERFORMANCE FOR EACH QUESTION

### 2.1 SECTION A: MULTIPLE CHOICE

### 2.1.1 Question 1: Multiple Choice items

The question consisted of ten (10) multiple choice items derived from various topics in the syllabus. The topics covered were: Fire Place and Flues, Site Plan, Perspective Drawing, Drawing Instruments and Equipment, Drainage System, Elevations, Doors, Foundations plan, Electrical Supply and Architectural Scales. The candidates were required to choose the correct answer from the five alternatives (A to E).

A total of $340(100 \%)$ candidates attempted this question, of which 12 (3.5\%) candidates scored marks from 0 to 2 . The candidates who scored from 3 to 6 marks were 216 ( $63.6 \%$ ), whereas 112 ( $32.9 \%$ ) scored from 7 to 10 marks. The performance of candidates on this question is summarised in Figure 2.


Figure 2: The Performance of Candidates in Question 1
The candidates who performed well in this question were capable to utilize the knowledge acquired on different topics to identify the correct answers among the given alternatives. All the items were attempted by the candidates, but those on which most candidates failed were items (i) from the topic of fireplace and flue and (vii) from the topic of doors. The analysis of candidates' responses also shows that most of the candidates chose correctly items (iv) and (x) from the topics of architectural draughting instruments and equipment and architectural scales, respectively. The rest of the items were performed averagely.

The strengths and weaknesses of candidates in choosing the correct answers to individual items in the question are analysed as follows:

Item (i) asked the candidates' which term describe the projecting brickwork that contains the fire and support chimney breast over the fireplace. The correct response was A, jamb. The candidates who opted for the correct answer were aware that a jamb is the projecting brickwork that contains the fire and support chimney breast over the fireplace. The candidates who opted for response B , flue were not aware that a flue is a vertical pipe or duct to remove smoke, combustion gases and other gaseous products from a fireplace to the outside of a building.

Moreover, the candidates who gave response C, hearth did not realize that a hearth is a base or floor of a fireplace. Option D, lintel was not a correct answer because a fireplace lintel is a bar or beam placed horizontally across the top of a fireplace opening. The purpose of a fireplace lintel is to spread the load from above the opening of a fireplace across down to the sides of the fireplace firebox. The last option E, fire back was also wrong because a fire back is a shaped unit or laid masonry of refractory brick forming the rear and side walls of a fireplace.

In item (ii), the candidates were required to identify crucial information to be included in the site plans during the preparation of the building drawing. The best alternative was C, locations and sizes of the proposed buildings. The response was chosen by candidates who were able to recall that the primary information required should be applicable to all building sites without considering the locality, orientation of the building and financial status of the owner of the site. The other candidates who opted for responses A Length and depth of proposes buildings, B North point of the proposed buildings, D Availability of municipal services and utilities and E Position for car parks, landscapes and pedestrians missed the point, because these factors are applicable to some sites.

Item (iii) required the candidates to identify the type of drawing used to represent the drawing to the client so that the object will appear natural and pleasing. The candidates with adequate knowledge of pictorial drawing opted for the response D , by perspective drawing. These candidates were aware that pictorial drawings are understood more clearly than front, top, and side views of an object. Pictorial drawings which are either sketched freehand or made with drawing instruments are used by engineers and architects to convey ideas to their assistants and clients. Perspective drawings provide the most realistic, and usually the most pleasing, likeness when compared with other types of pictorial views. Perspective drawing is a technique that creates the linear illusion of depth, as objects get further away from the viewer they appear to decrease in size at a constant rate.

The candidates who opted for A. isometric drawing, B. oblique drawing and E. by axonometric drawing were not correct because these drawings are pictorial drawings that used parallel projection where objects remain at the same size no matter how far away they are. These drawings were not realistic as Perspective drawings. The candidates with inadequate knowledge opted
for C. orthographic drawing. These candidates were not aware that an orthographic view is a 2 D representation of an object where the front, side, and top view are shown.

Item (iv) required the candidates to identify the next size of $210 \mathrm{~mm} \times 297$ mm drawing papers. The correct response was D, $297 \mathrm{~mm} \times 420 \mathrm{~mm}$. The candidates who answered correctly were familiar with the standard ISO drawing sheet sizes. The candidates were aware that the drawing sheet A4 ( $210 \mathrm{~mm} \times 297 \mathrm{~mm}$ ) is in series with A3 ( $297 \mathrm{~mm} \times 420 \mathrm{~mm}$ ) drawing sheet. Candidates who opted for response A, $105 \mathrm{~mm} \times 148 \mathrm{~mm}$ were wrong because this size of drawing paper is not used as drawing sheets.

Similarly, the candidates who selected response B, $297 \mathrm{~mm} \times 210 \mathrm{~mm}$ did not realize that the paper has the same size as the question with the exchange in the arrangements of dimension. Other candidates who selected option C, 841 $m m \times 1189 \mathrm{~mm}$ were incorrect because A0 with the size $841 \mathrm{~mm} \times 1189 \mathrm{~mm}$ is the largest size in the series of drawing papers. Moreover, the candidates who opted for E, $594 \mathrm{~mm} \times 841 \mathrm{~mm}$ were also wrong because this drawing paper is A1 and is next to A2 ( $420 \mathrm{~mm} \times 594 \mathrm{~mm}$ ) drawing paper.

In item (v), the candidates were required to identify the importance of a trap when designing a drainage system. The correct response was E, It prevents smell from coming back to house. The candidates who responded correctly were aware that a trap is designed to retain a small amount of water each time the sink drains water standing in the bottom of the curved portion of the trap. It keeps sewer gases from escaping the drain and entering your home.

However, the candidates who could not identify the correct response to this item mostly chose option A. It allows easy removal of waste water and C. It prevents flooding by removing waste water. This was an incorrect response because waste water is conveyed through drains, preventing flooding. Other candidates opted for B. It collects grit and residue from waste water. This was also an incorrect response because those candidates were supposed to understand that grit and residue are collected in a grit chamber along the drain. Some candidates chose D. It purifies waste water by facilitating percolation. This is false, because percolation of waste water occurs in soak away pits or cesspools along the drain.

In item (vi) the candidates were required to identify the type of drawing used to present the size and slope of the roof instead of section drawings. The correct response was C, elevation drawings. The candidates who choose the correct answer had enough knowledge on the type of architectural drawing. The candidates who selected incorrect responses failed to recall that option A, structural drawings presents details, fabrication, and installation of parts of the structure. Option B, detail drawings provide information about assembly and component junctions, as well as construction details and other details that would be impossible to include in drawings that are more general. Alternative D, Services Drawing was also incorrect because this drawing represents fabrication, assembly or installation of components. Furthermore, alternative E, perspective drawing, represents the ways objects appear smaller as they move farther into the distance.

Item (vi) instructed the candidates to identify the type of door to be used at narrow openings such as toilet and stores from the given alternatives. The correct response was A, Battened and ledged doors. The candidates who opted the correct response were able to categorize doors according to strength and appearance and choose the appropriate door for narrow openings. Candidates who opted response B. Battened, legged and braced doors, C. Solid core flush doors, D. Framed, battened and braced and E. Single leaf paneled doors were wrong because all of the doors have strength and appearance that is not applicable for narrow openings such as toilet and stores.

In item (viii), the candidates were required to identify factors affecting the selection of the appropriate type of foundation for the buildings. The correct response was E. Size and weight of the structure. The candidates who opted for A. Length and width of a building, B. Orientation of the building, C. Preferences of client and architect and D. Proximity of basic infrastructure, were not correct because these are factors considered when planning a site.

Item (ix) asked the candidates, which symbol represent "single pole one-way switch" on the electrical installation drawing?


D


The correct response was B, this alternative was chosen by the candidates who had adequate knowledge on electrical fitting drawing symbols. The analysis indicates further that the option C and D was chosen by the candidates who were not aware of symbols of two way and pole switches respectively. Nevertheless, some candidates opted for A and B, these alternatives were incorrect because these symbols do not represent any electrical fittings.

Item ( x ) asked the candidates scales listed in (1) to (6) are used to produce working drawing. Suppose you are asked to draw an elevation of medium class residential house, which scale would you use?

| (i) | $1: 5$ | (ii) | $1: 10$ | (iii) | $1: 20$ |
| :--- | :--- | :--- | :--- | :--- | :--- |
| (iv) | $1: 50$ | (v) | $1: 100$ | (vi) | $1: 200$ |

A
(4) or (6)
B
(4) or (5)
$C \quad$ (2) or (6)
$D \quad$ (1) or (3)
$E \quad$ (6) or (1)

The correct answer was B, (4) or (5). The candidates who opted for the correct response identified the type and size of the building and made the correct choice of the scale. The candidates who opted for all other options were not correct. These candidates were not aware that a scale for preparing a floor plan drawing of a building is chosen by considering the actual size of the structure, the amount of detail, dimensions, and notices to be shown. The choice of scale is also guided by a standard practice that regulates the scales of specific types of drawing.

### 2.2 SECTION B: SHORT ANSWER QUESTIONS

This section consisted of ten (10) short answer questions; each question weighed six (6) marks. The score ranges used for grading performance of candidates in each question in this section are indicated in Table 1.

Table 1: The Candidates' Performance in Question 2 to 11.

| Scores range | General Performance |  |
| :---: | :---: | :---: |
|  | Remark | Grade |
| $0-1.5$ | Weak | F |
| $2-3.5$ | Average | C - D |
| $4-6$ | Good | A - B |

### 2.2.1 Question 2: Sections

The question required the candidates to mention six components seen in a building section drawing.

The statistics show that 340 (100\%) candidates attempted this question. Out of these $76(22.4 \%)$ scored from 0 to 1.5 marks. The candidates who scored from 2 to 3.5 marks were 42 ( $12.3 \%$ ). While 217 ( $65.3 \%$ ) candidates scored from 4 to 6 marks, of which 100 (29.4\%) candidates scored full marks in this question. Figure 3 summarizes the candidates' performance in this question


Figure 3: The Performance of Candidates in Question 2
Generally, the performance of candidates in this question was good as 77.6 percent of the candidates scored average marks and above. The analysis shows that these candidates managed to give correct responses in variation of two to six. The performance shows that these candidates had good practical skills on drawing a section of a building. Extract 2.1 provides a sample of candidates' good responses.


Extract 2.1: A sample of candidates' good responses on Question 2

Extract 2.1 shows a sample of responses by a candidate who managed to identify six components seen on building section drawing and hence scored full marks.

Further analysis reveals that 22.4 percent of the candidates performed poorly, with scores ranging from 0 to 2 marks. These candidates failed to list at least two out of the six components seen on the building section drawing. The correct responses should include vertical sizes, thickness and materials of building components such as foundations, floors, walls, ceilings and roofs. The candidates who scored 0 marks resorted to write anything, regardless of whether it was meaningful or not, while others skipped the question. This is an indication that candidates in these categories lacked knowledge of sections and elevations. Extract 2.2 provides a sample of candidates' poor responses.

| 2. (i) Reinforced concrete material |  |  |
| :--- | :--- | :--- |
|  | (ii) mass concrete maternal |  |
|  | (iii) Brick maternal |  |
|  | (iv) Iran sheet material |  |
| (v) plastic material |  |  |
|  | (vi) Stone material |  |

Extract 2.2: A sample of candidates' poor responses on Question 2
Extract 2.2 shows a response by the candidate who listed the construction materials as building components in a section drawing.

### 2.2.2 Question 3: Foundation

The question required the candidates to draw a vertical section of a building cutting through the traditional strip foundation to a solid ground floor finish and showing (i) footing, (ii) foundation wall, (iii) DPM and (iv) DPC.

The analysis shows that 340 ( $100 \%$ ) candidates attempted this question out of whom, $48(14.1 \%)$ candidates scored from 0 to 1.5 marks. The candidates who scored from 2 to 3.5 marks were 91 (26.8\%), whereas 201 ( $59.1 \%$ ) candidates scored from 4 to 6 marks. Figure 4 shows the performance of candidates in this question.


Figure 4: The Performance of Candidates in Question 3

The general performance of the candidates in this question was good as Figure 4 illustrates. Majority of the candidates ( $85.9 \%$ ) who scored high marks (from 3 to 6) managed to draw the foundation and labeled all the required parts. The candidates who scored average marks failed to locate the correct position of DPM and DPC. They also failed to draw conversion symbols of some materials especially concrete. Extract 3.1 shows a sample of good responses provided by one of the candidates.


Extract 3.1: A sample of candidates' good responses on Question 3
Conversely, the candidates who scored poor marks (from 0 to 2 ) were not able to draw the section of the foundation as the question required. Majority of the candidates wrongly drawn other types of foundations especially raft foundation, wide and deep strip foundation. They also failed to locate some parts of the foundation. There are a number of factors, which have contributed to the failure of candidates in this question. These factors include poor understanding of the subject matter, wrong interpretation of the question and poor drawing skills. Extract 3.2 shows a sample of response by a candidate who was not able to respond correctly to the question.


Extract 3.2: A sample of candidates' poor responses on Question 3

Extract 3.2 is a sample of response by a candidate who drew a raft foundation instead of a traditional strip foundation.

### 2.2.3 Question 4: Architectural Scale

The question comprises of two parts. In part (a), candidates were required to prepare a scale of 60 millimetres to represent 1 m on a drawing paper, and in part (b), candidates were required to give the actual length (in metres) of 72 millimetres drawn on a scale of 1:50.

This question was attempted by 340 (100\%) candidates, of whom 149 ( $43.8 \%$ ) scored from 0 to1.5 marks of which 97 ( $28.5 \%$ ) scored 0 mark. Analysis of the data indicates that, 66 (19.4\%) candidates scored from 2 to 3.5 marks, while 125 ( $36.8 \%$ ) candidates scored from 4 to 6 marks. Figure 5 presents the performance of candidates in this question.


Figure 5: The Performance of Candidates in Question 4

Generally, the performance in question 4 was average as 56.2 percent of the candidates who attempted this question scored average and above as depicted in Figure 5. Further analysis shows that the candidates who scored average marks were able to respond to the question tested in both parts, (a) and (b). These candidates managed to recall the concepts on the topic of scales. Their variation in marks was due to some of the candidates skipped
some steps or procedures. For example, some candidates ended up by calculating the values without giving formula. Extract 4.1 shows a sample of good responses provided by a candidate.

| 4 | Soln. |  |
| :---: | :---: | :---: |
|  | Given Data |  |
|  | $D_{\text {rauing }}$ dimension $=60 \mathrm{~mm}$ |  |
|  | Actual dimension $=1 \mathrm{~m}$ |  |
|  | Scale $=$ Prawing dimension |  |
|  | Adual/arcund distance. |  |
|  |  |  |
|  | $=60 \mathrm{~mm}$ |  |
|  | 1000 mm |  |
|  |  |  |
|  | $=3: 50$ |  |
|  |  |  |
|  | $=31: 16.7$ |  |
|  | $\approx 1: 17$ |  |
|  | $\therefore$ The seale is 1619.7 |  |
|  |  |  |
|  | $\therefore$ The scale is 1:17 |  |
|  |  |  |
|  |  |  |
| 4 | Soln | 4 |
|  | 1 mm represents 50 mm |  |
|  | 72 mm represents = ? | M |
|  | . $72 \mathrm{~mm} \times 50 \mathrm{~mm}$ |  |
|  |  |  |
|  | $=3600 \mathrm{~mm}$ |  |
|  | But |  |
|  | $1 \mathrm{~mm}=1000 \mathrm{~mm}$ |  |
|  | $=3600 \mathrm{~mm}$ |  |
|  |  |  |
|  | $=3.6 \mathrm{~m}$ |  |
|  |  |  |
|  | $\therefore$ The actral lenoth is 3.6 metres |  |

Extract 4.1: A sample of the candidates' good responses on Question 4
Extract 4.1 is a sample of response by a candidate who followed properly all the procedures in part (a) to prepare a scale to represent on a drawing paper and in part (b) to calculate the actual length by using the given scale.

Furthermore, 43.8 percent who scored low marks (from 0 to 1.5 ), in part (a) could not calculate the required scale, but they partially calculated the actual length in part (b). The failure in this question might be attributed to inadequate exercises and lack of practices in preparing architectural drawings. These weaknesses led them to score poor marks as sampled in Extract 4.2.


Extract 4.2: A sample of candidates' poor responses on Question 4
Extract 4.2 is a sample of the candidate who failed to convert dimension to the same units and use the wrong formula

### 2.2.4 Question 5: Schedules

The candidates were required to mention three types of written instructions that were included in a set of drawings with their specific functions.

The analysis shows that, 340 ( $100 \%$ ) candidates attempted this question, out of whom $307(90.3 \%)$ scored from 0 to 1.5 marks. Further analysis indicates that $17(5 \%)$ candidates scored from 2 to 3.5 marks, while 16
$(4.7 \%)$ candidates scored from 4 to 6 marks. Figure 6 presents the candidates' performance in this question.


Figure 6: The Candidates' Performance in Question 5
The general performance of the candidates in this question was poor as Figure 6 illustrates. Majority of the candidates ( $90.3 \%$ ) who scored low marks (from 0 to 1.5 ) managed just to define the use of schedules in drawings hence they ended on scoring very low marks. Some of the candidates who scored a 0 mark did not comprehend the requirements of the question as a result wrote a set of drawings required for construction works. Others wrote the architectural draughting tools and their uses. The correct answer to this question is window and door schedule, finishing schedules and septic tank and soakway pit schedules. The factors that had contributed to candidate failure in this question include poor understanding of the subject matter and wrong interpretation of the question. Extract 5.1 shows a sample of poor responses provided by one of the candidates.

| 5 P) floer plan to shaw the area and dime |
| :--- |
| nficon of wall epenings, wall and rooms. |
| pi Reof plan to show the overall dimension |
| ot roof |
| igiv) toundation plan to shaw the length end |
| width of foundation. |

Extract 5.1: A sample of candidates' poor responses on Question 5

Extract 5.1 is a sample of the response by one of the candidates who responded by providing drawing used in the construction of the building.

However, further analysis reveals that, some candidates about 4.39 per cent managed to respond to the question correctly. These candidates managed to identify three types of written instructions that were included in a set of drawings and partially explained their specific functions. Extract 5.2 shows a sample of good responses for a part of question.


Extract 5.2: A sample of candidates' good responses on Question 5
Extract 5.2 is a sample of response by a candidate who partially explained the specific functions of written instructions that were included in a set of drawings.

### 2.2.5 Question 6: Windows

The question had two parts (a) and (b). Part (a) required the candidates to sketch a neatly single-line double-side hang casement window with a tophang vent light and clearly indicate conversion for opening direction. Part (b) required the candidates to explain how to remove water from the (i) head, (ii) top rail, and (iii) jamb of a given timber window frame.

This question was attempted by 340 (100\%) candidates, of whom 276 ( $81.2 \%$ ) scored from 0 to 1.5 marks. Further data analysis indicates that 60 ( $17.6 \%$ ) candidates scored from 2 to 3.5 marks while 4 (1.2\%) candidates scored from 4 to 6 marks. Figure 7 illustrates the candidates' performance in this question.


Figure 7: The Performance of Candidates in Question 6
The general performance of the candidates in this question is poor as depicted in Figure 7. Majority of the candidates, 276 ( $81.2 \%$ ) who scored low marks could not clearly draw the given window. They failed to indicate the conversion for the opening direction in some part of the window as required in part (a) of the question. In part (b), majority of the candidates failed to explain how water could be excluded from the given timber window frame components. The candidates who scored 0 failed to attempt both parts of the question. These candidates, in part (a) either drew a casement window, a pictorial view of the window, or a section of the window. The failure in this question is an indicator of wrong interpretation of the question, poor drawing skills and inadequate practical knowledge on windows. Extract 6.1 illustrates a sample of poor responses presented by the candidates in the failure category.


Extract 6.1: A sample of candidates' poor responses on Question 6
Extract 6.1 shows a sample of responses by a candidate who wrongly interpreted the question and drew a casement window instead of a double side hang casement window with a top-hang vent light (In a single line sketch).

Furthermore, some candidates who scored from 2 to 6 marks perfectly managed to sketch a neat single line double side hang casement window with a top-hang vent light but failed to indicate conversion for opening direction in some parts of the window. These candidates partially explained the way to exclude rain from the window component in part (b). In part (b) the correct responses are: (i) paint the joint between the head of the frame and the lintel or arch with non-setting mastic that remains intact even if the frames shrink a little; (ii) put a drip moulding on the head of the frame to deflect water from opening sash or alternatively, construct a window shed/cap. In (iii) paint this with mastic or construction window shed/cap. Extract 6.2 is a sample of good responses from one of the candidates in this category.


Extract 6.2: A sample of candidates' good responses on Question 6

Extract 6.2 is a sample of responses by the candidate who in part (a) was able to draw a neat single-line sketch for a double-side hang casement window with a top-hang vent light and clearly indicated conversion for opening direction. He/she could also partially explain how to remove water from the parts of the window in part (b).

### 2.2.6 Question 7: Residential House Planning

The question required candidates to enumerate six steps to follow when preparing a preliminary sketch for a residential house.

The statistics shows that $340(100 \%)$ candidates attempted this question. Out of these $184(54.1 \%)$ scored from 0 to 1.5 marks. The candidates who scored from 2 to 3.5 marks were 134 ( $39.4 \%$ ), while 22 ( $6.5 \%$ ) candidates scored from 4 to 6 marks. There were $2(0.6 \%)$ candidates who scored 6 marks in this question. Figure 8 summarizes the candidates' performance in this question.


Figure 8: The Performance of Candidates in Question 7
Figure 8 shows that 45.5 percent of the candidates scored 2 marks and above, which indicates average performance. These candidates were relatively able to enumerate steps to follow when preparing a preliminary sketch for a residential house. Their scores depend on the number of correct responses provided by each candidate. The candidates were supposed to write the correct steps to follow when preparing a preliminary sketch such
as: determining client needs; making a list of furniture needed; determining sizes of furniture; and finally, making and arranging furniture templates. Choose an architectural style; determine room dimensions, group rooms into areas, and areas into floor plans. Outside elevation projection design; client needs such as building size, room size, and number of rooms; size and location of the site. Extract 7.1 is an illustration of a good response from one of the candidates' script.


Extract 7.1: A sample of candidates' good responses on Question 7
Extract 7.1 shows a sample response from a candidate who correctly identified the steps of preparing a preliminary sketch of a residential house.

However, 54.1 per cent of the candidates scored low marks from 0 to 1.5 . The analysis shows that the majority of the candidates who scored low marks misinterpreted the requirements of the question. For example, one of the candidates wrote: "I will start to prepare a foundation plan to show its all measurements; I will prepare the floor plan to show division of rooms and dimension of wall; I will prepare the elevation of all sides of the wall; I will prepare the roof plan of the building; I will prepare a cross section of the building; and I will draw full section of the building". This response gives the sequence of steps for preparing working drawings of a residential house. The responses given by the candidates in this category indicate that they lacked practical knowledge and skills on the development of residential house floor plan. This is revealed by a response from one of the candidates, as shown in Extract 7.2.


Extract 7.2: A sample of candidates' poor responses on Question 7
Extract 7.2 shows a sample response from a candidate who failed to identify the steps of preparing a preliminary sketch for a residential house.

### 2.2.7 Question 8: Site Plan

The question stated that; give four reasons to convince a client to provide a setback during the planning of a residential building.

A total of $340(100 \%)$ candidates attempted this question, of which 295 ( $86.8 \%$ ) candidates scored marks from 0 to 1.5 . The candidates who scored from 2 to 3.5 marks were 34 ( $10 \%$ ), whereas 11 ( $3.2 \%$ ) scored from 4 to 6 marks. The performance of candidates on this question is summarised in Figure 9.


Figure 9: The performance of Candidates in Question 8

The general performance in this question is poor, as 86.8 per cent of the candidates scored 1.5 marks and below as shown in Figure 9. The majority of the candidates who scored low marks failed because they did not manage to interpret the question. They gave some points, which comprised inappropriate explanations and therefore scored no more than 1.5 marks. These candidates were not able to recall the reasons for the importance of providing the recess on the face of a building, usually on the ground or upper floor. The correct responses are: (i) protection of outside entities from the activities inside the house; (ii) provision of good natural ventilation; (iii) provision of natural light from the sun; (iv) provision of easy access and exit to and from the building compound; and (v) to ensure enough space for a car park, garden, and play grounds. Extract 8.1 shows a sample of the candidates' poor responses.


Extract 8.1: A sample of candidates' poor responses on Question 8
Extract 8.1 is a sample of the responses from one of the candidates who wrote importance of the site plan instead of explaining the importance of setback during the planning of a residential building.

However, a few candidates ( $9.1 \%$ ) who scored from 2 to 5 marks were able to correctly identify the steps of preparing a preliminary sketch for a residential house. Their scores varied depending on the clarity of their expressions and the number of correct points given by individual candidates. Extract 8.2 shows a sample of a relatively good response from one of the candidates.


Extract 8.2: A sample of candidates' good responses on Question 8
Extract 8.2 is a sample of the candidates who was able to explain the importance of setbacks during the planning of a residential building.

### 2.2.8 Question 9: Doors

This question required the candidates to give four factors considered when selecting the type of main entrance door of a residential building.

The question was attempted by 340 ( $100 \%$ ) candidates and their scores were as follows: 45 ( $13.2 \%$ ) candidates performed poorly as they scored from 0 to 1.5 marks; $152(23.0 \%)$ candidates scored from 2 to 3.5 marks and $143(42.1 \%)$ candidates had good performance as they scored from 4 to 6 marks. Figure 10 summarizes the overall performance in the question.


Figure 10: The Performance of Candidates in Question 9

The general performance in this question was good as 88.8 percent of the candidates scored average and above the pass mark as shown in Figure 10. These candidates used their knowledge on doors and experience of using their front doors in their homes to mention the factors considered when selecting the type of main entrance door for a residential building. They were able to recall the following factors: (i) the size of a door should be adequate for all needs including the passage of perambulators, occupants, and furniture; (ii) it should have adequate strength and durability; (iii) it should have an attractive appearance; (iv) it should have an adequate frame to support the door and the nature of the molding to frame it; and (vi) it should be painted soft wood or polished. Extract 9.1 shows a sample of good responses from a candidate.

| 9. | 1. Client's preparance. |  |
| :--- | :--- | :--- |
| I1. Conomic factor. |  |  |
|  | III. Availability of material). |  |
|  | N. \& Climatic and Geographical factors. |  |

Extract 9.1: A sample of candidates' good responses on Question 9
Extract 9.1 shows the response of one of the candidates who wrote correctly reasons to convince a client to provide a setback during the planning of a residential building.

However, a few candidates, 13.2 per cent were not focused, and hence gave blunt answers that did not satisfy the requirements of the question. Some failed to recall even a single point to defend their response. These candidates lacked practical knowledge on doors. Extract 9.2 shows a sample of candidates' poor responses.


Extract 9.2: A sample of candidates' poor responses on Question 9
Extract 9.2 is a sample of the candidates' responses who wrote wrong dimensions of door sizes, wrong operation of the door and wrong position of doors as correct responses.

### 2.2.9 Question 10: Fireplaces and Flues

This question had two parts, (a) and (b). In Part (a), the candidates were required to state the purpose of introducing the throat above the fireplace opening and in part (b), the candidates were required to list two advantages of using multi-piece fire bags during the construction of the fireplace and chimney.

The analysis shows that 340 ( $100 \%$ ) candidates attempted this question out of which, 185 ( $54.4 \%$ ) candidates scored from 0 to 1.5 marks. The candidates who scored from 2 to 3.5 marks were 100 (29.4\%), whereas 55 $(16.2 \%)$ candidates scored from 4 to 6 marks. Figure 11 shows the performance of the candidates in this question.


Figure 11: The Performance of Candidates in Question 10
Figure 11 shows that 45.6 per cent of the candidates scored from 2 to 6 marks, which indicates an average performance. The analysis shows that these candidates were relatively able to give correct responses in both parts (a) and (b), which means that they had acquired relevant knowledge concerning the fireplace. Extract 10.1 is an illustration of a good response from a candidate's script.


Extract 10.1: A sample of candidates' good responses on Question 10

Extract 10.1 is a sample of response by the candidates who managed to state the purpose of introducing the throat above the fireplace opening in part (a) and listed the advantages of using multi-piece fire bags during the construction of the fireplace and chimney in part (b).

Further analysis reveals that 54.4 per cent of the candidates who scored between 0 and 1.5 marks failed to comprehend the requirements of the question. For example, in responding to part (a), majority of the candidates failed to know that the purpose of introducing a throat above the fireplace opening. The throat prevents unpleasant draughts, which may draw an unnecessary amount of air through the flue and reduce the efficiency of the fire and allowing too much heat to escape into the flue. In part (b), they failed to list the advantages of using multi-piece fire back during the construction of the fireplace and chimney. Advantages which were expected to be listed are (i) the problem of expansion and contraction of materials will be minimized since the temperature encountered by a fire back will be high; and (ii) multi-piece fire back is easier to fit. The responses given by the candidates in this category indicate that they lacked adequate knowledge and skills on the topic of fireplaces and flues. This can be revealed by a response from one of the candidates, as shown in Extract 10.2.


Extract 10.2: A sample of candidates' poor responses on Question 10
Extract 10.2 is a sample of responses by a candidate who wrote irreverent materials in response to question 10 .

### 2.2.10 Question 11: Water Supply

The question required the candidates to explain briefly the four advantages of the indirect water supply system in order to convince the village water supply committee to adopt it in their village.

The statistics show that 340 ( $100 \%$ ) candidates attempted this question. Out of those $257(75.6 \%)$ scored from 0 to 1.5 marks. The candidates who scored from 2 to 3.5 marks were $70(20.6 \%)$ while $13(3.8 \%)$ scored from 4 to 6 marks. There was only 1 ( $0.3 \%$ ) candidate who scored full marks. Figure 12 summarizes the candidates' performance in question 11.


Figure 12: The Performance of Candidates in Question 11

As Figure 12 illustrates, the general performance of the candidates in this question is poor. The majority of the candidates ( $88.59 \%$ ) who scored low marks failed to give at least two advantages of indirect water supply system to convince the water supply committee in the village. The candidates who scored 0 marks provided irreverent answers that were completely out of context. Such meaningless responses are indicators that the candidates were not conversant enough with the water supply systems. If they had covered the topic well, they could had given the advantages of an indirect water supply, such as: (i) it imposes less pressure on the distribution network as the rising main is not connected directly to all fixtures; (ii) there is no threat of pipe bust; (iii) if the main is damaged or when water supply is stopped during a certain time period, water can still be made available to users from the storage tank; (iv) less wear and tear of all fixtures because of less pressure and plumbing materials; (v) water leakage is less because water pressure will be less from the tank and less water will escape and have less loss; and finally (v) most of the system is less likely to cause contamination of the public water main by back siphonage or back flow. Extract 11.1 is a sample of the poor responses provided by the candidate.


Extract 11.1: The candidates' poor responses on Question 11

However, responses from some of the candidates who scored 2 marks or above managed to explain the advantages of indirect water supply system to the village water supply committee. This is an indicator that the candidates in this category had enough knowledge on the topic of water supply as seen in Extract 11.2.

| 11. | Indirect widd water suply sytem - is the sytem of pipeworts in |  |
| :---: | :---: | :---: |
|  | which all sanitary aplliances except sink receives the supply from |  |
|  | storage tank. Water from the seure ì frist taten to the storage |  |
|  | and Thereapter the distribution to vanitary appliances begins. |  |
|  |  |  |
|  | A duvantages of indireeti cold water rupply syrtem. |  |
|  | i) It prevents the frouble of water hammer since no any |  |
|  | direct distribution connected to the main. |  |
|  |  |  |
|  | ii) It prevents the problem on back sphomage which also |  |
|  | help to avoid contameration to the main. |  |
|  |  |  |
|  | iii) It ensures constant supply even in Penods of problem |  |
|  | in the main or m/0w pressure penod. of |  |
|  |  |  |
|  | N) It does not requre regular maintemane sino no excess |  |
| 11. | pressure subjected to the distribution pipes. |  |
|  |  |  |
|  | v) In multivtorey buildengs, it enables sufficant avallability |  |
|  | of water when there low pressure. |  |
|  | Indrect cold water supply diagram |  |
|  |  |  |
|  |  |  |
|  | Ball |  |
|  | $<,$ |  |
|  | - Nen-return |  |
|  | $\uparrow$ rinsin ralvi |  |
|  | $\pm \ldots$ Ring |  |
|  | maxn |  |
|  | $\sin ^{k} \pm$ |  |
|  | $0 \rightarrow-\quad \text { stop ady } T_{\text {prain }}$ |  |

Extract 11.2: A sample of candidates' good responses on Question 11
Extract 11.2 is a sample of responses from a candidate who was able to explain four advantages of the indirect water supply system in order to convince the village water supply committee to adopt it in their village plans.

### 2.3 SECTION C: STRUCTURED QUESTIONS

This section consisted of two questions, and the candidates were required to attempt only one question. Each question carried 30 marks. The score ranges used for grading performance of the candidates in this section is indicated in Table 2.

Table 2: The Candidates' Performance in Question 12 and 13.

| Scores range | General Performance |  |
| :---: | :---: | :---: |
|  | Remark | Grade |
| $0-8.5$ | Weak | F |
| $9-19$ | Average | C - D |
| $19.5-30$ | Good | $\mathrm{A}-\mathrm{B}$ |

### 2.3.1 Question 12: Roofs

In this question, the candidates were required to draw a roof plan and king post roof truss. The question was as follows:
(a) Draw to a scale of 1:100 a hipped roof plan of primary school building of 15 m in length and 7.2 m in width. A roof has a corrugated iron sheet covering materials with an overhang of 600 mm measured horizontally from the face of the wall.
Show the following information in your drawing:
(i) Ridge
(ii) Direction of fall
(iii) Roof overhang
(iv) Hipped rafter
(v) Type of covering
(b) Draw to scale of 1:100 a king post roof truss to be used for office building which has a span of 5500 mm and a pitch angle of 35 degree given the following information
(i) The size of rafter, wall plate, king post and ceiling joist is 150 $m m \times 50 \mathrm{~mm}$
(ii) The size of ridge board is $150 \mathrm{~mm} \times 25 \mathrm{~mm}$
(iii) The thickness of the wall is 230 mm

The candidates were required to apply drafting technique to demonstrate the acquired practical knowledge and skills that can be practiced to produce working drawings.

The analysis shows that 200 ( $58.8 \%$ ) candidates attempted this question out of whom, 33 ( $16.5 \%$ ) candidates scored from 0 to 8.5 marks. The candidates who scored from 9 to 19 marks were 83 ( $41.5 \%$ ), whereas 84 ( $42 \%$ ) candidates scored 19.5 to 30 marks. Figure 13 presents the candidates' performance in this question.


Figure 13: The Performance of Candidates in Question 12
Generally, the performance of the candidates is good, because 83.5 per cent of the candidates scored from 9 to 30 marks, as illustrated in Figure 13. Those candidates comprehended the task of the question and were knowledgeable on a roof plan and roof trusses drawings. The variation in scores of the marks in this category was due to the varied neatness, smartness in labeling and dimensioning of their drawings.


Extract 12.1: A sample of candidates' good responses on Question 12
Extract 12.1 shows a sample of good responses from one of the candidates who failed to draw correctly in both parts (a) and (b).

However, the candidates' responses indicates that 16.5 percent scored 8.5 marks or below. Most of these candidates lacked knowledge of roof plan and others did not comprehend the information given as they drew a section of the roof instead of a roof plan in part (a). In addition, in part (b), they
drew queen post roof trusses instead of king post roof trusses as demanded in the question.

Another identified weakness in this category of candidates is the failure to apply the correct scale for drawing roof plans and king post roof trusses. This is evidenced by the unproportioned length between the component members of the roof plan and the king post roof trusses drawn by the candidates. Extract 12.2 presents a sample of poor responses to this question.


Extract 12.2: The candidates' poor responses on Question 12

Extract 12.2 shows a sample of poor response from one of the candidates who failed to draw correctly in both parts (a) and (b).

### 2.3.2 Question 13: Stairs and Staircases

In this question, the candidate was required to design and draw an open stringer timber stair. The question stated:
(a) Design a step and draw to a scale of 1:20 cross - section elevation of an open stringer timber stair to be used for private use with the following characteristics:
(i) Number of steps is 13
(ii) Total riser is 2600 mm
(iii) Total going is 2760 mm
(iv) Thickness of floor joists, flooring, ceiling, and under hang of apron lining is 240 mm
(v) Available space for width of stair is 900 mm
(vi) The thickness of a risers is 25 mm
(vii) The thickness of tread is 38 mm
(viii) The risers and the treads are connected by tongued and grooved joints and the joint are nailed
(ix) The size of balusters is 25 mmx 25 mm fixed at each tread
(x) The size of the newel post is $100 \mathrm{~mm} \times 100 \mathrm{~mm}$ and
(xi) The size of the hand rails $75 \mathrm{~mm} \times 50 \mathrm{~mm}$ fixed at the height of 900 mm
(b) In a stair cross - section elevation in (a) above, draw detail of step using a scale of 1:5. The following parts should be shown:
(i) Riser
(ii) Going
(iii) Tread
(iv) Nosing
(v) Rise

The candidates were expected to use the given information of a stair to design and draw in the given scale the cross section of a stair. The candidates were tested on six crucial items including, the proper use of architectural scales and quality of lines, labelling, dimensioning, neatness and the usage of data to produce the anticipated drawing.

A total of 140 (41.2\%) candidates attempted this question, of which 78 ( $55.7 \%$ ) candidates scored marks from 0 to 8.5 . The candidates who scored
from 9 to 19 marks were $56(40 \%)$, whereas $6(4.3 \%)$ scored from 19.5 to 30 marks. The performance of candidates in this question is as summarised in Figure 14.


Figure 14: The Performance of Candidates in Question 13
The candidates' performance in this question is average because $43.3 \%$ of the candidates scored from 9.5 to 30 marks as shown in Figure 14. The analysis of the candidates' responses show that, the candidates managed to demonstrate skills in interpreting the given information. They appropriately designed and drew the section of the stair to the required scale as shown in one of the sampled responses presented in Extract 13.2.


Extract 13.2: A sample of candidates' good responses on Question 13

Extract 13.2 is a sample of response by the candidates who managed to use the given information to design and draw an open stringer timber stair.

Further analysis reveals that, 55.7 per cent of the candidates who scored 8.5 marks and below failed to score high marks because they lacked knowledge on the subject matter and failure to recall the procedure of presenting the drawing on a standard drawing paper. For example, majority of the candidates failed to calculate the size of a step, likewise other candidates failed to draw with different line weight and they failed to label and indicate dimensions of the component members. Father analysis shows that candidates in this category failed to use the given scale as they drew a sketch or section by using different scale, from what was instructed in the question.

Moreover, the few candidates (5.6\%) who scored a 0 mark failed to draw the required section. This failure is an indicator that, the candidates were completely unaware of the stairs drawings. Extract 13.1 shows a sample of a poor response from one of the candidates.


Extract 13.1: A sample of candidates' poor responses on Question 13

Extract 13.1 is a sample of response by a candidate who failed to design and draw an open stringer timber stair.

### 3.0 ANALYSIS OF THE CANDIDATES' PERFORMANCE PER TOPIC

A total of 18 topics were examined in the Architectural Draughting paper. The analysis shows that the candidates had good performance in five topics and average performance in four topics. However, they demonstrated poor performance in four topics.

The topics that were well performed include the multiple choice items in question $1(96.5 \%)$. The question comprises the topics of Fire Place and Flues, Site Plan, Perspective Drawing, Drawing Instruments and Equipment, Drainage System, Elevation, Doors, Foundation plan, Electrical Supply and Development of floor plan. The performance was also good in the questions 2, 3, 9 and 12 set from the topic of Sections ( $77.6 \%$ ), Foundation ( $85.9 \%$ ), Doors ( $88.8 \%$ ) and Roof ( $83.5 \%$ ) respectively. The good performance in the stated topics was attributed to adequate knowledge, appropriate drawing skills and correct interpretation of the requirements of the questions.

The four topics on which the candidates performed averagely were Architectural scale (56.2\%), Residential house planning (45.5\%), Fireplace and flue ( $45.6 \%$ ) and Stairs and staircase ( $45.5 \%$ ), that was tested in questions $4,7,10$ and 13. This average performance shows that the candidates lacked sufficient knowledge that could enable them perform above average in those topics.

The candidates also performed poorly in the topic of Schedules (9.7\%), Windows (18.6\%), Site planning (13.2\%) and Water supply (24.4\%) which were tested in questions 5, 6, 8 and 11 respectively. The analysis shows that the cause of poor performance in these topics were inability of candidates to identify the requirements of the questions, misinterpretation of the question demands and improper use of the knowledge and skills learned to respond to the questions.

A summary of the detailed analysis of the candidates' performance on each topic is presented in the Appendix where, green, yellow and red colours represent good, average and weak performance respectively.

### 4.0 CONCLUSION AND RECOMMENDATIONS

### 4.1 Conclusion

The analysis of candidates' performance was done in all the questions that were examined on CSEE, in Architectural Draughting subject. Generally, the performance of the candidates in Architectural Draughting paper was good as 288 (69.1\%) candidates were able to score pass mark and above.

The candidates' performance in questions $1,2,3,9$ and 12 is 'good' while the performance in questions $4,7,10$ and 13 is "average". The poorly performed questions were $5,6,8$, and 11 .

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

Provision of drawing equipment and more involvement of students in industrial practical works are required for the improvement of the prospective candidates' performance, as it will help them catchup with the logical and technical understanding of the subject matter.

### 4.2 Recommendations

### 4.2.1 Recommendations to Candidates

Basing on the performance observed in this analysis, the following are recommended to candidates:
(a) Since some of the candidates failed to adhere to the demands of the questions; it is recommended that future candidates should be encouraged to read carefully the instructions before answering the questions.
(b) Candidates should be encouraged to read relevant materials and to practice in order to widen their knowledge, especially in the areas where most of the candidates demonstrated to have lack of knowledge.

### 4.2.2 Recommendations to Teachers

(a) In order to improve candidate's performance, teachers should be encouraged to provide enough exercises and tests for their candidates before they sit for national examinations.
(b) Candidates should be embedded with practical skills so that they can integrate theories with practical experiences and hence acquire the expected competences.
(c) Teachers should guide candidates to develop drawing skills through practice, as this will help them to draw neat and well labelled drawings.

Appendix

A Summary of the Candidates' Performance Question-wise

| $\mathbf{S} / \mathbf{N}$ | Topic | Question Number | Percentage of Candidates who Scored 30\% o More | Remarks |
| :---: | :---: | :---: | :---: | :---: |
| 1 | Fire Place and Flues, Site Plan, Perspective <br> Drawing, Drawing <br> Instruments and <br> Equipment, Drainage <br> System, Elevations, <br> Doors, Foundations <br> plan, Electrical <br> Supply and <br> Development of floor plan. | 1(Multiple Choice Items) | 96.49 | Good |
| 2 | Doors | 9 | 88.8 | Good |
| 3 | Foundations | 3 | 85.9 | Good |
| 4 | Roofs | 12 | 83.5 | Good |
| 5 | Sections | 2 | 77.6 | Good |
| 6 | Architectural Scales | 4 | 56.2 | Average |
| 7 | Fireplace and flue | 10 | 45.6 | Average |
| 8 | Residential house planning | 7 | 45.5 | Average |
| 9 | Stairs | 13 | 43.3 | Average |
| 10 | Water supply | 11 | 24.4 | Weak |
| 11 | Windows | 6 | 18.6 | Weak |
| 12 | Site plan | 8 | 13.2 | Weak |
| 13 | Schedules | 5 | 9.7 | Weak |

