THE NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

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

083 RADIO AND TV SERVICING

THE NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

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083 RADIO AND TV SERVICING

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TABLE OF CONTENTS

FOREWORD

The National Examinations Council of Tanzania (NECTA) is pleased to issue *Candidates' Items Response Analysis* (CIRA) reports in order to provide feedback on candidates' performance on the Certificate of Secondary Education Examination (CSEE) 2018 in Radio and TV Servicing subject. The report is intended to sensitize the future candidates, teachers, examiners and other key education stakeholders on the general performance, specific areas of weakness and suggestions for improvement. Therefore, this report is an important guide for future CSEE processes.

The report is mainly based on responses obtained from candidates' scripts and statistical data processed by NECTA. The examiners have analysed candidates' responses for each question and identified some factors for scoring low marks which include candidates' inability to interpret the requirements of the questions, failure in using correct formulae in solving problems, and lack of knowledge and skills in various topics. Each factor has been clarified using extracts from candidates' scripts as illustrations.

The National Examinations Council of Tanzania is confident that the feedback which is provided in this report will be useful to education stakeholders and that, the suggestions offered will enable them to take appropriate measures in enhancing candidates performance in future.

Dr. Charles E. Msonde
EXECUTIVE SECRETARY

LIST OF SYMBOLS AND ABBREVIATIONS

A.C	Alternating Current
BJT	Bipolar Junction Transistor
CIRA	Candidates' Items Response Analysis
CSEE	Certificate of Secondary Education Examinations
D.C	Direct current
dB	decibel
mA	mill Ampere
MHz	Mega Hertz
NECTA	National Examinations Council of Tanzania
TV	Television
UJT	Unipolar Junction Transistor
Ω	Ohm
µ	Micro

1.0 INTRODUCTION

The Radio and TV Servicing Examination comprised of three sections; A, B and C. Section A consisted of one multiple choice question with ten items (i to x) drawn from the topics of *Soldering, Semiconductors, Power Supply, Transistor Amplifiers, Oscillators, Radio Receivers, RF amplifier, Transducers, Television Receiver,* and *Radio Receiver Alignment*. The candidates were required to answer all questions from this section. Total of 10 marks were allocated for this section.

Section B consisted of ten short answer questions, each carried 3 marks. The candidates were required to answer all questions in this section. The questions were composed from the topics of *Integrated Circuits, Picture Tube, Transistor Amplifiers, Video Tape Recorders, Transistors Converter Circuit, Power Gain in Decibel, Electronic Circuit Components, Multistage Amplifiers, Power Supply* and *Bipolar Junction Transistors.* The total marks allocated for this section were thirty.

There were five structured questions in section C set from the topics of *Transistor Amplifiers, Electronic Circuits Component, Oscillators, Radio Receivers,* and *Television Receivers*. The candidates were required to opt for questions from this section. Each question carried 20 marks to make a total of 60 marks allocated for this section.

A total of 140 candidates sat for Radio and TV Servicing out of whom 100 (71.43%) of students passed, while 40 (28.57%) failed. The candidates' performance in each question is categorized into three grade ranges as shown in Table 1.

Table 1: **Categories of the Grade Ranges of the Candidates' Performances**

Ranges of Marks Scored in %	0 – 29	30 – 64	65 – 100
Remarks on performance	Weak	Average	Good

The report presents a detailed analysis of the candidates' items response by indicating the task they were required to do in each question and how they performed it. Samples of good and poor responses extracted from the candidates' scripts have been used to illustrate such responses.

Lastly, the report gives a general observation and recommendation which will improve the candidate's performance in future.

2.0 ANALYSIS OF CANDIDATES' RESPONSE IN EACH QUESTION

Detailed analysis and general evaluation on the candidates' responses in each question have been conducted in this part. It intended to point out the candidates' performance and the challenges encountered when responding to a particular question.

2.1 SECTION A: OBJECTIVES QUESTIONS

2.1.1 Question 1: Multiple Choice Items from Various Topics

The question comprised ten items, (i) to (x), drawn from various topics in the prescribed syllabus of Radio and TV Servicing subject. Candidates were required to choose the correct answer from the given alternatives by writing its letter in the box provided. Total marks allocated for this question were 10.

A total of 138 (98.6%) candidates attempted this question. Among them, 13 (9.4%) performed poorly because they scored from 0 to 2 marks. There were 99 (71.8%) candidates who performed averagely as they scored from 3 to 6 marks. The rest, 26 (18.8 %) had good performance by scoring 7 to 10 marks. The general performance of students in this question was, therefore, good since 125 (90.6%) candidates scored average and above average. This performance is illustrated in the Figure 1.

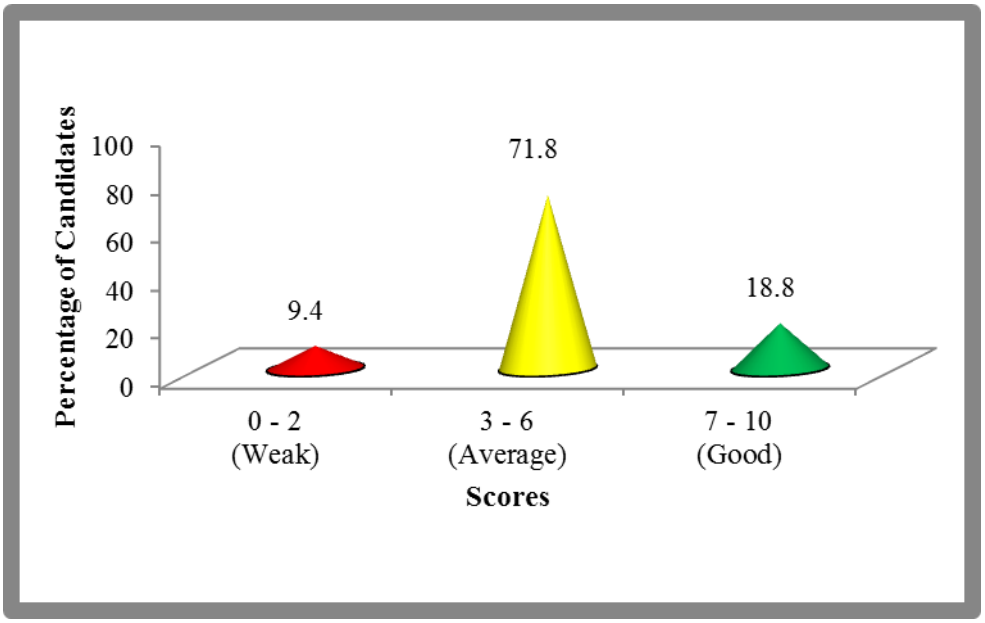


Figure 1: *Overall Candidates' Scores in Percentage for Question 1*

The items in which most of the candidates failed to select the correct responses were (iv), (v) and (viii). In item (iv), the candidates were asked to choose one of the essential conditions for the power gain of a common emitter amplifier. Most candidates chose alternative B: *maximum gain* instead of D: *half of its Vcc*. These candidates confused the essential conditions for the 'power gain' of a common emitter amplifier with those for input and output 'impedances' of a common emitter amplifier which is maximum. Both 'power gain' and 'impedance' are common terms used in transistor amplifiers specifically in common emitter configuration.

In item (v), the candidates were required to choose the reason for an oscillator to produce oscillation. Most of them opted for alternative B, *negative feedback* and C, *both positive and negative feedback* instead of most correct alternative A, *positive feedback*. Those who chose alternative B, confused the property of an amplifier which has negative feedback with the property of an oscillator which employs positive feedback. On the other hand, those who chose alternative C, had a thought that, for an oscillator to oscillate it requires the movement of '*to* and *fro*'. Therefore, they related the 'to and fro' movement with the movement from positive to negative, and vice versa. The analysis of the candidates' responses in this item suggests that most of the candidates lacked knowledge on the area of electronic oscillators.

Moreover, in item (viii), the candidates were required to identify the section of the television set in which sound and video signals are separated. A number of students failed to choose the correct answer as they had a clue with the phrase "video" which appeared frequently in the question. This made most of them to choose alternative B, *At video amplifier* and alternative E, *At video output* instead of alternative A, *At video detector*. These candidates observed to have acquired some knowledge on TV receivers but they were not conversant enough on functions of various sections of TV receiver, particularly the video detector

The analysis indicates further that, items (ii), (iv), (vii), (ix) and (x) were averagely performed. However, items (i) and (vi) were very well performed as most of the candidates managed to choose the correct answers. The candidates' performance in these items showed that most of them had sufficient knowledge on the topics of soldering and transducers in item (i) and (vi), respectively.

2.2 SECTION B: SHORT ANSWER QUESTIONS

2.2.1 Question 2: Integrated Circuit

The question consisted of two parts, (a) and (b) which required the candidates to:

(a) Define the term "integrated circuit" as applied in electronics.

(b) List two advantages of integrated circuits.

The question was attempted by 140 (100%) candidates and their scores were as follows: 42 (34.7%) candidates performed poorly by scoring marks from 0 to 0.5, 13 (10.8%) candidates scored averagely from 1 to 1.5 marks, and others 66 (54.5%) candidates scored higher marks from 2 to 3. The general candidates' performance in this question is illustrated in the Figure 2.

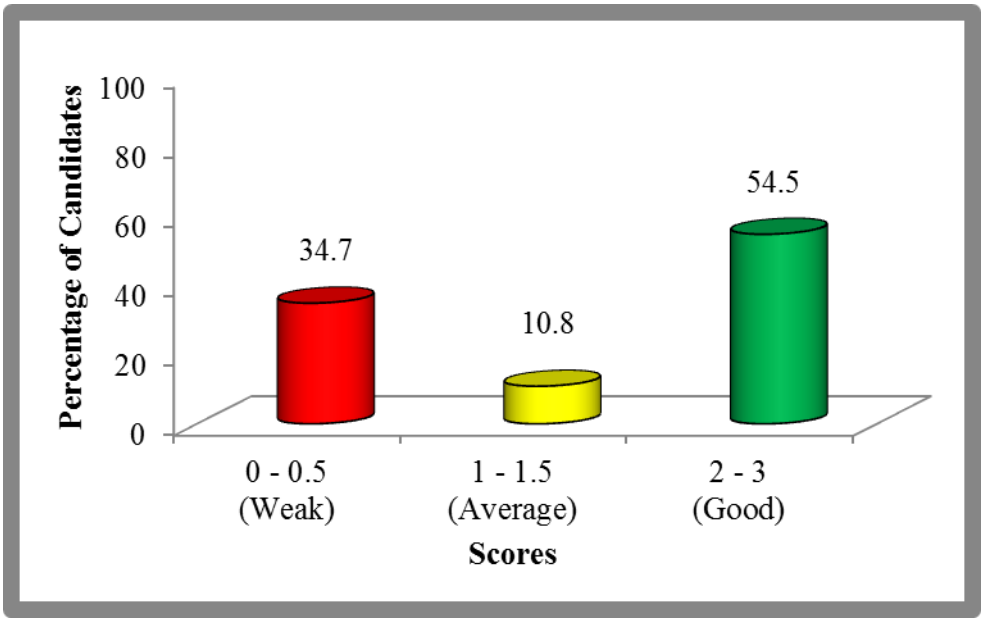


Figure 2: *Distribution of Candidates' Scores in Question 2*

The general performance in this question was good since 79 (65.3%) candidates who attempted this question managed to score from 1 to 3 marks. The analysis indicates that 31 (22.1 %) candidates who scored full (3 marks) were able to provide correct responses in all parts of the question. This signifies that the candidates acquired adequate knowledge in the topic of integrated circuits. Extract 2.1 is a sample of good response given by one of the candidates.

2	(a) Interg rated circuit - Is the complete circui t in which passive and active component can fabricated in single ~~tiy~~ tiny chip of silcon
	(b)(i) It is small in size so as easily to fabricate.
	(ii) It is easily to be replaced.

Extract 2.1 shows a good response from a candidate who managed to define the term integrated circuits in 2 (a) and listed two advantages of integrated circuits in 2 (b).

There were also 13 (10.8 %) candidates who performed averagely as they scored 1 mark. These candidates were able to provided correct response in one part of the question but failed in the other. The candidates in this group demonstrated partial understanding on integrated circuits, particularly the advantages of using integrated circuits.

Performance analysis indicates further that among 42 (34.7%) candidates who scored poorly there were 39 (32.2%) who neither could define the term integrated circuit nor list its advantages, thus scored zero. These candidates revealed to lack knowledge in the area of integrated circuits. Extract 2.2 presents a sample of poor responses from a one of the candidates.

2.	a) Integrated Circuit is the electrical device which used to interchange electrecity in the circut.
	b) i Produce high frequency in electrical divices
	Provide electrical signal into different ways

Extract 2.2 shows an incorrect response provided by one of the candidates who failed to define the term integrated circuit as well as giving its two advantages.

2.2.2 Question 3: Picture Tube

The question consisted of two parts in which the candidates were required to:

(a) Mention two types of television camera tubes.

(b) Point out one major problem that will occur if the 3.58-MHz section of a TV set is missing.

A total of 117 (83.6%) out of 140 (100%) candidates attempted this question. The statistics of the candidates' performance show that 72 (61.5%) candidates scored from 0 to 0.5 marks, 25 (21.4%) scored 1 to 1.5, whereas 20 (17.1%) candidates scored from 2 to 3 marks. The general candidates' performance in this question is summarized in Figure 3.

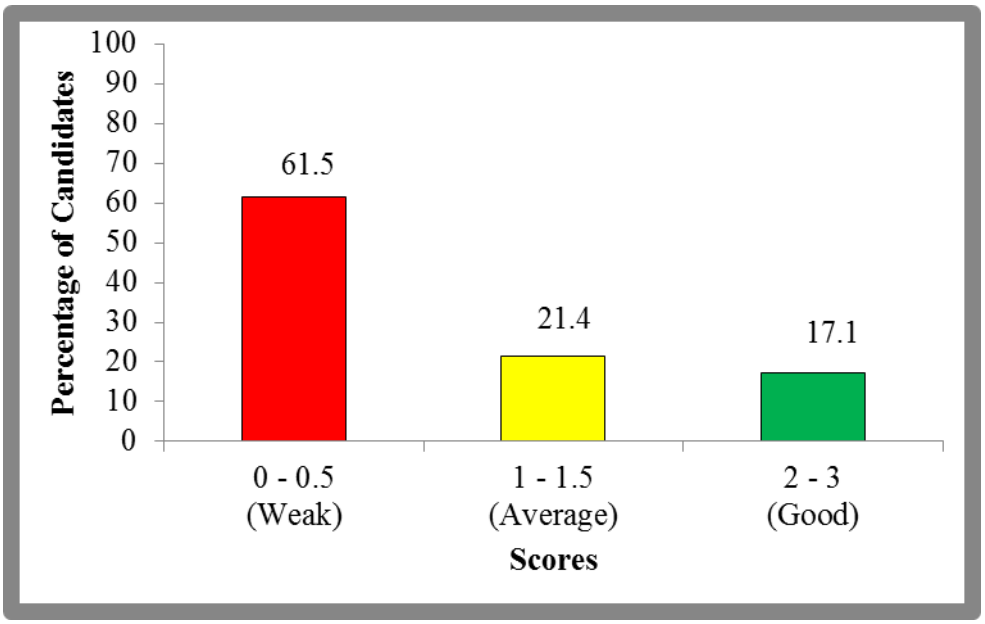
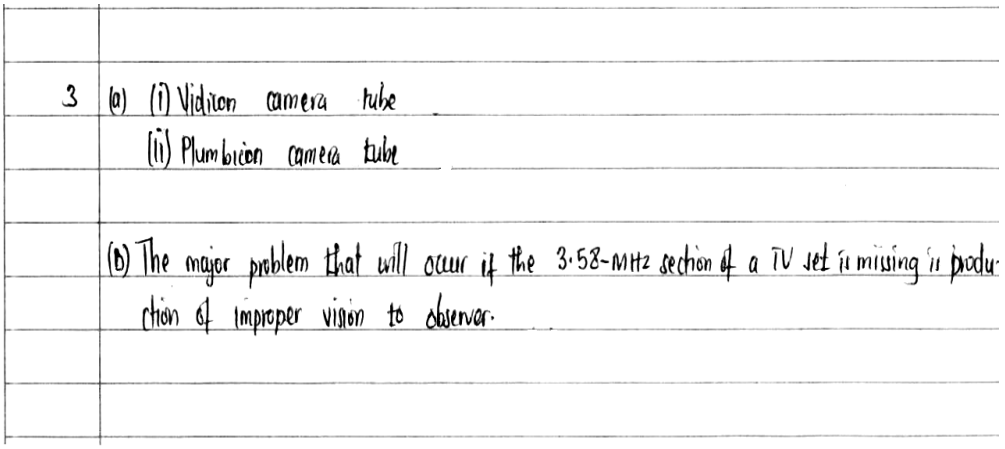


Figure 3: *Distribution of Candidates' Scores in Question 3*

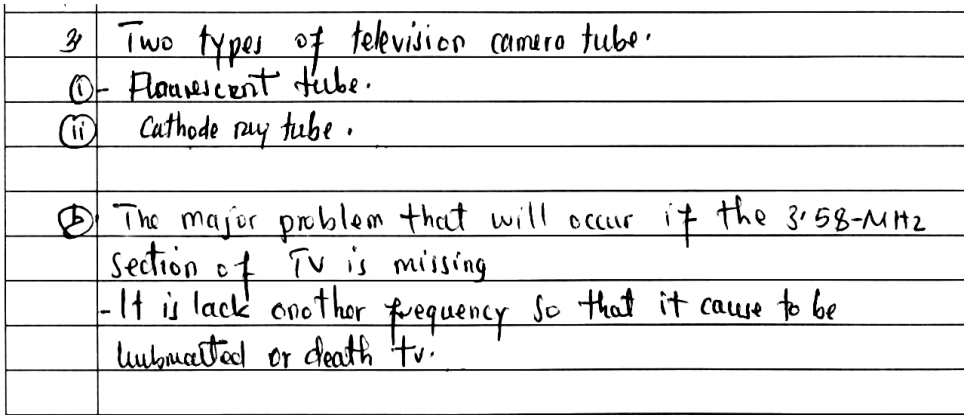
The general performance in this question was average since only 45 (38.5%) candidates who attempted this question managed to score average and above. The average performance of most of the candidates was due to the fact that they were only capable of providing the correct response in one part of the question but failed on the other part. These candidates acquired knowledge on the topic of picture tubes but lacked practical skills in the

principles of operation of the TV set. This is because they failed to recognize the problem which would occur if 3.58 MHz section is missing. Extract 3.1 is a sample of a candidate with average responses.



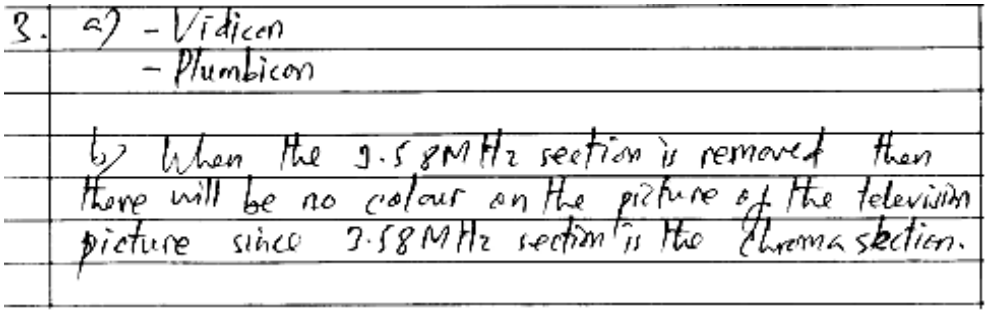
Extract 3.1 shows an average response provided by a candidate who mentioned correctly the two types of camera tubes. However, the candidate failed to identify the problem in a TV set if 3.48MHz section is missing.

Performance analysis show that 72 (61.5%) candidates performed poorly in this question. Out of these candidates 71 (60.7%) scored zero and only 1 (0.9%) scored 0.5 marks. These candidates proved to have insufficient knowledge and practical skills concerning television camera tubes and the principles of operation of TV receivers. In part (a), the candidates failed to mention clearly the types of television camera tubes. They seemed to confuse the term 'tube' with other tubes learned in other related subjects of electrical engineering. In part (b), the candidates were just guessing the answer and took on advantage of the word "problem" that makes them to respond that '*the TV would be dead'*. This performance is illustrated in Extract 3.2.



Extract 3.2 shows a sample of incorrect response from a candidate who mentioned in part (a) fluorescent tube and cathode ray tube which are used in electrical lighting system and test equipment, respectively and, in (b) provided irrelevant responses.

However, there was a candidate (0.9%) who indicated high ability of understanding and mastering of matters relating to picture tubes. This candidate managed to score full (3) marks. Extract 3.3 illustrate this performance.



Extract 3.3 shows a sample of good response from a candidate who correctly mentioned the two types of camera tube in part (a). The candidate also pointed out one major problem that will occur if the 3.58 MHz section of a TV set is missing in part (b).

2.2.3 Question 4: Bipolar Junction Transistor

The question consisted of two parts in which the candidates were required to:

(a) State the conditions under which the transistor is said to be in cut-off.

(b) Calculate the value of collector current, if a transistor has the emitter current of 10 mA and the base current is 150 µA.

This question was attempted by 131 (93.6%) out of 140 (100%) candidates who sat for this paper. Performance analysis reveals that 27 (20.6%) candidates performed poorly as they scored 0, 16 (12.2%) candidates scored 1 to 1.5 marks and those who scored from 2 to 3 marks were 88 (67.2%). The general candidates' performance in this question is summarized in Figure 4.

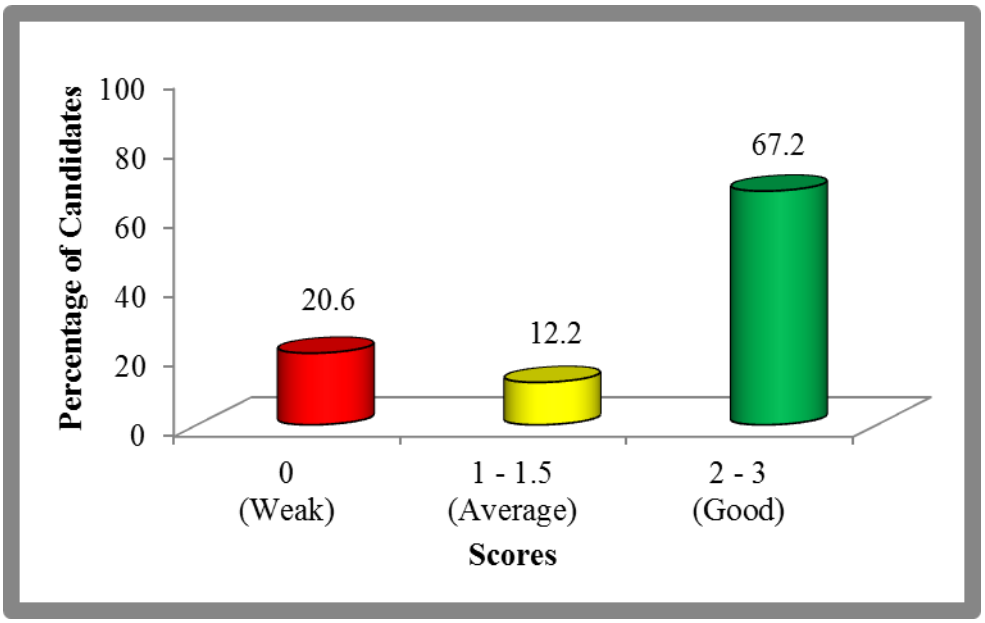
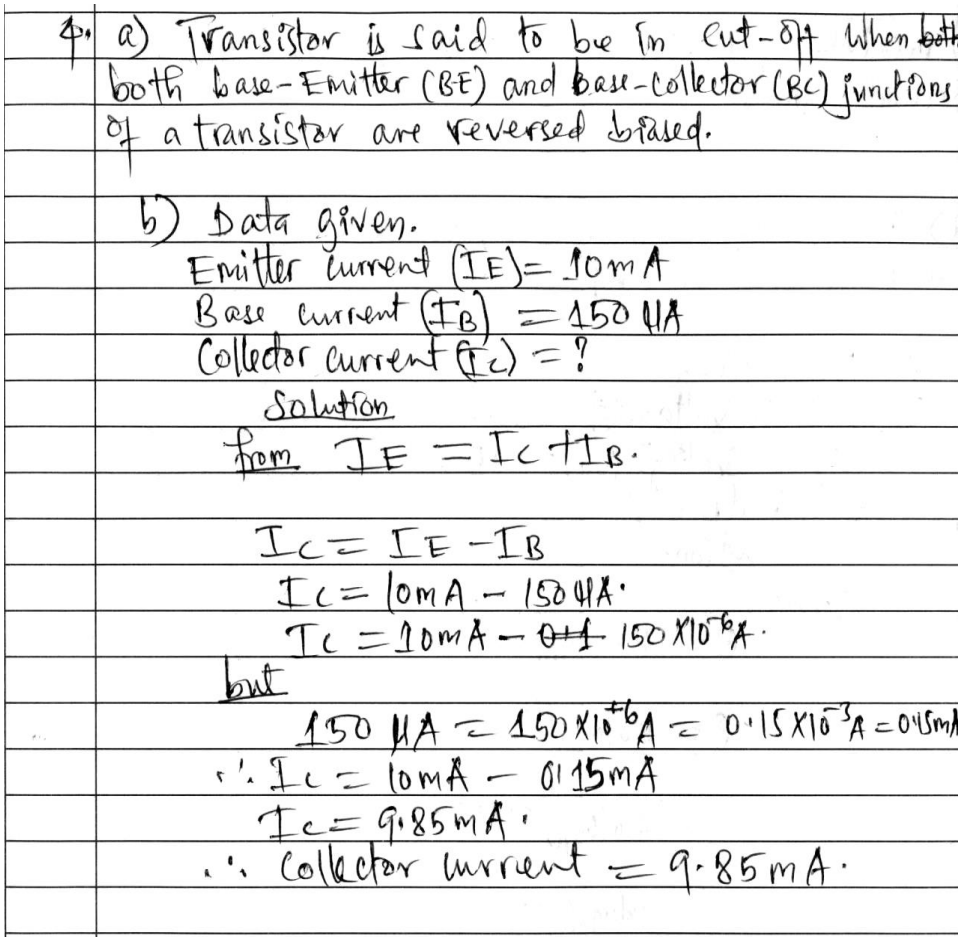


Figure 4: *Distribution of Candidates' Scores in Question 4*

The general performance in this question was good since 104 (79.4%) candidates who attempted this question scored from 1 to 3 marks. The good performance was due to most of the candidates to being conversant enough on bipolar junction transistor. They managed to recall the correct formula for calculating the value of the transistor collector current and were able to state the condition for a transistor to be in cut-off. Extract 4.1 presents a sample of good response from one of the candidates.

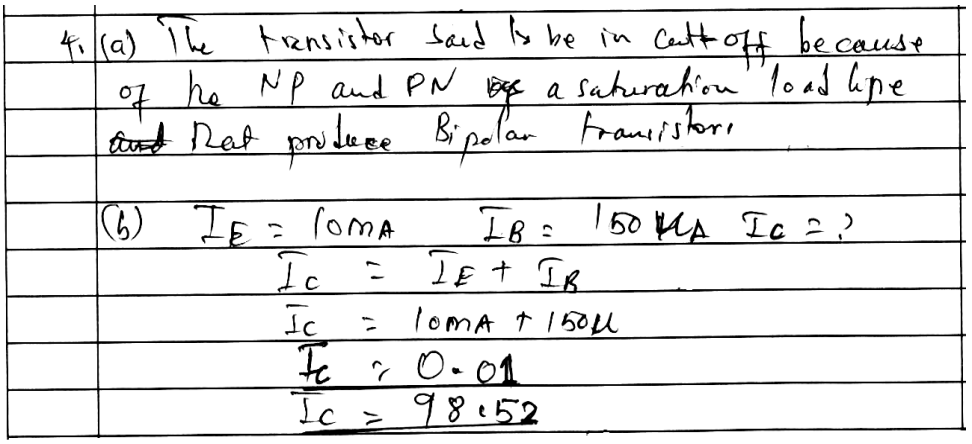

4. a) Transistor is said to be in cut-off when both base-Emitter (BE) and base-collector (BC) junctions of a transistor are reversed biased.

b) Data given.
Emitter current (I_E) = 10mA
Base current (I_B) = 150 μA
Collector current (I_C) = ?
Solution
from $I_E = I_C + I_B$.

$I_C = I_E - I_B$
$I_C = 10mA - 150\mu A$.
$I_C = 10mA - 150 \times 10^{-6} A$.
but
$150\ \mu A = 150 \times 10^{-6} A = 0.15 \times 10^{-3} A = 0.15mA$
$\therefore I_C = 10mA - 0.15mA$
$I_C = 9.85mA$.
∴ Collector current = 9.85mA.

Extract 4.1 shows a sample of good response from a candidate who managed to state the conditions for the transistor to be in cut – off. The candidate also used the proper formula to calculate the value of transistor collector current.

Nevertheless, the performance of most of the candidates was good. There were few candidate 27 (20.6%) who performed poorly by scoring 0. Analysis shows that these candidates had a little knowledge on bipolar junction transistors, particularly in its conditions and operations. Extract 4.2 illustrate a poor performance of the candidate.



Extract 4.2 shows a sample of wrong response from a candidate who described the construction of transistor instead of stating the condition of a transistor to be in cut-off in part (a). The candidate also used improper sign in equation for calculating the value of collector current in (b).

2.2.4 Question 5: Video Tape Recorder

The question had two parts, (a) and (b), in which the candidates were required to:

(a) Name two types of video tape recorder.

(b) Give the reasons for the video tape recorders to have in-built tuner circuits.

The candidates' performance analysis for this question shows that those who scored from 0 to 0.5 marks were 78 (75.7%), while 22 (21.4%) candidates scored from 1 to 1.5 marks and 3 (2.9%) candidates scored from 2 to 3 marks. The general candidates' performance in this question is summarized in Figure 5.

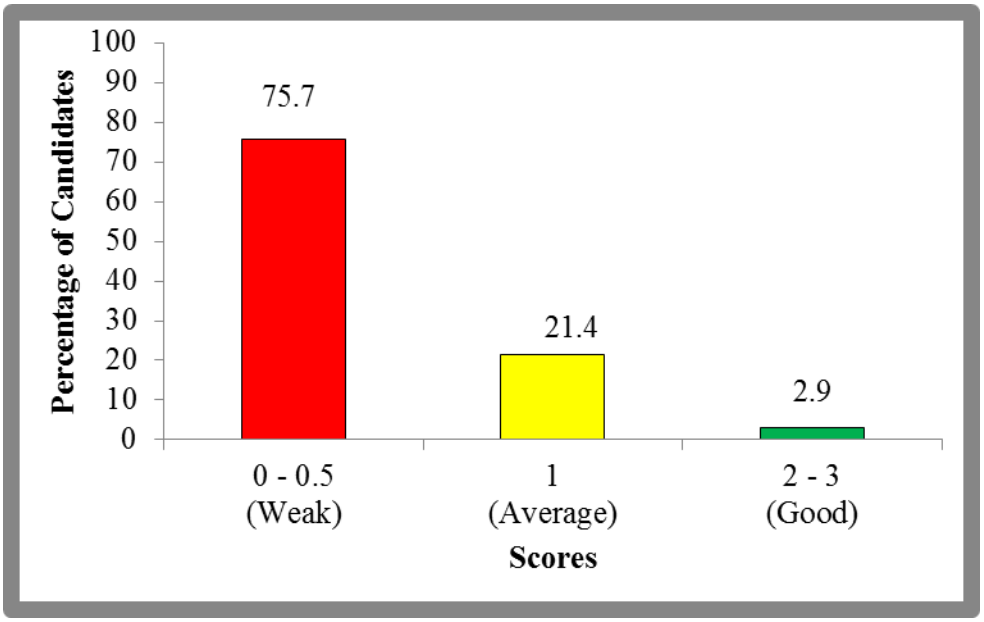
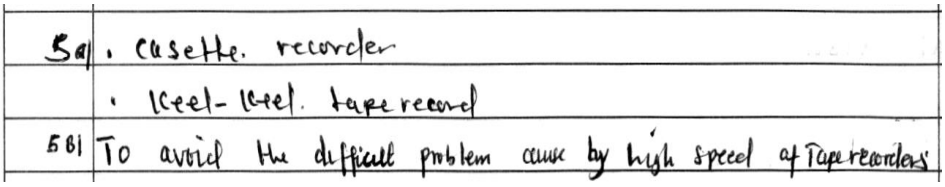


Figure 5: *Distribution of Candidates' Scores in Question 5*

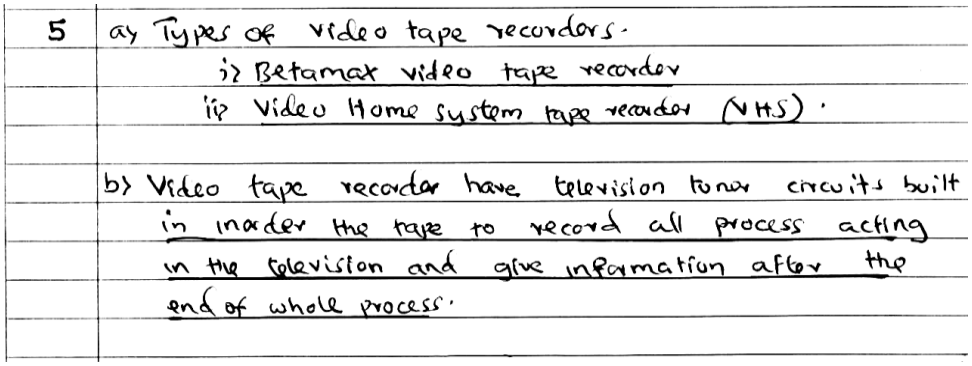
The general performance in this question was poor since 78 (75.7%) scored below average. Analysis shows that 75 (72.8%) candidates from this group scored 0 and only 3 (2.1%) managed to score 0.5 marks. The mass failure of the candidates implies that they had inadequate knowledge and competence concerning video tape recorders. Extract 5.1 illustrate a sample of candidate's with poor response.



Extract 5.1 shows a sample of incorrect response from a candidate who in (a) confused the video tape recorders with other tapes used in audio recording. In (b), the candidate failed to give the reasons for the video tape recorder to have television tuner circuits built in.

Despite the fact that the candidates performance was poor, there were 25(24.2%) who scored average and above. Out of those, only 3 candidates scored from 2 to 3 marks. This result implies that the candidate had partial knowledge on video tape recorders, which led them to provide correct responses only in either of the parts of the question.

Further the analysis indicates that only 3 (2.9%) candidates managed to score marks above average. These candidates demonstrated high capability of understanding the video tape recorders, particularly in its types and construction. Extract 5.2 illustrate a sample of good response.


5
a) Types of video tape recorders.
i) Betamax video tape recorder
ii) Video Home system tape recorder (VHS).
b) Video tape recorder have television tuner circuits built in inorder the tape to record all process acting in the television and give information after the end of whole process.

Extract 5.2 shows a good response from a candidate who managed to name the types of video tape recorder, and to give out the proper reason for the tape recorders to have in-built tuner circuits.

2.2.5 Question 6: Transistor Converter Circuit

The question had two parts, (a) and (b), and was constructed as follows:

(a) Outline two parts of a converter circuit.
(b) What is the main function of a converter circuit in a radio receiver?

The question was attempted by 104 (74.3%) out of 140 candidates. There were 89 (85.6%) candidates who scored from 0 to 0.5 marks, 10 (9.6%) candidates scored from 1 to 1.5 marks and 5 (4.8%) candidates scored from 2 to 3 marks. The general candidates' performance in this question is summarized in Figure 6.

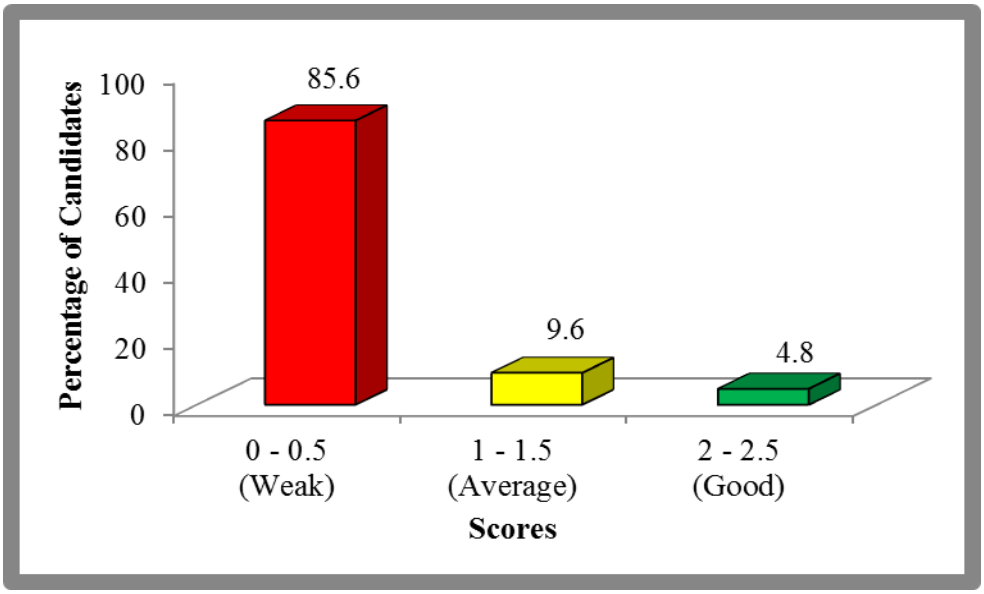
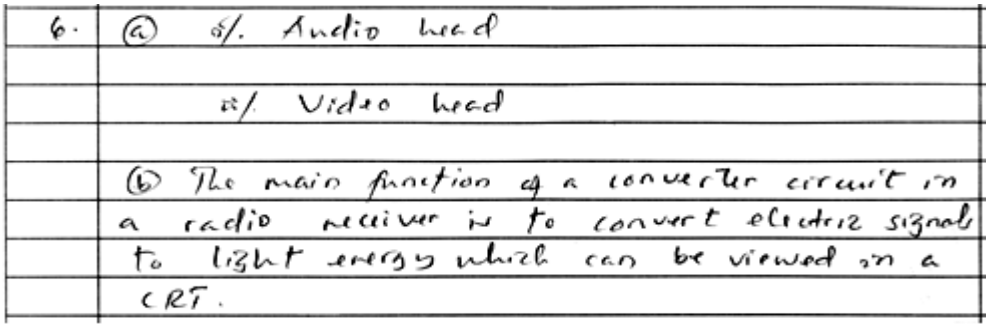


Figure 6: *Distribution of Candidates' Scores in Question 6*

The general performance in this question was weak since 89 (85.6%) candidates perform poorly. Results shows that among these candidates 85 (81.7%) scoring 0. Most of the candidates failed to outline parts of convertor circuit and mentioning the main faction of a convertor circuit in radio receiver. None of the candidates scored full (3) marks. This implies that the candidates had insufficient knowledge and skills about transistor convertor circuit. Extract 6.1 illustrate poor candidate's responses.

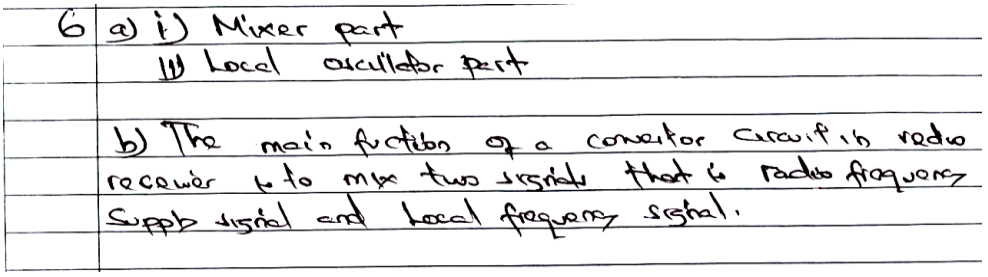

6. (a) i/. Audio head

ii/ Video head

(b) The main function of a converter circuit in a radio receiver is to convert electric signals to light energy which can be viewed on a CRT.

Extract 6.1 shows an incorrect response provided by one of the candidates who mentioned parts of video recorder instead of the parts of convertor circuit in (a). The candidate provided the function of LED instead of the function converter circuit in part (b).

Although the general performance was weak, there were 15 (14.4%) candidates who scored average and above. These candidates scored from 1 to 2.5 marks. Analysis shows that the candidate's responses were partial as they managed to provide correct answers in either of the parts of the question. This performance implies that the candidates had acquired insufficient knowledge and skills on transistor converter circuit. Extract 6.2 presents a sample of satisfactory response from a candidate.


6 a) i) Mixer part
ii) Local oscillator part

b) The main fuction of a convertor circuit in radio receiver is to mix two signals that is radio frequency signal and local frequency signal.

Extract 6.2 shows a sample of satisfactory response from a candidate who mentioned the two parts of a converter circuit. The candidate also partly explained the main function of the converter circuit in a radio receiver.

2.2.6 Question 7: Power Gain in Decibels

This question had two parts, (a) and (b). The question required the candidates to:

(a) Define the term gain as applied in amplifiers.

(b) Calculate the gain of amplifier in dB, if the input signal to a voltage amplifier is 350 mV and the output signal is 15 V.

The question was attempted by 131 (93.6%) out of 140 (100%) candidates. The score were as follows; 32 (24.4%) candidates scored from 0 to 0.5 marks, 35 (26.7%) candidates scored 1 to 1.5 marks and 64 (48.9%) candidates scored from 2 to 3 marks. The general candidates' performance in this question is summarized in Figure 7.

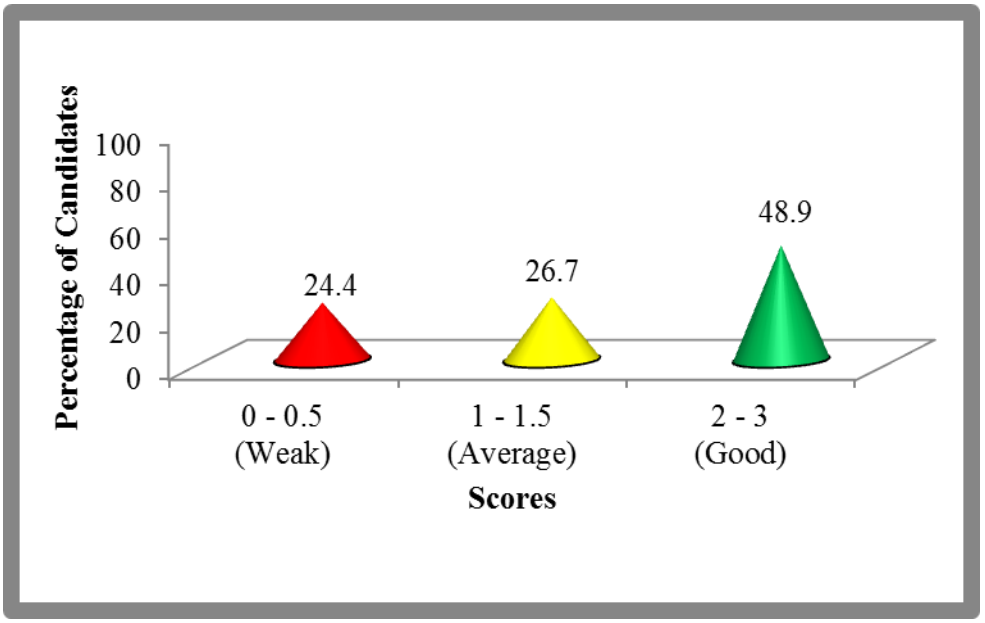
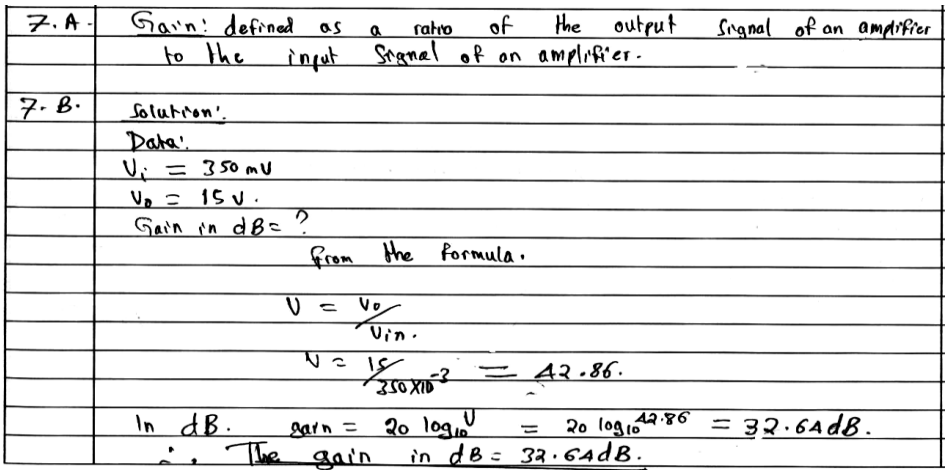


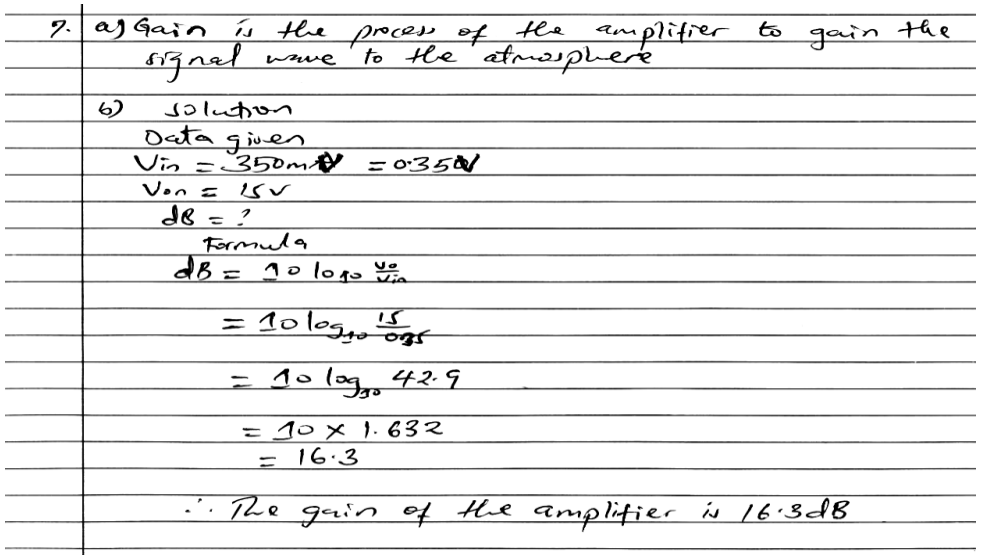
Figure 7: *Distribution of Candidates' Scores in Question 7*

The general performance in this question was good since 99 (75.6%) candidates scored average and above. These candidates showed to have an adequate knowledge on power gain in decibel. They managed to define the term gain as well as recall, and to apply correct formula in calculating gain in decibel. Extract 7.1 illustrate a sample of good response.



Extract 7.1 shows a good response from one of the candidates who in (a) defined well the term gain. In (b), the candidate applied the correct formula in calculating the gain of amplifier in decibel.

For those 32 (24.4%) candidates who performed poorly, the analysis shows that they had little knowledge on power gain in decibel. That is why they failed to provide correct responses in all parts of the question. Extract 7.2 is a sample of poor response of the candidates.



Extract 7.2 shows a sample of improper response from one of the candidates who provided a wrong definition of gain, and also confused the formula of power gain with that of voltage gain.

2.2.7 Question 8: Electronic Circuit Components

The question required the candidates to draw the schematic symbols for each of the given types of transformers used in radio and TV receivers. The types were:

(a) Iron core.
(b) Dust core.
(c) Air core.

This question was attempted by 124 (88.6%) out of 140 (100%) candidates. The candidates who scored from 0 to 0.5 marks were 53 (42.7%), those who scored from 1 to 1.5 marks were 19 (15.4%) and considered to perform averagely. The rest 52 (41.9%) scored from 2 to 3 marks. The general candidates' performance in this question is summarized in Figure 8.

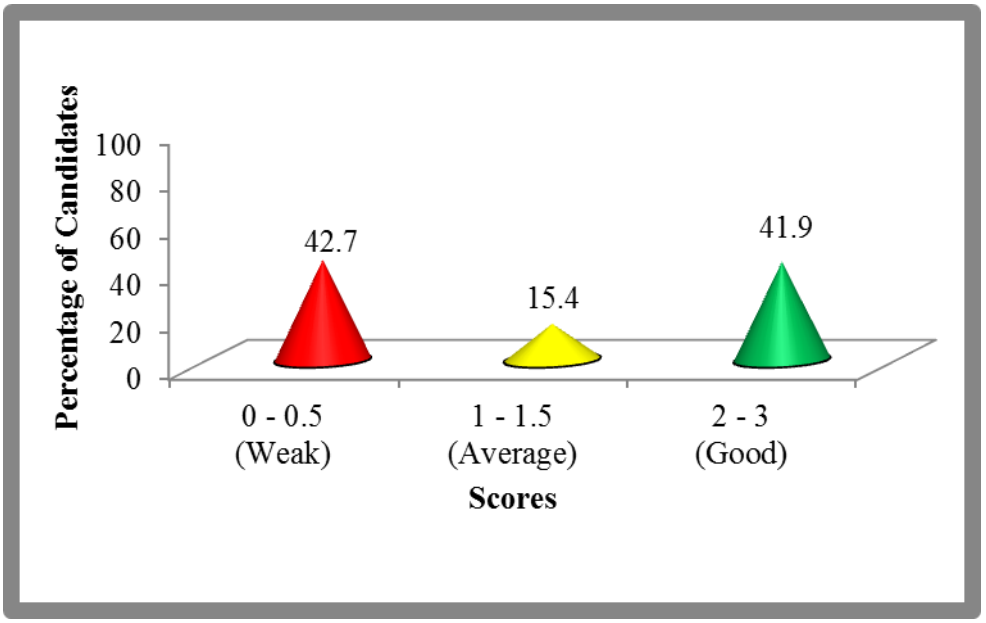
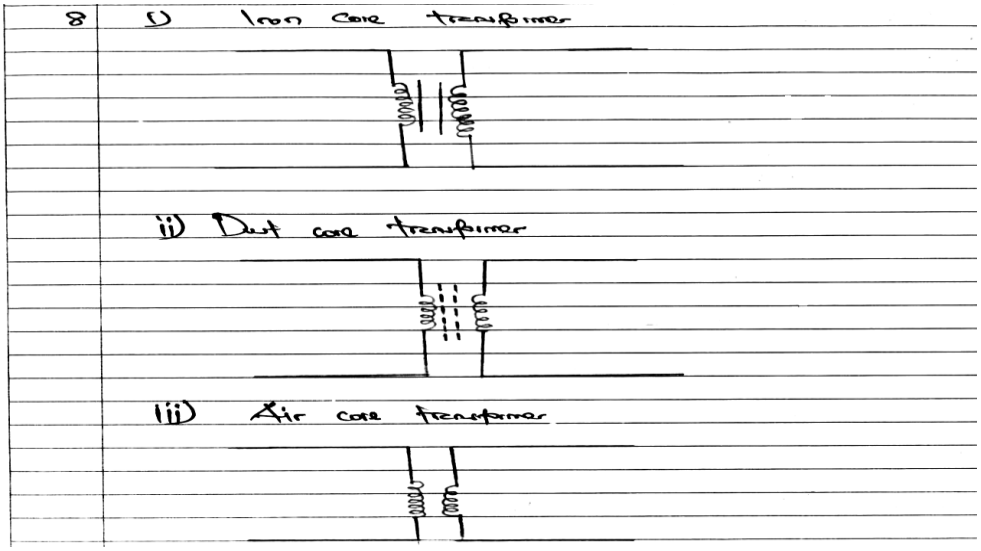


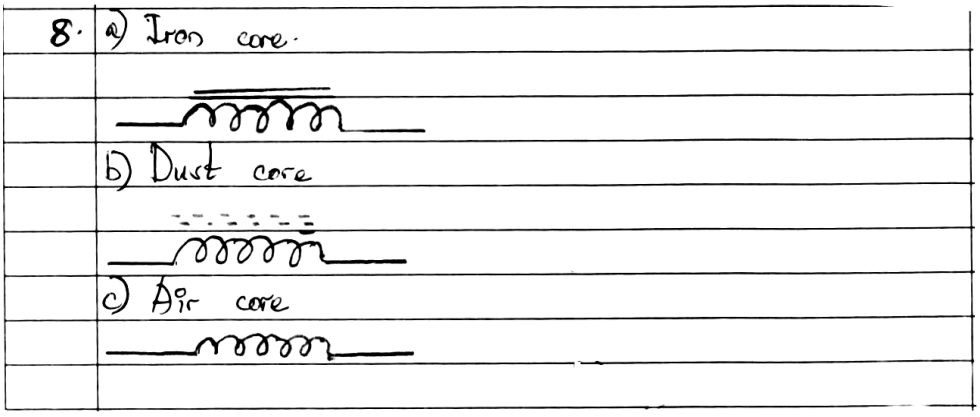
Figure 8: *Distribution of Candidates' Scores in Question 8*

The general performance in this question was average since 71 (57.3%) candidates scored average and above. Performance analysis indicates that the candidates were relatively knowledgeable on electronic circuit components. Most of them managed to draw schematic symbols for the types of transformers used in radio and TV receivers. However, few candidates could not provide correct responses to some parts. Extract 8.1 illustrate the sample of candidate with a good response.



Extract 8.1 is a sample of good responses from a candidate who managed to draw correct and neat schematic symbols for the types of transformer in question.

Candidates' performance analysis also shows that, there were 53 (42.7%) candidates who performed poorly. The majority had inability to draw transformer symbols. Candidates under this group lacked sufficient knowledge in some aspects of electronics components symbols. This is illustrated in the Extract 8.2, which shows the sample of poor response from one of the candidates.



Extract 8 shows a sample of a poor response from a candidate who drew the schematic symbols for inductors instead of the transformers.

2.2.8 Question 9: Multi Stage Amplifiers

This question required the candidates to give three reasons that make negative feedback network to be preferred in amplifier circuit.

A total of 118 (84.3%) candidates attempted this question. Of those, 55 (46.6%) candidates scored from 0 to 0.5 mark, 33 (28%) scored from 1 to 1.5 marks and 30 (25.4%) candidates scored from 2 to 3 marks. The general candidates' performance in this question is summarized in Figure 9.

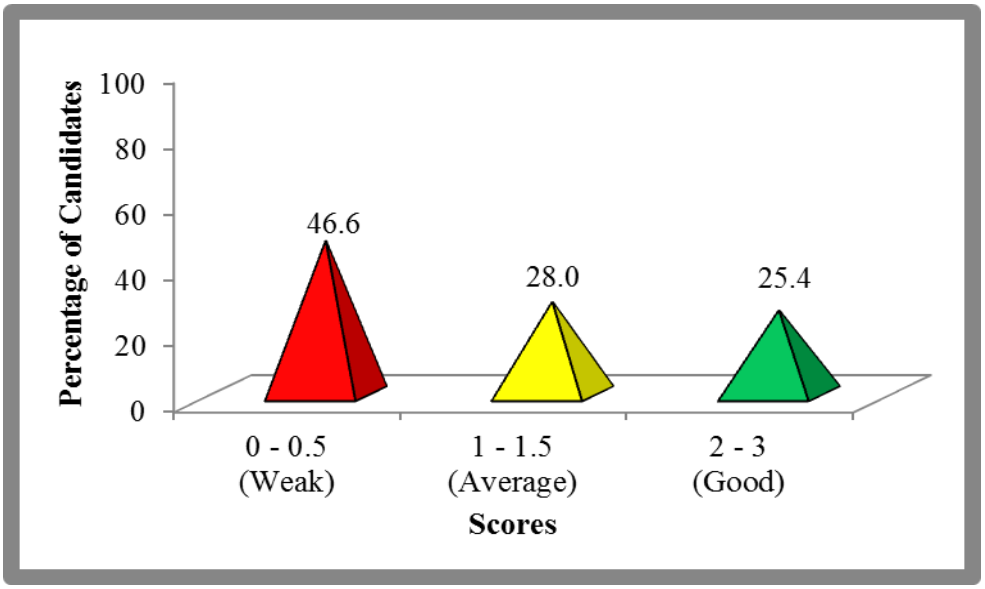
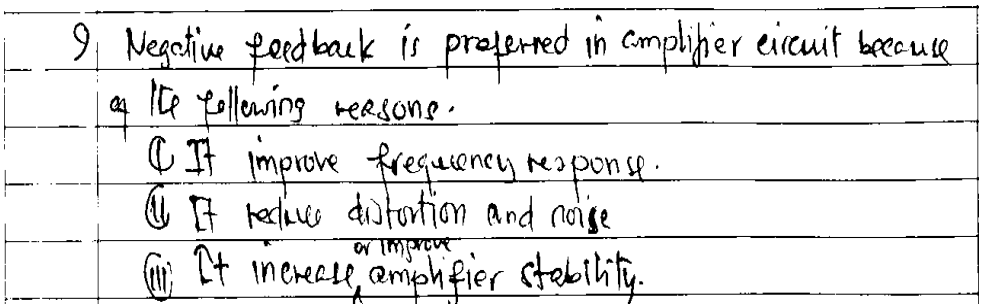


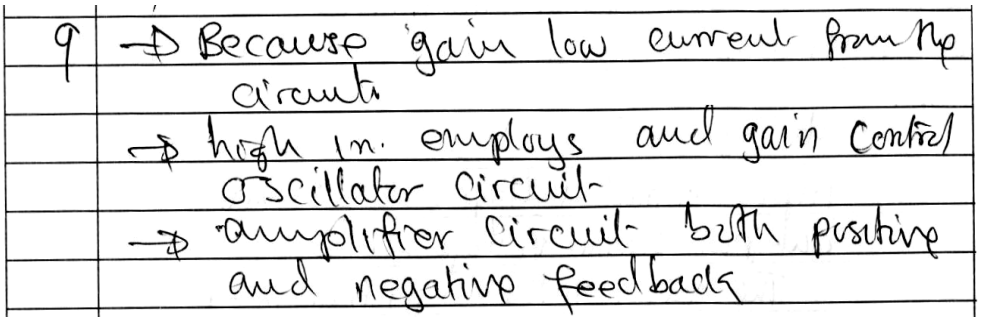
Figure 9*: Distribution of Candidates' Scores in Question 9*

The general performance in this question was average since 63 (53.4%) candidates scored average and above. Performance analysis shows that these candidates had appropriate knowledge and skills on the negative feedback amplifiers. They managed to provide clearly the reasons as to why negative amplifier is preferred in amplifier circuits. Extract 9.1 is a sample of good response from a one of the candidates.



Extract 9.1 shows a sample of a candidate's good response who managed to provide the reasons for preferring negative feedback network in amplifier circuit.

Performance analysis also shows that 55 (46.6%) candidates performed poorly. These candidates lacked enough knowledge on multi-stage amplifiers. They indicated inability in attempting this question as most of them failed to give the reasons for negative feedback network to be preferred in amplifier circuits. Extract 9.2 illustrate a sample of poor response candidate.



Extract 9.2 shows a sample of a poor response from a candidate who provided improper reasons for using negative feedback in amplifiers.

2.2.9 Question 10: Power Supply

The question had two parts, (a) and (b), and required the candidates to:

(a) Give one basic type of full wave power supply used in electronics circuits

(b) Find the value of ripple factor of the output signal if a power supply produces an output signal with $V_{dc} = 30$ V and $V_r = 0.2\ V_{rms}$

The question was attempted by 121 (86.4%) out of 140 (100%) candidates. There were 55 (45.5%) candidates who scored from 0 to 0.5 mark, 50 (41.3%) candidates scored from 1 to 1.5 marks and 16 (13.2%) candidates scored from 2 to 3 marks. The general candidates' performance in this question is summarized in Figure 10.

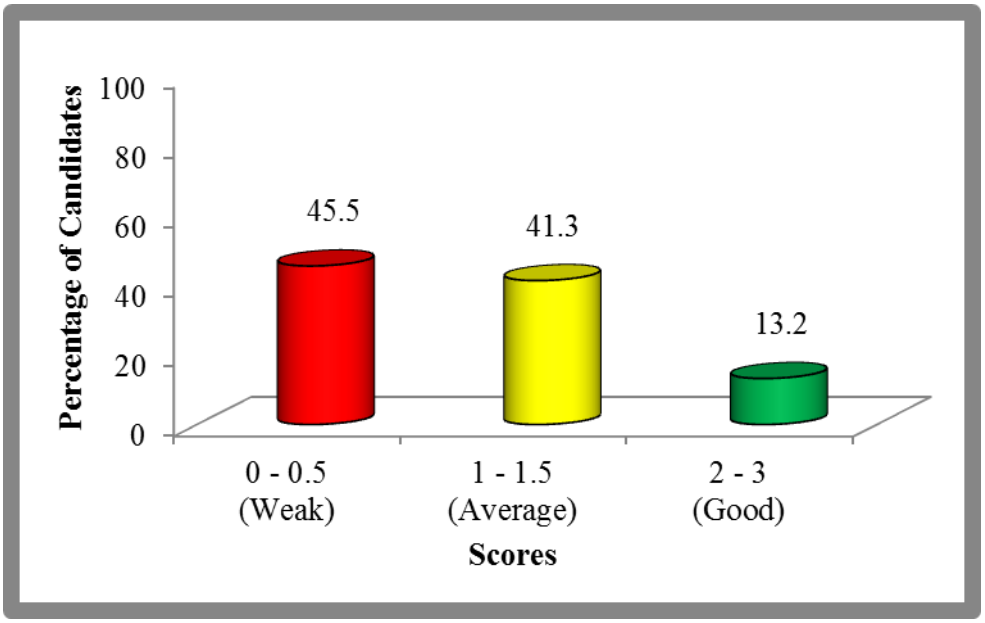
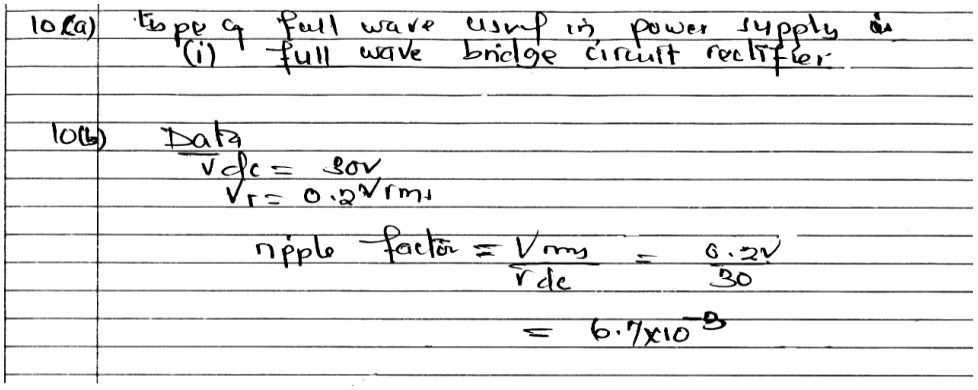


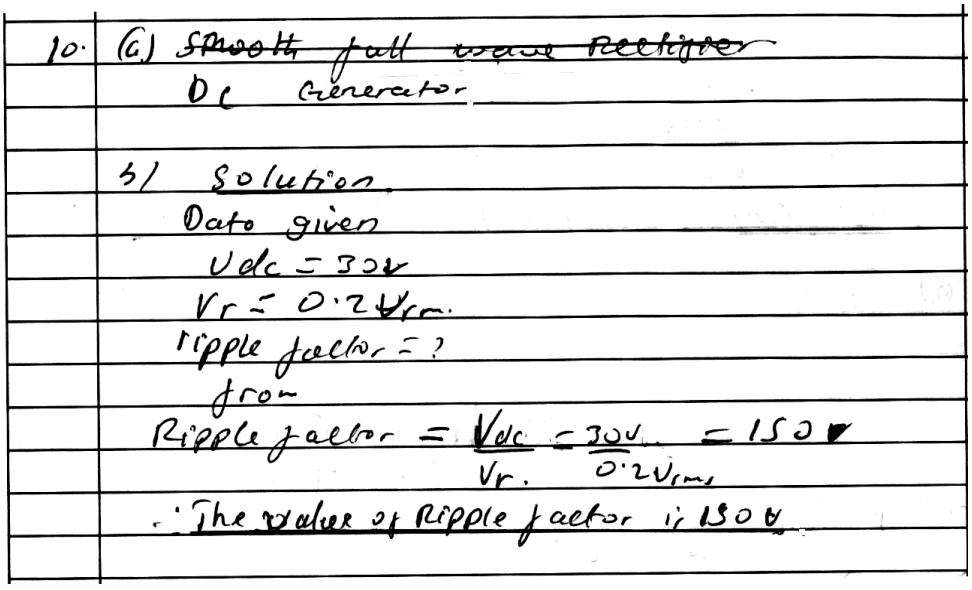
Figure 10: *Distribution of Candidates' Scores in Question 10*

The general performance in this question was average since 66 (54.5%) candidates who attempted this question scored average and above. This performance was due to the fact that most of the candidates had acquired knowledge and skills concerning power supplies. Thus, clearly give one basic type of full wave power supply used in electronics circuits and recalled the appropriate formula for calculating the value of ripple factor. Extract 10.1 illustrate a sample of good response from the candidate.



Extract 10.1 shows a sample of good response from a candidate who managed to clearly give a basic type of full wave power supply. The candidate also managed to apply correctly the formula for calculating the ripple factor.

Despite the candidates average performance in this question, there were 55 (45.5%) who performed poorly. These candidates lacked knowledge on the power supplies. They failed to identify the type of full wave power supply and used wrong formula for calculating the ripple factor. Extract 10.2 illustrate a sample of poor candidate's response.



Extract 10.2 shows a sample of poor response from a candidate who mentioned a *generator* which is one of sources of electrical power instead of types of full wave power supply in (a). In part (b), the candidate also applied incorrect formula of ripple factor.

2.2.10 Question 11: Bipolar Junction Transistors

The question had two parts in which the candidates were required to:

(a) List two types of bipolar junction transistor.

(b) Compute the value of I_C if I_E= 5.34 mA and I_B = 475 µA.

This was the most well done question and was attempted by 135 (96.4%) candidates. The candidates who scored from 0 to 0.5 marks were 11 (8.1%). Other group of 26 (19.3%) scored from 1 to 1.5 marks and the rest who scored from 2 to 3 marks were 98 (72.6%). The general candidates' performance in this question is summarized in Figure 11.

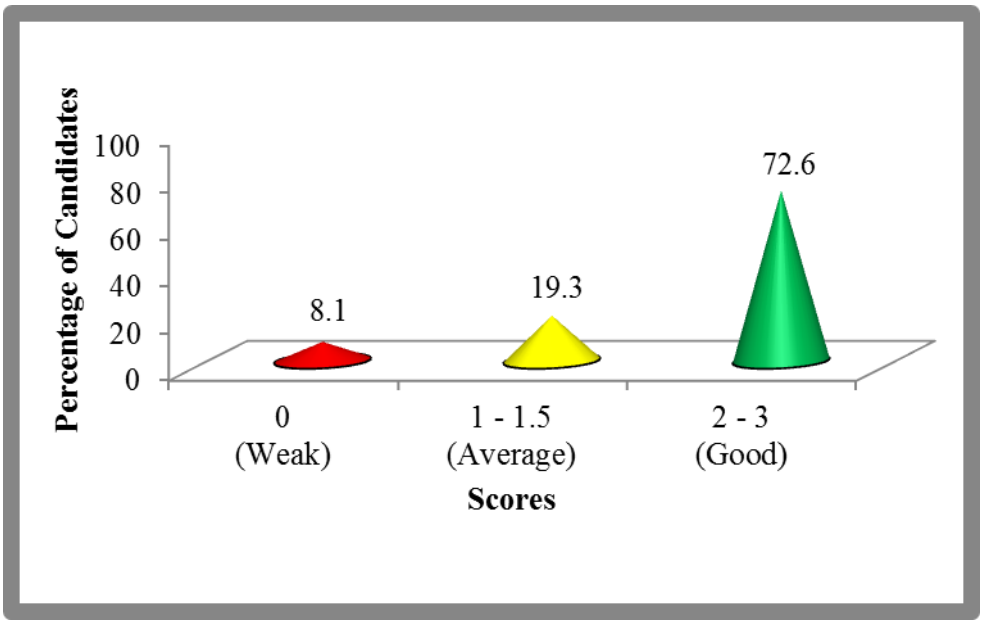
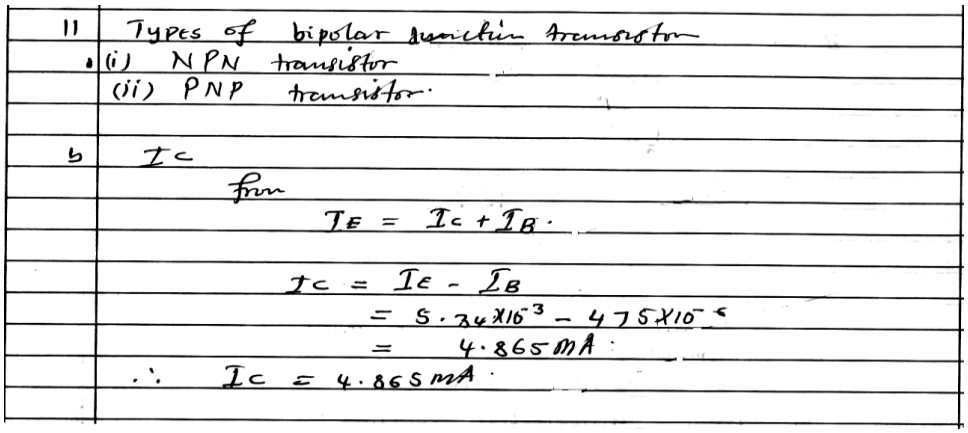


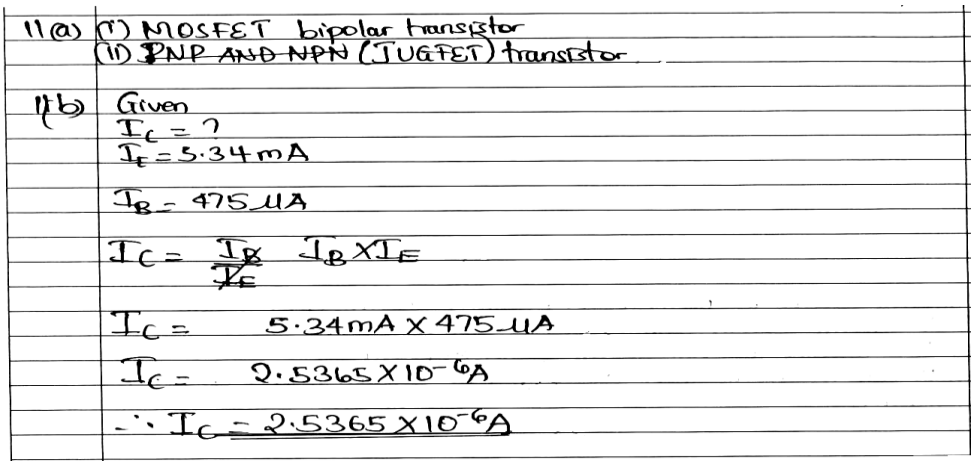
Figure 11: *Distribution of Candidates' Scores in Question 11*

The general performance of the candidates in this question was good since 124 (91.9%) candidates managed to score average and above. These candidates proved to have an adequate knowledge on bipolar junction transistors. Most of them listed clearly the two types of bipolar junction transistor and used the correct formula to calculate the value of I_C. Extract 11.1 illustrate a sample of good response.



Extract 11.1 shows a sample of good response from a candidate who clearly listed the two types of bipolar junction transistor, and also used the correct formula to calculate the value of I_C.

Although the performance was good, the analysis shows that only 11 (8.1%) candidates who attempted this question scored 0. This proves that they had little knowledge on the bipolar junction transistor. The candidates were incompetent to pertaining bipolar junction transistor. That is the reason made them to fail to provide correct responses in all parts of the question. Extract 11.2 illustrate a sample of poor response from one of the candidates.



Extract 11.2 shows a sample of incorrect response from a candidate who was uncertain on various types of BJTs, and instead gave the types of UJTs in part (a). The candidate also used improper formula to calculate the value of the collector current (b).

2.3 SECTION C: STRUCTURED QUESTIONS

2.3.1 Question 12: Transistors Amplifier

This question had two parts and required the candidates to:

(a) Name the function of an arrow on symbol for bipolar junction transistor.

(b) Study the circuit in Figure 1 and answer questions that follow.

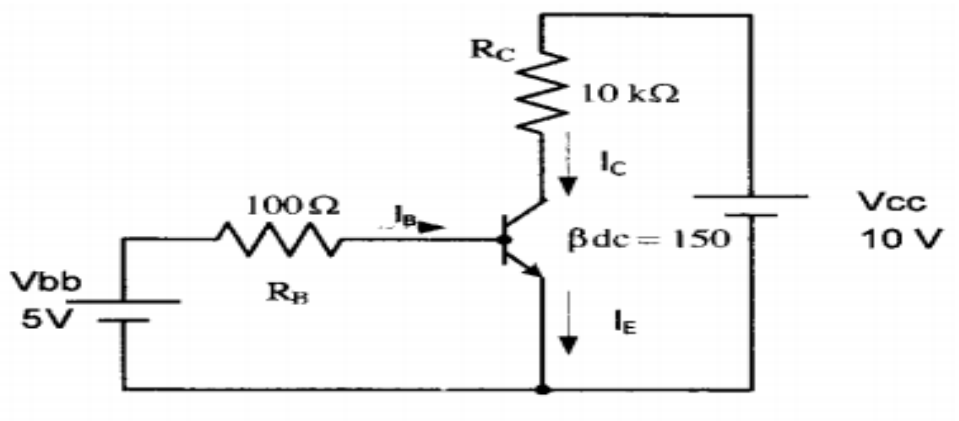


Figure 1: for question 12 (b)

If the value of V_{BE} for the circuit is 0.7 V; determine:
Base current (I_B)
Collector current (I_C)
Emitter current (I_E)
Collector emitter voltage (V_{CE})

This question was attempted by a total of 100 (71.4%) out of 140 (100%) candidates. 40 (40.0%) candidates were those who scored from 6 to 12 marks, whereas 30 (30.0%) scored from 13 to 20 marks. The general performance of students in this question is summarized in Figure 12.

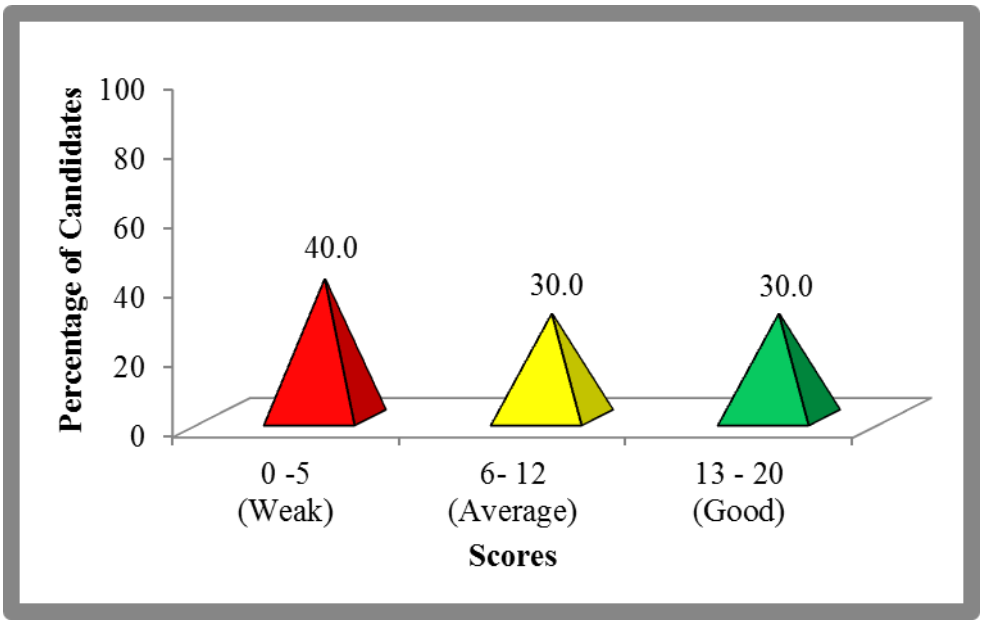
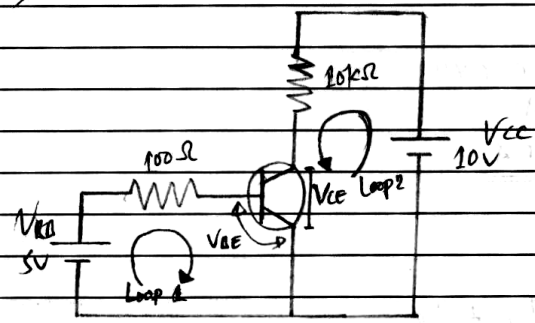


Figure 12: *Overall Candidates' Performance in Question 12*

The general performance of the candidates in this question was average because 60 (60.0%) candidates scored marks from 6 to 20. Of those, 30 (30.0 %) candidates revealed to have knowledge and skills on the specified topic. They clearly stated the function of an arrow on a symbol of the bipolar junction transistor as well as applying the correct formulae on calculating the values of base current (I_B), collector current (I_C), emitter current (I_E) and collector emitter voltage (V_{CE}). However, 30 (30.0%) managed to attempt correctly in either of the two parts of the question, thus performed averagely. An example of a correct response given by one of the candidate is illustrated in Extract 12.1.

12. a) The arrow indicates whether the transistor is NPN or PNP and the direction of flow of current.

b) Soln



Data Given

$R_C = 10k\Omega$ $V_{BE} = 0.7V$

$V_{CC} = 10V$

$\beta = 150$

$V_{BB} = 5V$

$R_B = 100\Omega$

Taking Loop 1

$V_{BB} = I_B R_B + V_{BE}$

$V_{BB} - V_{BE} = I_B R_B$

$\frac{I_B R_B}{R_B} = \frac{V_{BB} - V_{BE}}{R_B}$

Extract 12.1 shows a good response from a candidate who clearly gave the function of an arrow on bipolar junction transistor symbol. The candidate also calculated the values of base current (I_B), collector current (I_C), emitter current (I_E) and collector emitter voltage (V_{CE}).

The analysis indicated further that, 40 (40.0%) candidates who attempted this question performed poorly. Most of them failed to give out the function of an arrow on the symbol of transistor and apply proper formulae for calculating asked parameters. These candidates signify to lack skills and knowledge on the area of transistor amplifiers, especially the schematic symbol of the transistor and its properties. Extract 12.2 is a sample of poor response given by one candidate.

12 a) The following are the functions of an arrow in the bipolar junction transistor

i) Used as a component of prevent bursting of conductors materials.

ii) Use to violong the capacitors in the applied power.

iii) Used to selecting the hole mater to voice or sound in the amplifier

b) i) Soln.

Data given

$R_D = 100\Omega$

$V_{bb} = 5V$

$I_D = ?$

from the formulara

$V = IR \rightarrow I = \frac{V}{R}$

$I = \frac{5}{100} = 0.05A$

$\therefore I_D = 0.05A$

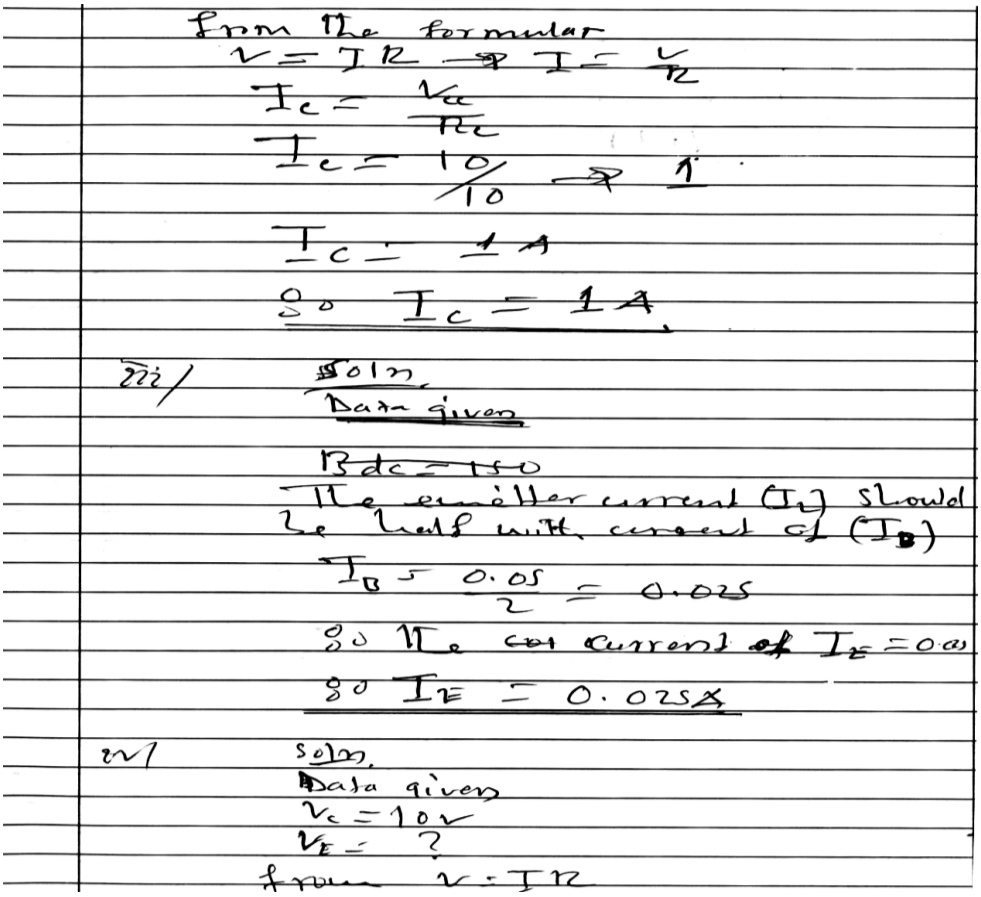
ii) Soln

Data given,

$R_c = 10\Omega$

$V_{cc} = 10V$

$I_c = ?$



Extract 12.2 shows a sample of poor response from a candidate who provided incorrect response pertaining the function of an arrow on symbol of bipolar transistor in part (a). In part (b) the candidate applied the relationship derived from Ohms law in calculating the values of base current (I_B), collector current (I_C), emitter current (I_E) and collector emitter voltage (V_{CE}) in part (b).

2.3.2 Question 13: Electronic Circuit Component

The question had three parts, (a), (b) and (c) and was set as follows:

(a) List four applications of a capacitor in different electronic circuits.

(b) Draw a simple LC parallel tuned circuit.

(c) A tank circuit is designed by using a capacitor of 100 pF, inductor of 150 μH and a resistor of 10 Ω which are connected in series, calculate the following:
  (i) The circuit impedance.
  (ii) Quality factor.
  (iii) Bandwidth.

This question was attempted by 116 (82.9%) out of 140 (100%) candidates who sat for this paper. Performance analysis indicates that 56 (48.3%) scored from 0 to 5 marks, 47 (40.5%) scored from 6 to 12 marks, and the remaining 13 (11.2%) scored from 13 to 15 marks. There was no candidate who scored above 15 marks in this question. Table 2 summarizes the overall performance on the question.

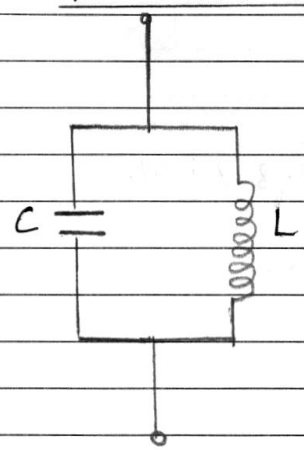
Table 2: Overall Performance of Candidate in Question 13

Scores	Number of Candidates	Percentage (%)	Remarks
0 to 5	56	48.3	Weak
6 to 12	47	40.5	Average
13 to 15	13	11.2	Good
Total	**116**	**100**	

The general performance on this question was average because the statistical analysis reveals that a total of 60 (51.7%) candidates scored average and above. The candidates who performed well proved to have sufficient knowledge on electronic circuit components as they managed to provide correct responses in more than one part of the question although they failed in some few parts. Most of them were able to list some applications of a capacitor in different electronic circuits and partially drew a simple LC parallel tuner circuit. The big challenge was the failure of the candidates to use appropriate formulae in calculating some of the parameters required in part (c) of the question. Extract 13.1 presents a sample of average response from one of the candidates.

13. (a) - It is used in filter circuit to remove ripples.
- It is used to store electric charges.
- It is used in power factor correction.
- It is used in tuning circuit
- It is used to couple one stage of an amplifier to another stage.

(b) LC TUNED CIRCUIT



(c) Data:-

$C = 100\,pF$

$L = 150\,\mu H$

$R = 10\,\Omega$

Soln

(i) Circuit Impedance (Z) (The circuit is in resonance)

From:-

$$Z = \sqrt{R^2 + (X_L - X_C)^2}$$

but:- $X_L = 2\pi F/L$

$= 2 \times 3.14 \times 150\,\mu\, X_{fr}$

13 (c) But

$$fr = \frac{1}{2\pi\sqrt{LC}}$$

$$= \frac{1}{2 \times 3.14 \sqrt{150\mu \times 100p}}$$

$$= 1,300,153.8 \text{ Hz}$$

Hence:- $X_L = 2\pi fL$

$= 2 \times 3.14 \times 1,300,157.8 \times 150\mu$

$= 1224.74 \Omega$

Also $X_C = \frac{1}{2\pi fC}$

$$X_C = \frac{1}{2 \times 3.14 \times 1,300,153.8 \times 100p}$$

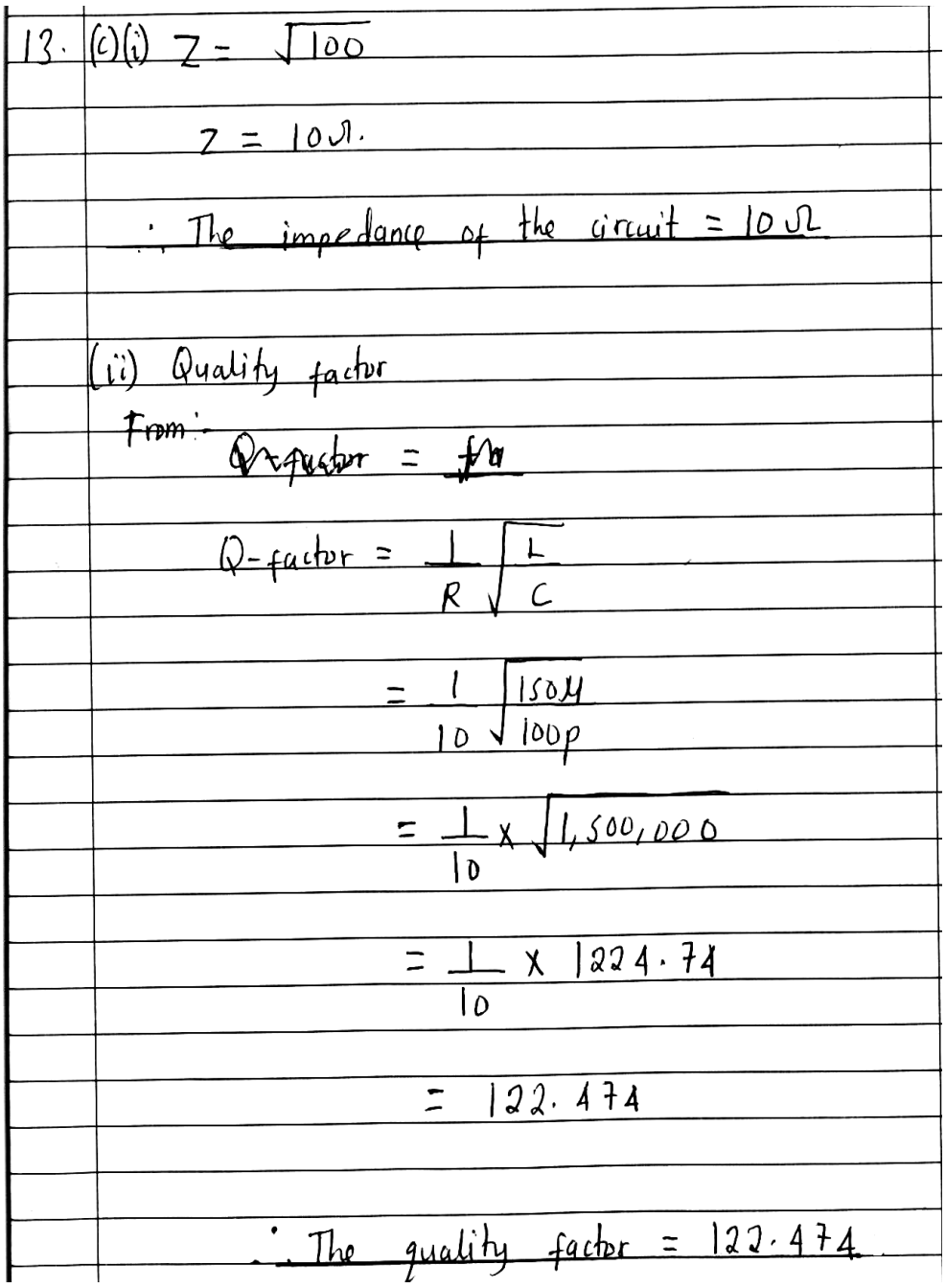
$X_C = 1224.74 \Omega$

Hence: From:

$$Z = \sqrt{R^2 + (X_L - X_C)^2}$$

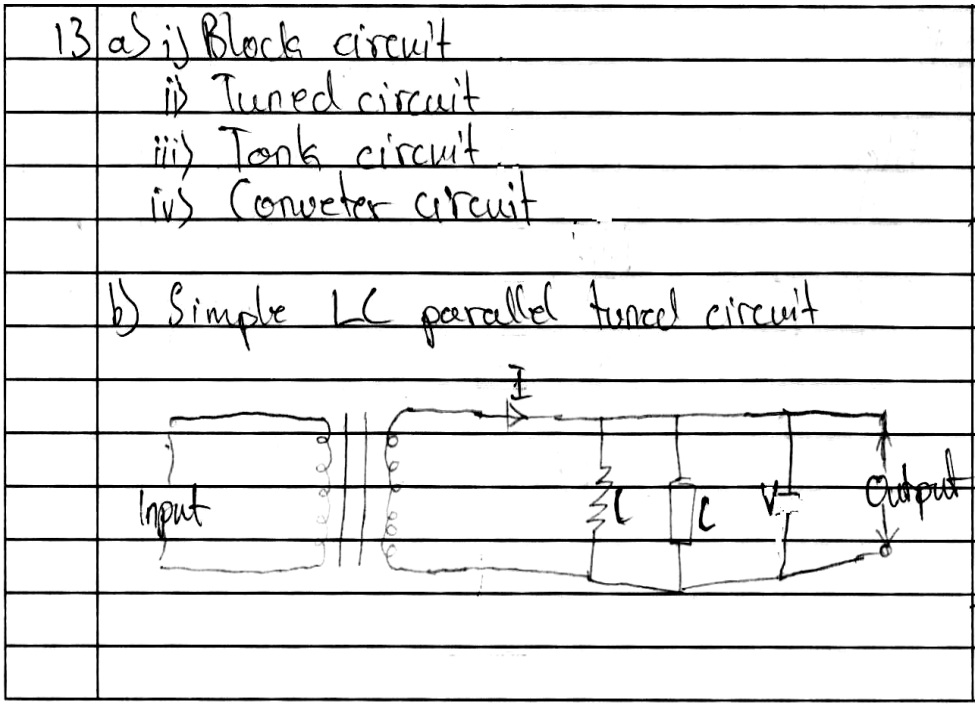
$$Z = \sqrt{10^2 + (1224.74 - 1224.74)^2}$$

$$Z = \sqrt{10^2 + 0^2}$$



Extract 13.1 shows a sample of a candidate good response. The candidate managed to list two out of four applications of a capacitor in different electronic circuits in part (a). In part (b), the candidate succeeded to draw correctly a simple LC parallel tuned circuit. He/she also managed to calculate some of the values of the parameter asked in (c) (i) and (c) (iii), but failed in (c) (ii).

In contrary, 56 (48.3%) candidates who attempted this question scored poorly. Among those, 9 (7.8%) candidates scored 0 as they failed to provide correct responses in all parts of the question. Other group of 37 (40.5%) candidates scored marks from 1 to 5. These candidates managed to provide less than one correct response on listing the applications of a capacitor in different electronic circuits. They also failed to draw a simple LC parallel tuned circuit and were incapable of calculating values of the asked parameters in more than two items. A sample of a correct response from one of the candidates is shown in Extract 13.2



13 c) Data

Capacitor = 100 pF

Inductor = 150 μH

Resistor = 10 Ω

Required

(i) The circuit impedance

(ii) Quality factor

(iii) Bandwidth

Soln (i)

from $Z = \sqrt{R^2 (X_L - X_C)^2}$

but

$X_L = 2\pi FL$

$X_C = \frac{1}{2\pi FC}$

$X_L = 2 \times 3.14 \times 150$

$= 942$

$\therefore X_L = 942\,\mu H = 9.42 \times 10^{-04} = 0.0009$

Also

$X_C = \frac{1}{2 \times 3.14 \times 100\,pF}$

$\therefore X_C = 157\,pF = 0.000000000157$

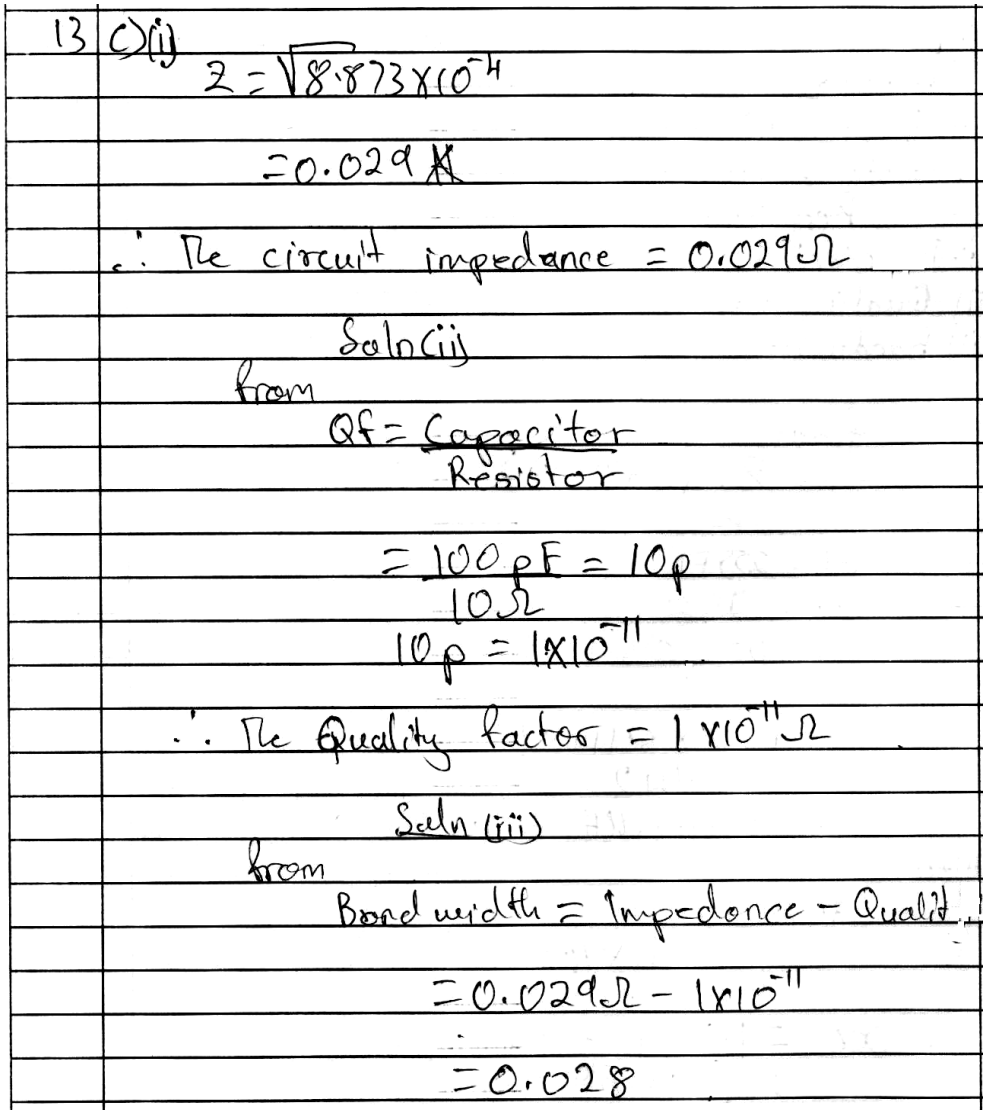
$= 1.57 \times 10^{-10}$

So $Z = \sqrt{(10)^2 \cdot (9.42 \times 10^{-4} + 1.57 \times 10^{-10})^2}$

$Z = \sqrt{(10)^2 (8.873 \times 10^{-7})^2}$

$= \sqrt{100 (8.873 \times 10^{-7})}$

$= \sqrt{8.873 \times 10^{-4}}$



Extract 13.2 shows a sample of incorrect response from a candidate who failed to list the applications of capacitor in part (a), drew an LC parallel tuned circuit in part (b), and applied the correct formulae in calculating the required parameters in part (c).

2.3.3. Question 14: Oscillators

The question had three parts (a), (b) and (c) in which the candidates were required to:

(a) Study a transistor oscillator for a simple audio amplifier given in Figure 2 and to answer the questions that follow.

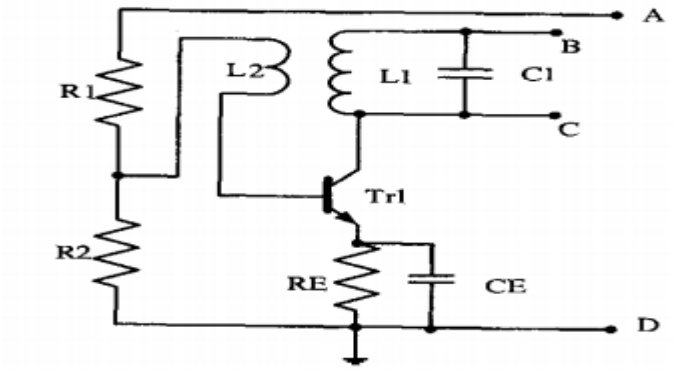


Figure 2 for question 14 (a)

(i) What are the components used to form an oscillatory part of the circuit?
(ii) Where should a power supply be connected in the circuit?
(iii) Where should the output signal be taped?
(iv) What is the function of capacitor C1?
(v) What is the name of the circuit created by resistors R1 and R2?
(vi) What is the name of the component Tr1?
(vii) Give the name of a transducer that the circuit can drive.

(b) A local oscillator in a radio receiver uses an LC tuned circuit with an inductor L1 of 60 μH and capacitor C1 of 300 pF. Calculate the frequency of oscillation of the circuit.

(c) Study figure 3 then answer the question that follow.

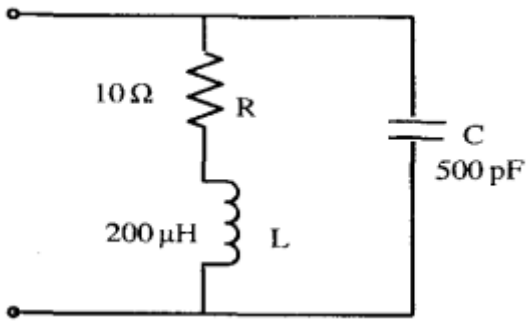


Figure 3 for question 14 (c)

If the figure represents the parallel resonant circuit, calculate the following:

(i) A resonant frequency.
(ii) Q- factor of the circuit.
(iii) The impedance of the circuit.

The question was opted by a total of 77 (55.0%) candidates. Of those, 31 (40.3%) candidates scored from 0 to 5 marks, 32 (41.5%) candidates performed averagely by scoring marks from 6 to 12, and the remaining 14 (18.2%) were considered to perform well as they scored marks from 13 to 17. The highest score in this question was 17 marks. The general candidates' performance in this question is illustrated in Figure 14.

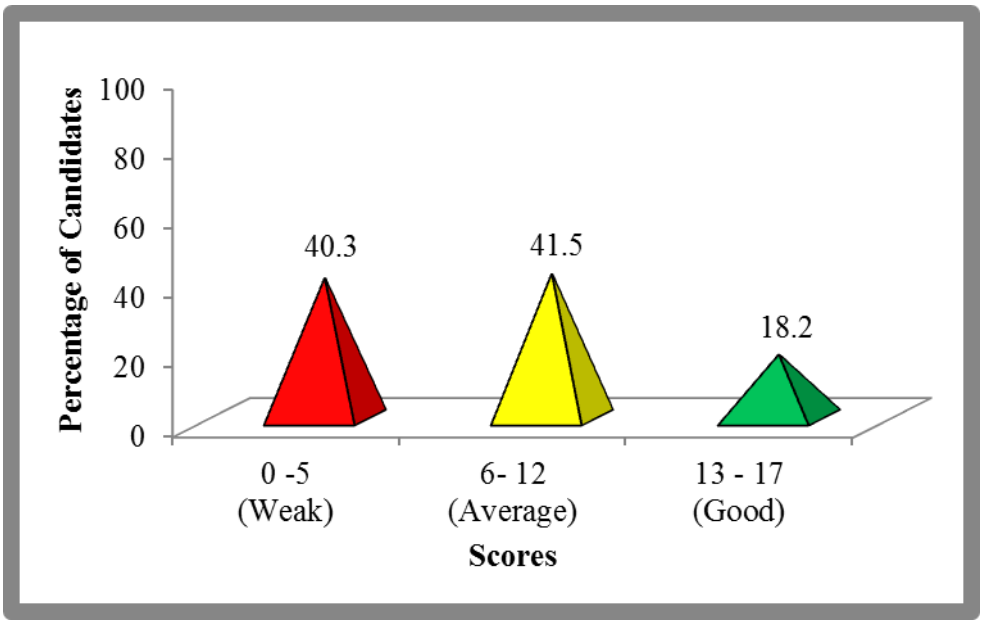


Figure 14: *Distribution of Candidates' Scores in Question 14*

The general candidates' performance on this question was average. Most of the candidates 46 (59.7%) scored marks above the lower pass margin. Majority of them managed to provide correct response in many parts of the question. These candidates demonstrated high capability of understanding on the area of electronic oscillators. However, there were few who performed averagely because they provided partial responses. Extract 14.1 is a sample of response from a candidate who performed well in this question.

14. (b) Data:-

$L_1 = 60\mu H$

$C_1 = 300pF$

Soln

From:-

$$f_o = \frac{1}{2\pi\sqrt{L_1 C_1}}$$

$$= \frac{1}{2 \times 3.14\sqrt{60\mu \times 300p}}$$

$$= 1,186,872.6\ Hz.$$

∴ Frequency of oscillation = 1,186,872.6 Hz

14. (c)(i) Resonant frequency

$$f_r = \frac{1}{2\pi\sqrt{LC}}$$

$$= \frac{1}{2\pi\sqrt{200\mu H \times 500pF}}$$

$$= 503,547.4\ Hz.$$

∴ Resonant frequency = 503,547.4 Hz

(ii) $Q\text{-factor} = \frac{1}{R}\sqrt{\frac{L}{C}}$

$$= \frac{1}{10}\sqrt{\frac{200\mu}{500p}}$$

$$= 0.1 \times \sqrt{400,000}$$

$$= 0.1 \times 632.45$$

$$= 63.245$$

∴ Q-factor of the circuit is 63.245

14 (c)(iii) Impedance of the circuit.

From:- (Parallel resonance circuit)

$$Z = \frac{L}{CR}$$

$$Z = \frac{200\,\mu H}{500pF \times 10\Omega}$$

$$= \frac{200 \times 10^{-6}}{5 \times 10^{-9}}$$

$$Z = 40,000\,\Omega$$

∴ The impedance of the circuit = 40,000 Ω

14. (a)(i) - Inductor
- Resistor
- Capacitor
- Transistor

(ii) To the terminal C D

(iii) To the terminal B C

(iv) It is used to remove unwanted R F components.

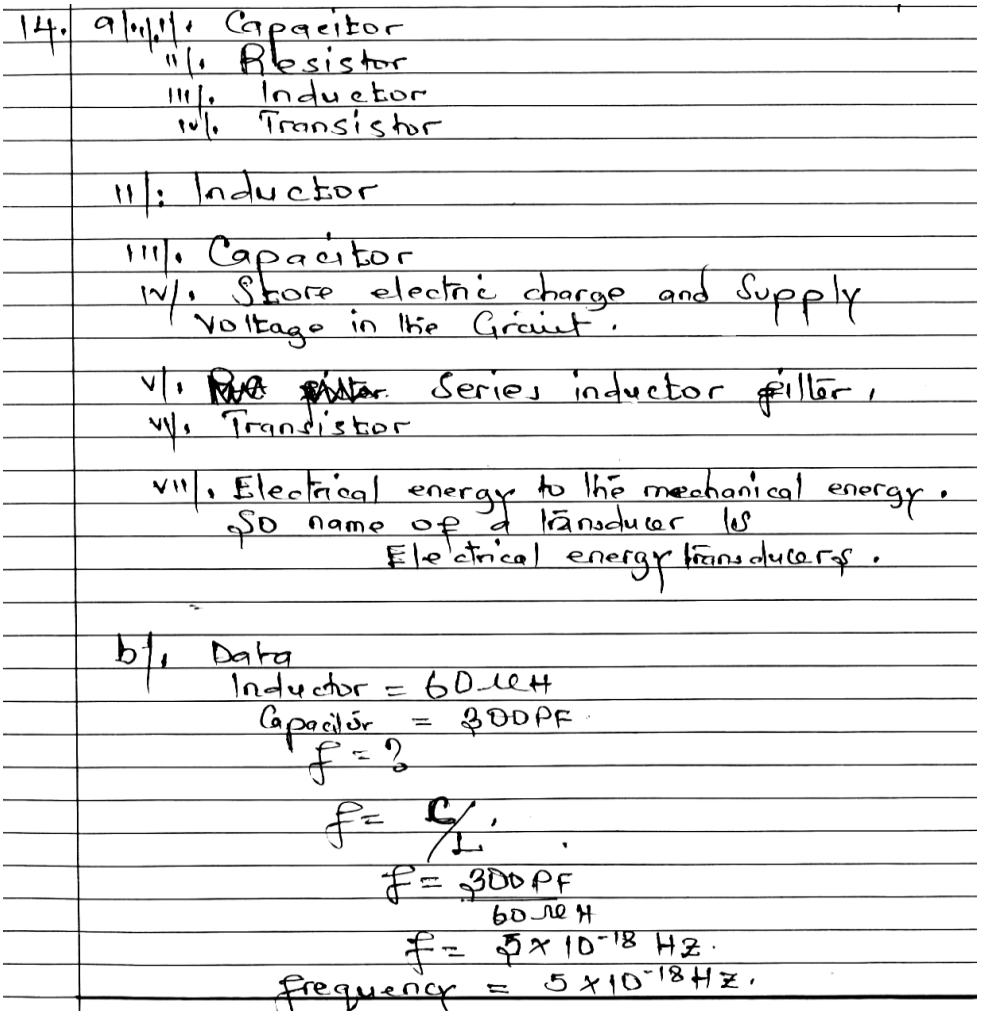
14. (a) (v) Voltage divider.

(vi) NPN transistor.

(vii) Loudspeaker.

Extract 14.1 shows a sample of response from a candidate who performed well in parts (b) and (c) of the question but managed to give correct answer only in one item in part (a).

Analysis also revealed that 31 (40.3%) candidates who opted for this question performed poorly. Most of them indicated to have inadequate knowledge on electronic oscillators. They failed to give correct answers in all items of part (a). The candidates also provide unsatisfactory responses in part (b) and (c) which lead them to low scores. Extract 14.2 is a sample of response from a candidate who performed poorly.


14. a) i) Capacitor
ii) Resistor
iii) Inductor
iv) Transistor

ii): Inductor

iii) Capacitor
iv) Store electric charge and supply voltage in the Circuit.

v) ~~RC filter~~ Series inductor filter,
vi) Transistor

vii) Electrical energy to the mechanical energy.
So name of a transducer is
Electrical energy transducers.

b) Data
Inductor = 60 μH
Capacitor = 300PF
f = ?

$f = \frac{C}{L}$.

$f = \frac{300PF}{60\mu H}$

$f = 5 \times 10^{-18} Hz$.

Frequency = $5 \times 10^{-18} Hz$.

14. a). Data.

C = 500 PF

L = 200 μH

R = 10 Ω.

(i) $f = \frac{1}{2}\sqrt{\frac{C}{L}}$. $f = \frac{1}{2}\sqrt{\frac{C}{L}}$.

$f = \frac{500\,PF}{200\,\mu H}$.

$f = \frac{1}{2}\sqrt{\frac{500\,PF}{200\,\mu H}}$

$f = \frac{1}{2} \times 1.5811 \times 10^{-9}$.

Resonant $f = 7.91 \times 10^{-10}$ Hz.

∴ Resonant frequency = 7.91×10^{-10} Hz

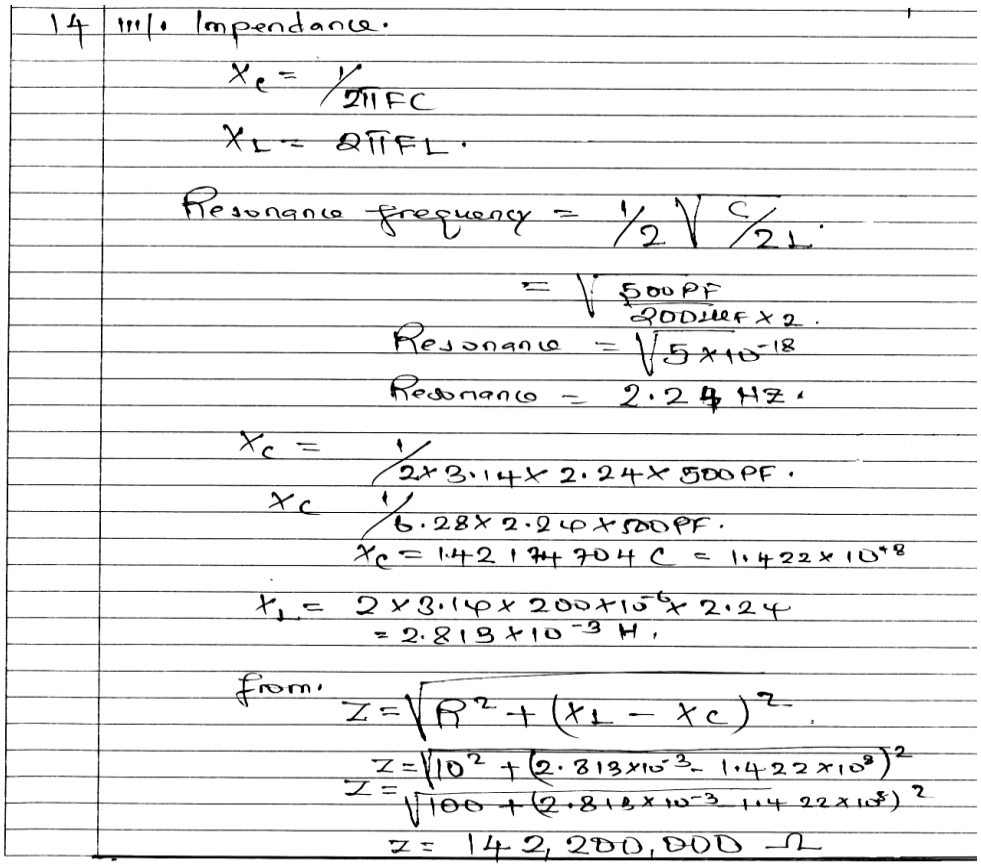
ii). Q-factor.

$= \frac{1}{2}\sqrt{\frac{C}{2L}}$.

Q-factor = $\frac{500\,PF}{2 \times 200\,\mu H}$

$= 5 \times 10^{-14}$

Q-factor = 5×10^{-14}



Extract 14.2 shows a sample of poor response from a candidate who provided incorrect answers in all items of part (a). In part (b), the candidate failed to calculate the frequency of oscillation. The candidate failed to calculate a resonant frequency, Q-factor and the impedance of the circuit in part (c).

2.3.4 Question 15: Television Receivers

The question was divided into three parts, (a), (b) and (c). It was set as follows:

(a) Give the meaning of the following terms as used in the television technology:
   (i) Blanking.
   (ii) Compatibility.
   (iii) Aspect ratio.
   (iv) Monochrome signal.

(b) Name the major functions of the following parts of TV receiver:
   (i) Delay line.
   (ii) Video detector.
   (iii) Picture tubes.

(c) A TV receiver is tuned to one of the TV channels. The picture carrier signal is at a frequency of 799.25 MHz. If the picture intermediate frequency is maintained at constant frequency of 39.5 MHz, determine the:
   (i) Frequency of the local oscillator.
   (ii) Frequency of the sound carrier.
   (iii) Intermediate frequency of the sound carrier.

A total of 28 (20.0%) candidates opted for this question. There were 18 (64.3%) candidates who performed poorly by scoring marks from 0 to 5. Those who scored from 6 to 11 marks were 9 (32.1%) and were considered to have performed average. One candidate (3.6%) scored 17 marks which was the highest score in this question. The general candidates' performance in this question is summarized in Figure 15.

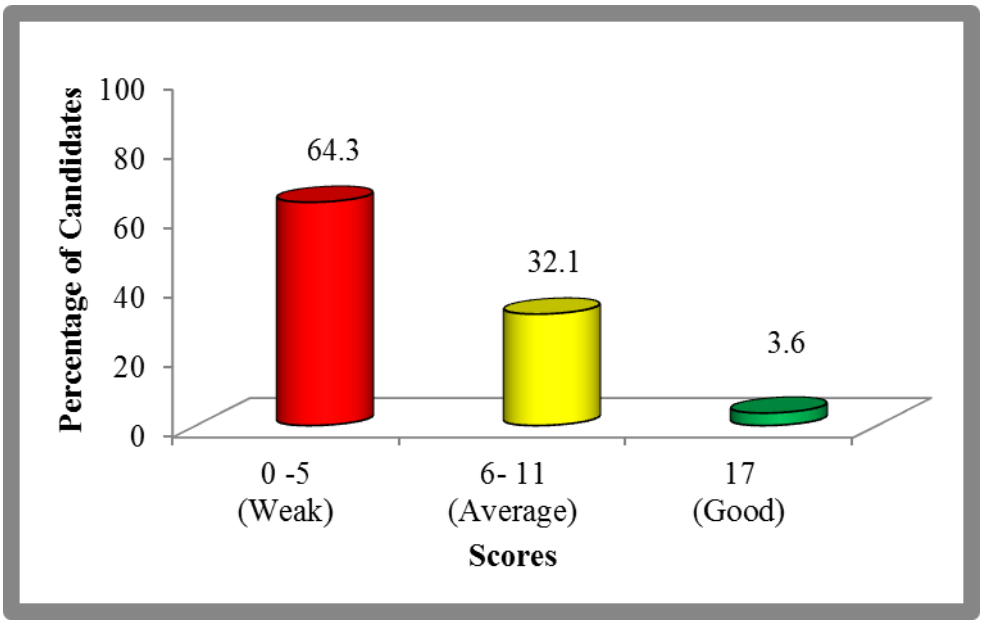
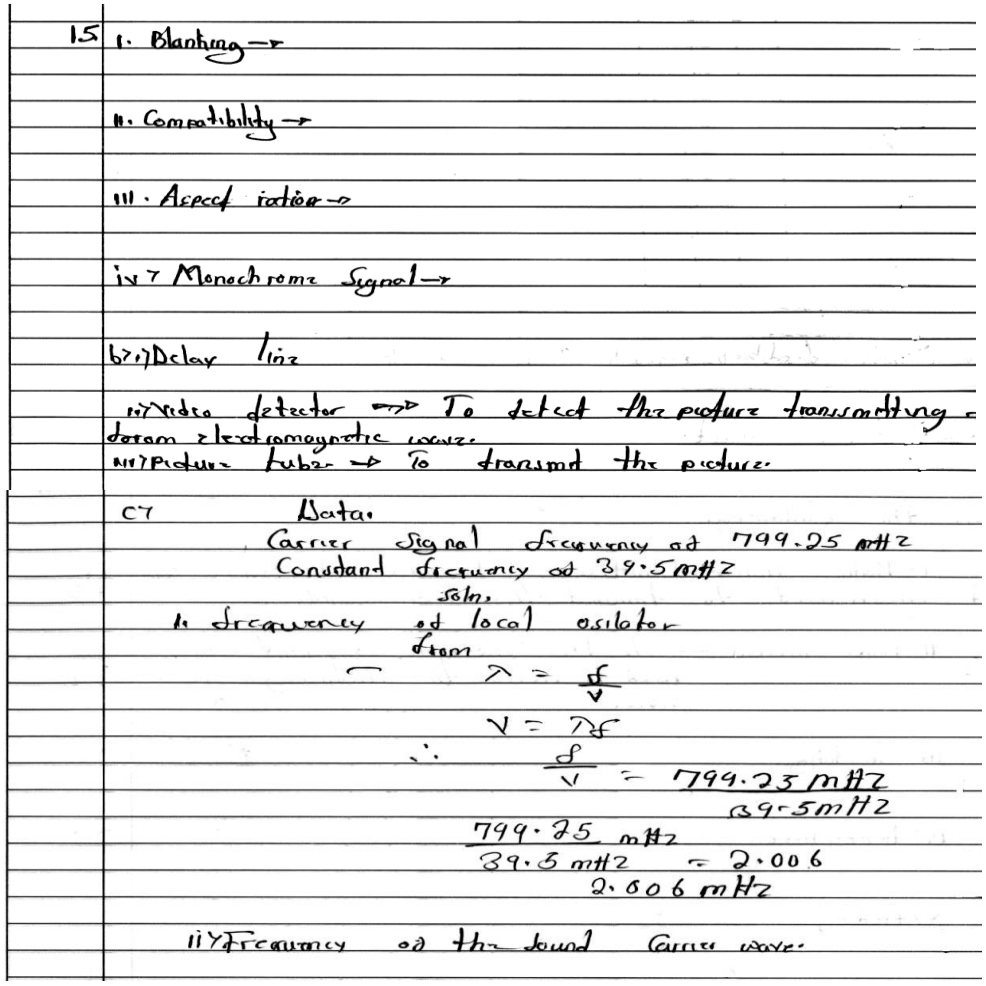


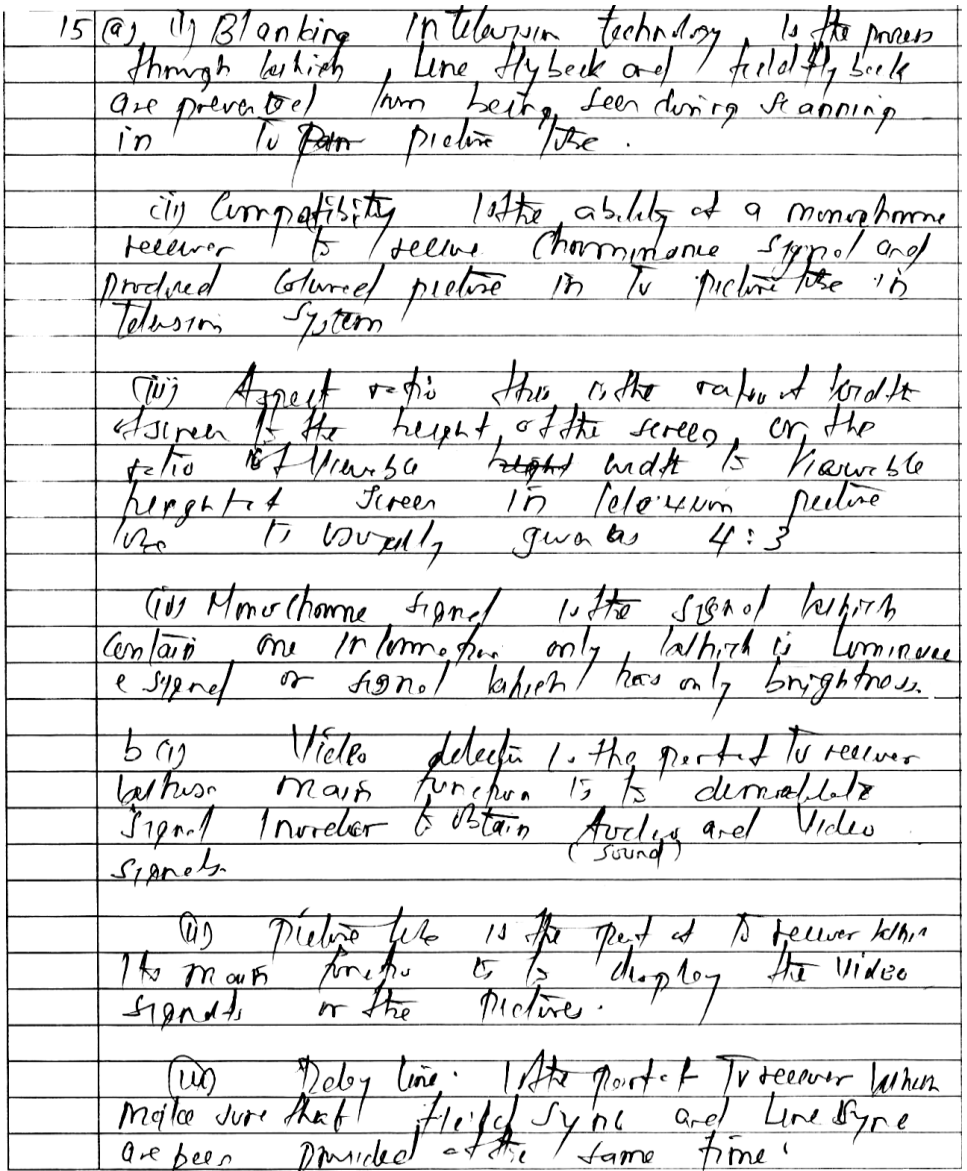
Figure 15: *Distribution of Candidates' Scores in Question 15*

The general performance of candidates in this question was poor. The analysis indicates that, only 10 (35.7%) out of 28 candidates who attempted this question, managed to score average and above average. Majority of them 18 (64.3%), performed poorly as they scored below average. This performance implies that, the candidates had insufficient knowledge on TV receivers, particularly in defining various terms and operational functions of TV parts. They also encountered challenges in performing calculation pertaining TV frequencies. Extract 15.1 is a sample of poor response from one of the candidates.



Extract 15.1 shows a sample of poor response from a candidate who copied the given terms without providing the meaning as required in (a). The candidate also provided wrong answers in all items in (b) and applied wrong formulae to calculate the parameters required in part (c).

On the other hand, 10 (35.7%) candidates who had good performance managed to deliver correct responses in either of the parts but failed in the other. These candidates demonstrated to have understanding on TV receivers though they lacked the ability to recall some of the concepts, such as meaning of the terms, functions of TV receiver parts as well as formulae for calculating TV frequencies. Extract 15.2 illustrates a sample of a good performance of one of the candidates.


15 (a) (i) Blanking in television technology is the process through which, Line flyback and field flyback are prevented from being seen during scanning in TV picture tube.

(ii) Compatibility is the ability of a monochrome receiver to receive chrominance signal and produced coloured picture in TV picture tube in television system

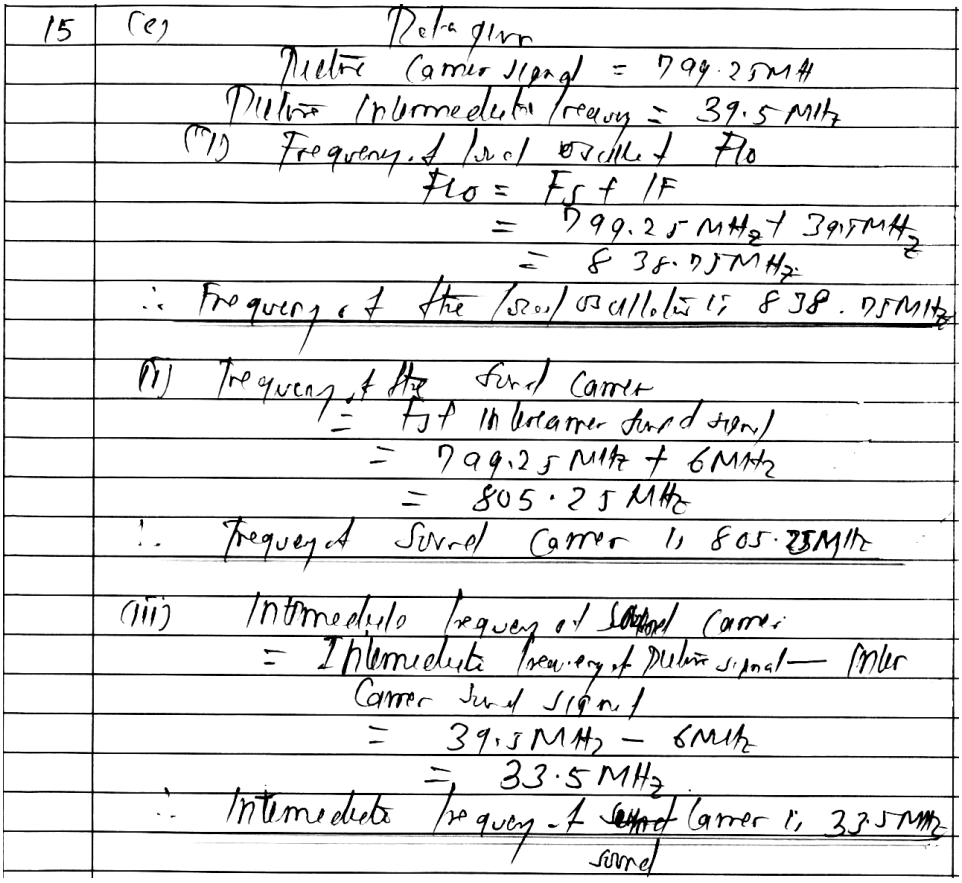
(iii) Aspect ratio this is the ratio of width of screen to the height of the screen, or the ratio of viewable width to viewable height of screen in television picture tube usually given as 4:3

(iv) Monochrome signal is the signal which contain one information only which is luminance signal or signal which has only brightness.

b (i) Video detector is the part of TV receiver which main function is to demodulate signal from receiver to obtain Audio (sound) and Video signals.

(ii) Picture tube is the part of TV receiver which the main function is to display the Video signals or the picture.

(iii) Delay line: is the part of TV receiver which make sure that field sync and Line sync are been provided at the same time.



Extract 15.1 shows a sample of good response from a candidate who managed to give the meaning of three items in part (a), two functions in part (b), and correctly calculating the asked parameters in (c).

2.3.5 Question 16: Radio Receivers

The question had three parts in which the candidate were required to:

(a) Define the following terms as used in radio communication system
   (i) Radio transmitter
   (ii) Radio receiver
   (iii) Tracking
   (iv) Ionosphere
   (v) Fading

(b) Draw a well labeled block diagram of an AM radio transmitter.

(c) (i) Give the meaning of noise in radio communication systems.
(ii) Calculate the input signal to noise ratio, if the input to a small amplifier consisted of 50 mW of a signal power and 0.5 mW of noise power.

The question was opted by a total of 89 (63.6%) out of 140 (100%) candidates. The candidates who scored from 0 to 5.5 marks were 25 (28.1%), those who scored from 6 to 12.5 marks were 53 (59.5%), while 11 (12.4%) candidates scored from 13 to 18 marks. The general candidates' performance in this question is illustrated in Figure 16.

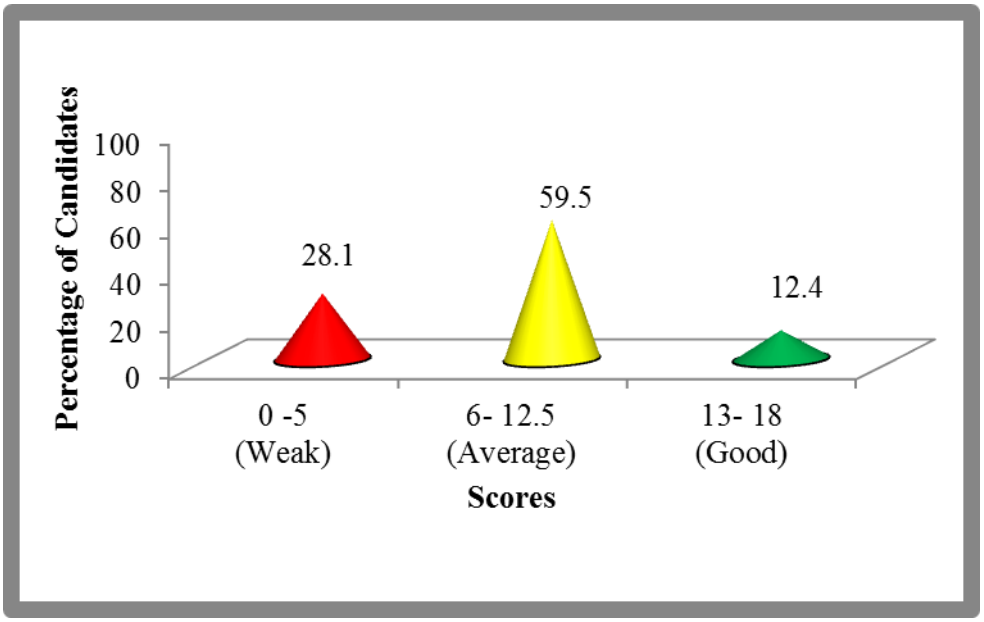


Figure 16: *Distribution of Candidates' Scores in Question 16*

The general candidates' performance in this question was good. This was because 64 (71.9%) of the candidates who attempted this question scored average and above. These candidates recognized to have adequate knowledge and skills on radio communication systems. Many of them were able to define clearly terms used in radio communication systems, drew well a labeled block diagram of an AM radio transmitter, and calculate the input signal to noise ratio. This performance is illustrated in Extract 16.1

6. a) i) Radio transmitter is the device which transmitts radio waves in air as electromagnetic waves, using transmitting aerial. Radio transmitter has a ~~modu~~ radio frequency oscillator for generation of radio waves. and modulator for ~~mi~~ superimposing generated radio waves and audio signals to be transmitted, for proper sending of infomation.

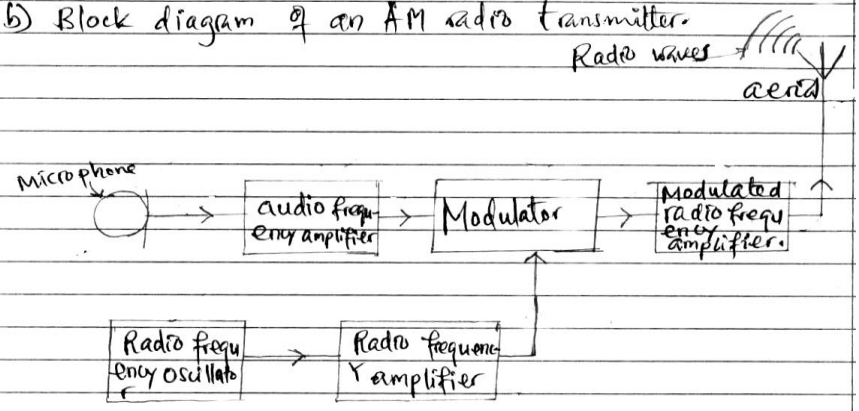
ii) Radio receiver is the device which uses receiving aerial to pick radio waves from the air. The aerial then send picked signals to tuner circuit, which selects desired signals and reject other signals. Then radio signals are demodulated by detector circuit and information is given out by loudspeaker of radio receiver.

iii) Tracking is the process of maintaining constant difference between Local oscillator frequency and wanted signal frequency in Superheterodyne radio receiver. The difference between local oscillator frequency and wanted signal frequency is called intermediate frequency.

iv) Ionosphere is the ionized layer in earth's atmosphere, which contain free electrons that reflects back sky waves to earth's surface. It extends between 17-80 Km of earth's atmosphere.

(6. a) (i) Fading is process of change in strength of ~~rad~~ signals in communication system. It is sometimes caused by unstable output of a transmitter and distance of transmition. It can be prevented by introducing diversity reception to the receiver.

b) Block diagram of an AM radio transmitter.



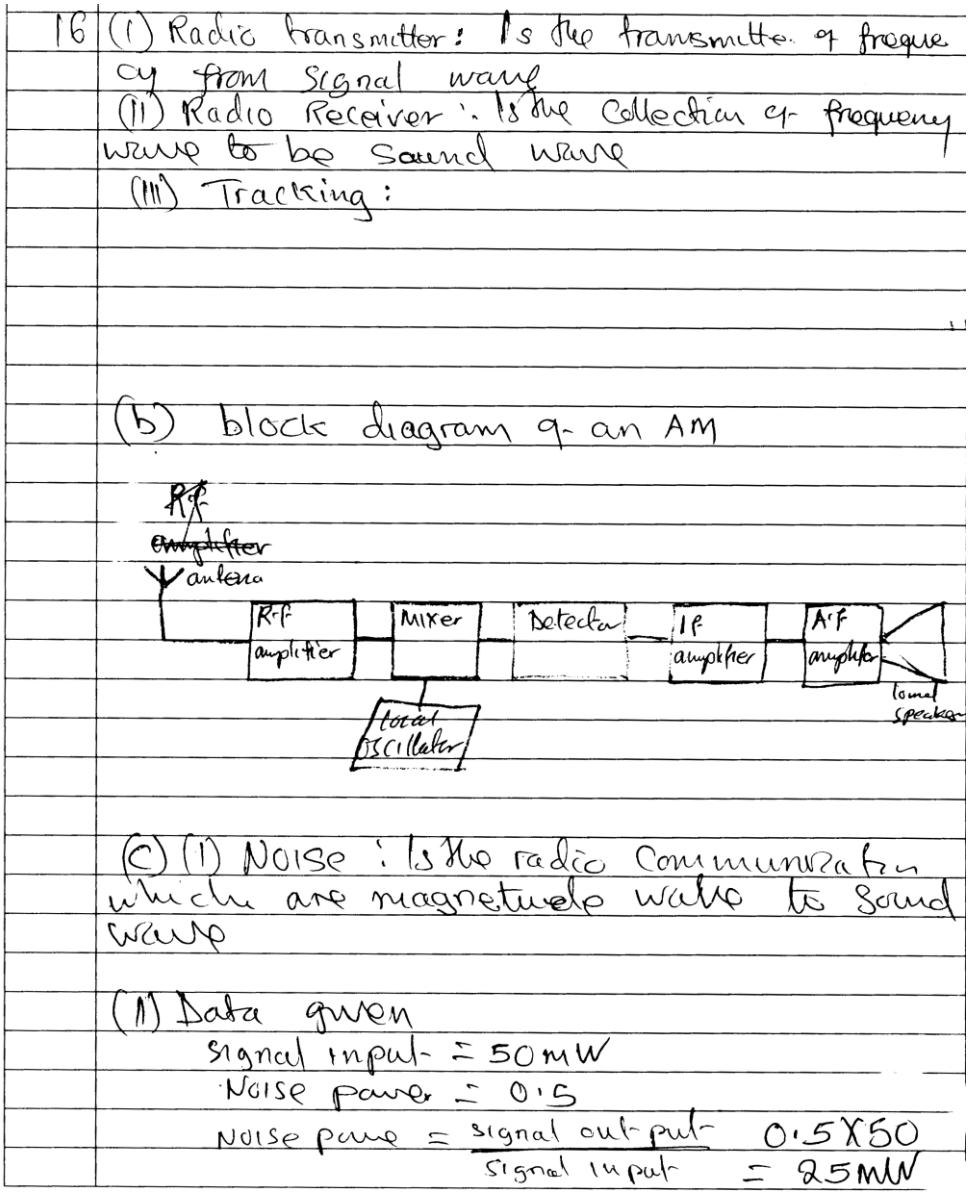
c) (i) Noise is unwanted signals in the output of the radio system (either transmitter or receiver). Noise makes output non-clear.

(ii) Data given.
Signal power (P_s) = 50mW
Noise power (P_n) = 0.5mW
Required - Signal to noise ratio. (S/N).
Solution.
$S/N = \frac{P_s}{P_N} = \frac{50mW}{0.5mW} = \frac{500}{5} = 100$
∴ Signal to noise ratio = 100.

Extract 16.1 shows a sample of good response from a candidate who properly defined the given terms. The candidate drew correctly the block diagram of AM radio transmitter and clearly calculated the input signal to noise ratio.

The analysis indicated further that a total of 25 (28.1%) candidates who attempted this question performed poorly. Most of them could not attempt all three parts of the question correctly. These candidates revealed to have unsatisfactory knowledge and skills on the area of radio communication systems, specifically in defining various terms used in that area. They also

faced difficulties in noise calculations. A sample of poor response is shown in Extract 16.2.



Extract 16.2 shows an incorrect response from a candidate who failed to define the given terms. The candidate also failed to draw a correct block diagram of an AM radio transmitter and calculate correct value of signal to noise ratio.

3.0 SUMMARY OF CANDIDATES' PERFORMANCE IN EACH TOPIC

The analysis of the topics which were examined in Radio and TV Servicing subject for the year 2018 revealed that, most of the candidates performed well in many topics covered by the paper. However, in few topics the candidates' performance appeared to be either average or poor.

The topics that were performed well include, *Bipolar Junction Transistors, Video Tape Recorder, Power Gain in Decibel, Radio Receivers, Intergrated Circuits* and *Various Topics* from which *Multiple-choice* items were developed. The good performance in these topics signifies that, the candidates were well equipped with knowledge, skills and competence on the mentioned topics as they provided good response in many parts of the questions examined.

There were also seven topics in which the candidates performed averagely; these were *Transistor Amplifiers, Oscillators, Electronic Circuit Components, Power Supply, Multistage Amplifiers, Picture Tube* and *Television Receivers.* This average performance gives an impression that, the candidates had partial knowledge, skills and competence in those topics, or they lacked ability to recall what they have been lent regarding the three specified topics.

The candidates also demonstrated poor performance on the topic of *Transistor convertor Circuit.* The analysis show that the candidates lacked sufficient knowledge and practical skills on this particular topic.

A summary of detailed analysis on the candidates' performance in each topic is also presented. In the summary, *Green, Yellow* and *Red* colours represents good, average and weak performance, respectively. (See the Appendix)

4.0 CONCLUSION AND RECOMMENDATIONS

4.1 CONCLUSION

Regarding the analysis of candidates' responses performance in each question examined in Radio and TV Servicing subject for the year 2018, it is concluded that, the overall performance was good. This is because out of 140 candidates who sat for this paper, 100 (71.43%) passed while the remaining 40 (28.57%) failed. The analysis also show that, the performance of the candidates in the year 2018 increased by 0.66 percent in comparison with the year 2017. Table 3 presents the comparison of grade scores of the candidates in the year 2017 and 2018.

Table 3: Candidates Grade Scores in the year 2017 and 2018

YEAR	CANDIDATES GRADE SCORES				
	A	B	C	D	F
2017	1	3	40	48	38
2018	2	15	46	37	40

Further findings from the analysis of candidates' performance show that, the quality of responses demonstrated by the candidates on each question was satisfactory although there were few shortcomings observed. These include the candidates' inadequacy knowledge, practical skills and competence on some topics, particularly *Transistor Convertor Circuit* which was poorly performed.

Another weakness noted was inability of some candidates to tackle questions that required performing mathematical computations and failure to identify the demands of the questions.

It is, therefore expected that, the shortcomings that have been noted together with the suggestions provided in this report, will be very useful as a guide to teachers and other educational stakeholders throughout the process of education delivery, particularly in teaching and learning for the purpose of improving the standard of the candidates performance in Radio and TV Servicing Subject in future.

4.2 RECOMMENDATIONS

Based on the shortcomings observed in the analysis of candidates' item responses, this report highlight some recommendations pertaining improvement of candidates' performance in the Radio and TV Servicing subject as follows:

(a) Teachers should guide candidates on better means to acquire knowledge and skills through learning. This will enable them to keen understanding of the requirements of the questions when doing examinations.

(b) Teachers should practice "competence based" mode of material delivery to the students and ensure that practical skills is also acquired as it brings a sense of "practice makes perfect".

(c) Candidates should take serious initiative on how to acquire knowledge and skills that will be useful in tackling questions that involve mathematical computation.

Appendix

A Summary of Candidates' Performance Topic-wise in Radio & TV Servicing Subject

S/N	Topic	Qn. number	Percentage of candidates score	Remarks
1	Multiple-choice Items from Various Topics	1	90.6	Good
2	Bipolar Junction Transistor	4 & 11	85.7	Good
3	Video Tape Recorder	5	75.7	Good
4	Power Gain in Decibel	7	75.6	Good
5	Radio Receivers	16	71.9	Good
6	Integrated Circuits	2	65.3	Good
7	Transistor Amplifiers	12	60	Average
8	Oscillators	14	59.7	Average
9	Electronic Circuit Components	8 & 13	54.5	Average
10	Power Supply	10	54.5	Average
11	Multistage Amplifiers	9	53.4	Average
12	Picture Tube	3	38.5	Average
13	Television Receivers	15	35.7	Average
14	Transistor Convertor Circuit	6	14.4	Weak