THE NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

EXAMINERS' REPORT ON THE PERFORMANCE OF CANDIDATES CSEE, 2012

031 PHYSICS
(School Candidates)

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Published by

The National Examinations Council of Tanzania,

P.o Box 2624,

Dar es salaam, Tanzania.

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FOREWORD

The Physics subject CSEE 2012 examiner's report on the performance on the candidates was set in order to give a feedback to the students, teachers, parents, policy makers and the public in general.

The Certificate of Secondary Education Examination marks the end of four years of secondary education. It gives a picture of effectiveness of the education system in general and education delivery system in particular as it is a summative evaluation. The candidates' answer to the examination questions is a strong indicator of what the education system was able or was unable to offer to the students in their four years of secondary education.

The analysis done in this report will help to understand some of the reasons which led to the performance shown in Physics subject. The report point out some of the factors which made the candidates fail to score high marks in the questions, these includes; failure to identify the task of the question, inability to follow instructions, difficulties in answering the questions requiring mathematical manipulations and lack of the knowledge of the concepts related to the subjects. The views provided will help the educational administrators, school managers, teachers and students to identify proper ways to be followed in order to improve the candidates' performance in future examinations administered by the Council.

The National Examinations Council of Tanzania will highly appreciate observations and suggestions from teachers, students and the public in general, that can be used for improving future Examiners' Reports.

Finally, the Council would like to thank all the Examination Officers, subject teachers and others who participated in the preparation of this report. We would like also to express sincere appreciation to all the staff who participated in analyzing the data used in this report.

Dr. Charles E. Msonde
Ag. EXECUTIVE SECRETARY

1.0 INTRODUCTION

This report analyses the performance of the candidates who sat for Physics paper on the Certificate of Secondary Education Examination (CSEE, 2012). The examination had three sections, namely A, B and C. The candidates were required to answer all the questions in sections A and B, and only two (2) questions from section C.

The total number of the candidates who sat for this paper was 111,891. Results show that 47,571 (43.51%) passed the examination, and 61,771 (56.49%) failed. The analysis of the candidates' performance for each question has been presented. Extracts from candidates scripts are also included in order to illustrate the cases presented.

It is expected that this report will provide sufficient insight to enable educational stakeholders to take proper action to improve the teaching and learning of Physics and hence improve performance at schools and national level.

2.0 ANALYSIS OF THE CANDIDATES' PERFORMANCE IN INDIVIDUAL QUESTIONS

2.1 SECTION A

2.1.1 Question 1: Multiple Choice Items

This question consisted of ten multiple choice items derived from different topics in the syllabus. For each of the items (i)-(x) the candidates were required to choose the correct answer among the given alternatives and write its letter beside the item number.

The question was attempted by 95.4 percent of the candidates, of which 3 percent scored 0 mark, 59.6 percent scored from 1 to 3 marks, 37.2 percent scored from 4 to 7 marks, and 0.2 percent scored from 8 to 9 marks. Most of those candidates who performed poorly in this question, failed to give the correct responses for items number (i), (ii), (vii) and (x).

In item (i), the candidates were required to identify one advantage of the lead-acid accumulator. The correct alternative was C, which reads: *"it can be recharged*." Most of the candidates selected option D which reads, "Its e.m.f is more than 10V." Option D attracted many candidates due to the fact that the lead-acid accumulator has 12V. These candidates failed to recognize that all cells cannot be recharged except lead-acid accumulator.

Item (ii) required the candidates to select the alternative which gives the condition for an acceleration of moving object in a horizontal circle with a constant speed. Most of the candidates selected option A

*"*zero" instead of the correct option, B *"*towards the centre." These candidates seemed to confuse an acceleration of moving object in a horizontal circle with the acceleration in a straight line which is zero at constant speed.

Item (iii) required the candidates to choose the correct reason for a total eclipse of the sun. The correct alternative was A, *"*the moon coming between the earth and sun." The majority of the candidates selected alternative B, *"the moon coming between the earth and sun."* These candidates failed to differentiate the total eclipse of the moon from that of the sun.

Item (iv), required the candidates to identify the cause of a short-sightedness in a human eye. The correct option was B *"*eye ball being too large." Many candidates who attempted this question selected option A *"*eyeball being too short." These candidates failed to recognize that eyeball being too short is the condition for long-sightedness.

In item (v), the candidates were required to find the value of force X applied to the press. The correct answer was option B *"*100N." Most of the candidates selected option D *"*33.3N.*"* These candidates failed to use the principle of moment in finding the value of force X.

Item (vi) required the candidates to identify the alternative which gives the condition for a note from a string of a plucked guitar to have low pitch. The correct alternative was B "thick and slack." Majority of the candidates selected option C "thin and slack." These candidates could not discover that as the diameter of the string increases, its pitch from a note becomes low.

In item (vii), the candidates were required to choose the statement predicted by Lenz's law. The correct option was D *"*direction of induced e.m.f in a circuit", but many candidates selected option B *"*magnitude of induced current in a circuit." These candidates seemed to confuse Lenz's law with Faraday's law which predict the magnitude of induced e.m.f in a circuit.

Item (viii) required the candidates to choose the option which gives the fraction of an element disintegrated. The correct alternative was A *"*$\frac{1}{64}$.*"* However, some candidates selected option C *"*$\frac{1}{32}$.*"* These candidates used incorrect formula in calculating the amount of materials decayed.

In item (ix), the candidates were required to identify the particles in which the mass of an atom depends on. The correct answer was D *"neutrons and protons"*, but most of the candidates selected option B "*neutrons, electrons and protons*." These candidates failed to recognize that an electron has no mass number but a negative charge.

Item (x) required the candidates to select the list of three major zones of the interior structure of the earth. Most of the candidates selected alternative A *"*magma, mantle and the core" instead of correct option, E *"*crust, mantle and the core." *These candidates failed to discover that the magma is the part of the core.*

2.1.2 Question 2: Matching Items

The question was consisted of ten matching items. Candidates were required to match items i-x in List A with responses in List B by writing the letter of the correct response beside the item number.

A total of 95.3 percent of the candidates attempted this question, whereas 22.5 percent scored zero mark, 59.8 percent scored from 1 to 3 marks, 16.6 percent scored from 4 to 7 marks and 1.1 percent of the candidates scored from 8 to 10 marks. Most candidates who performed poorly in this question, failed to give the correct responses for items number (iii), (v) and (vii).

In item (i) the candidates were required to find a suitable response from list B, which matches correctly with the statement, *"*The motion of a body through equal distances in equal times" from list A. The correct answer in this item was D, *"*Uniform speed." Most candidates matched it correctly. However, a few candidates selected option I *"Uniform velocity."* These candidates failed to recognise that uniform velocity is the rate of change of displacement in equal times.

Item (ii) required the candidates to find a suitable response from list B, which matches correctly with the phrase, *"*Displacement per unit time" from list A. The correct answer was M *"*Velocity." *The* majority of the candidates matched this item correctly showing that the concept was well understood.

In item (iii) they were required to match the statement, "Area under velocity-time graph" from list A with a correct response from list B. The correct match was option J, "Distance." Most of the candidates matched it with an incorrect answer H "Average acceleration." These candidates could not realise that area under velocity-time graph is equal to velocity × time which is distance covered.

Item (iv) was on "the rate at which an object travels." This item was matched correctly by many candidates whose answer from list B was, "speed." This indicates that they had enough knowledge of the concept asked in this question.

In item (v) the candidates were required to match the phrase "constant displacement along the road in equal times" from list A, with a correct response from list B *"*uniform velocity.*"* The majority of the candidates matched it with letter D, which reads, *"*uniform speed.*"* They failed to recognize that displacement is the distance in specified direction.

In item (vi), most of the candidates failed to match the phrase *"the gradient of displacement-time graph"* from list A, with a correct response from list B, E "average velocity." However, some candidates matched the item with letter M "velocity." These candidates failed to discover that the gradient of the graph is always an average value of that graph.

Item (vii) required the candidates to find a suitable response from list B, which matches correctly with the statement, *"*Uniform accelerated motion of a body.*"* The correct answer was F *"*Straight line graph.*"* Many candidates matched it with letter H *"Average acceleration"* because uniform acceleration has the same meaning as *Average acceleration.*

In item (viii) they were required to match the phrase, "The rate of decrease of the constant velocity" from list A with a correct response from list B. The correct match was option A, "Uniform deceleration." However, a few candidates matched it with an incorrect answer K "Retardation." They could not find out that uniform deceleration is the decreases of velocity by equal amounts in equal times, no matter how small the times may be.

Item (ix) required the candidates to find a suitable response from list B, which matched correctly with the statement "A measure of how far a body is from starting point." The correct answer was B *"*Displacement.*"* Most of the candidates managed to provide the correct response. This indicates that they had enough knowledge on the subject matter.

Item (x) was about "The gradient of velocity-time graph," and the correct response was H "Average acceleration." However, some candidates matched the item with letter E "*Average* velocity." These candidates did not know that the average velocity is the gradient of displacement-time graph.

2.1.3 Question 3: Fill in Blanks Items

The question was consisted of ten items. For each of the item (i) – (x), the candidates were required to fill in the blank spaces by writing the correct answer on the answer booklet provided.

The question was attempted by 95.3 percent of the candidates, of which 25.7 percent scored 0 mark, 42.5 percent scored from 1 to 3 marks, 28.3 percent scored from 4 to 7 marks and 3.5 percent scored from 8 to 9 marks. Most of those candidates who performed poorly in this question, failed to give the correct responses for items number (ii), (iv) and (ix).

Item (i) required the candidates to write the law in which the refractive index is involved. The correct answer was *"Snell's law/second law of refraction/refraction of light.*" The majority of the candidates wrote "*law of reflection."* These candidates failed to discover that refractive index is constant obtained when light is passing from one medium to another.

In item (ii) the candidates were required to give the name of the parallel forces which are equal in magnitude but acting in opposite direction. Most of the candidates wrote *"Parallelogram of forces"* instead of *"Coplanar forces or couple."* These candidates failed to recognize that Parallelogram of forces is when two inclined forces are represented in magnitude and direction by the adjacent sides of a parallelogram, their resultant is represented in magnitude and direction by the diagonal of the parallelogram passing through the point of intersection of the two sides.

Item (iii) required the candidates to write the condition in which the latent heat of vaporization can change the state of the substance from liquid to vapour. The correct answer was *"Temperature." The* majority of the candidates filled this item correctly because they might have been familiar with the change of state. A few candidates wrote *"Pressure"* because it is related to the change of state of matter.

Item (iv) was about the name of the multiple reflection of sound waves when they are placed in an enclosed room or cavity. The

correct answer was *"Reverberation"* Majority of the candidates answered *"echo"* because echo is reflected sound.

In item (v) the candidates were required to give the name of particle emitted by a radioactive nucleus ${}^{123}_{60}X$ when decay to ${}^{119}_{58}Y$. Most of the candidates filled it correctly. However, a few candidates answered *"β-particle."* These candidates failed to recognise that the radioactive nucleus reduced its mass number by 4 and its atomic number by 2 which is emission of *"α-particle."*

Item (vi) required the candidates to name an instrument used to detect radiant energy. The correct answer was *"Thermopile."* Many candidates failed to provide the correct answer. These candidates wrote thermometer because it is used to measure the temperature of a substance or place.

In item (vii) the candidates were required to mention the condition in which the ammeter is connected when measuring the current passing through an electrical component. The correct answer was *"series."* Majority of the candidates filled it correctly, but some of the candidates answered *"parallel."* These candidates could not realise that ammeter has zero resistance; hence it should always be connected in series in order to measure the total current flowing in the circuit.

Item (viii) required the candidates to state the condition in which the geocentric theory was based. The correct answer was "Religious/observations/common-sense. Many candidates filled the item correctly. This indicates that they had enough knowledge of the geocentric theory which assumed that all heavenly bodies are attracted towards the earth.

In item (ix) the candidates were required to mention the property of X-rays as electromagnetic waves. Majority of the candidates wrote *"frequency"* instead of *"wavelength."* These candidates had poor knowledge on electromagnetic spectrum. They failed to understand that as the frequencies increases the wavelengths decreases. Hence X-rays are electromagnetic waves with very short wavelength and very high frequency.

Item (x) required the candidates to give the name of the point within the earth where an earthquake begins. The correct answer was *"Hypocenter/focus."* Most of the candidates filled the item correctly. However, a few candidates wrote "*seismograph"*. These candidates were not aware that, seismograph is an instrument used to record ground movement caused by earthquake.

2.2 SECTION B

2.2.1 Question 4: Force, Archimedes Principle and Law of Floatation

This question had three parts (a), (b) and (c). Part (a) required the candidates to give the reason for a solid body to weigh more in air than when immersed in a liquid. Part (b) required the candidates to calculate (i) the total volume of the stem of hydrometer just under the surface of the liquid and (ii) the relative density of the liquid. Part (c) required the candidates to (i) explain the meaning of resolution of a force and (ii) calculate the position of an upward force of 3N which will balance a metre rule.

The question was attempted by 94.8 percent of the candidates, whereby 42.3% scored 0 mark, 53.5% scored from 0.5 to 4.5 marks and 4.2% of them scored from 5 to 10 marks. Those who scored 0 mark failed to give the reason for a solid body to weigh more in air than when immersed in a liquid. For example one candidate wrote:

> *"The solid body weight more in Air than when immersed in a liquid becase when the body is in liquid it dis preas its volume."*

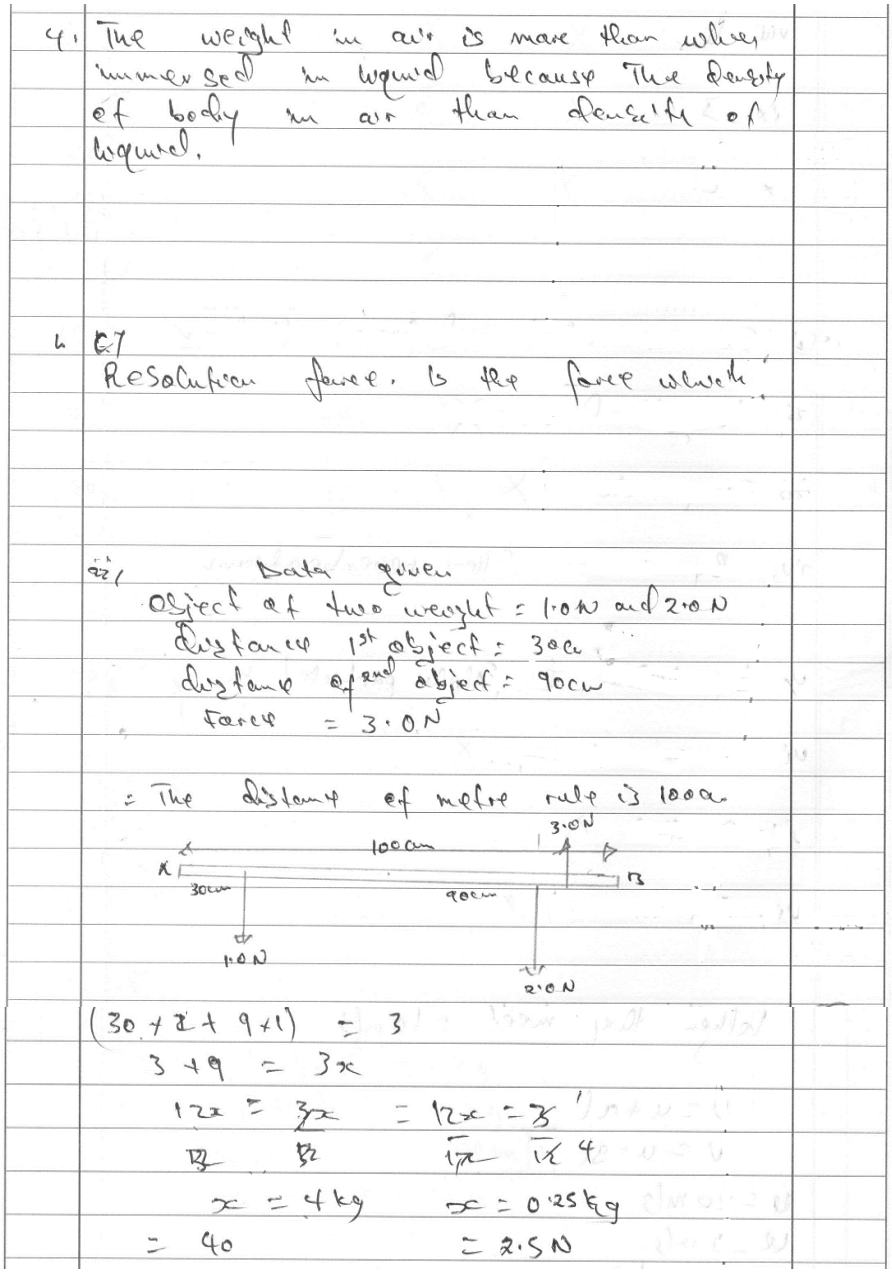
Another candidate wrote:

> *"Because when a body in air posses all mass if it in water is lose the mass."*

They should have provided the correct response which was, *"because the liquid exerts an upward force (upthrust) on the body."* Some of the candidates failed to use law of floatation to find the mass of water displaced and the relative density of the liquid. They also failed to explain the meaning of resolution of a force and to use the principle of moment to calculate the position needed by an upward force of 3N to balance a metre rule.

Extract 1.1 is a sample of the candidate's response who attempted the question poorly.

Extract 1.1



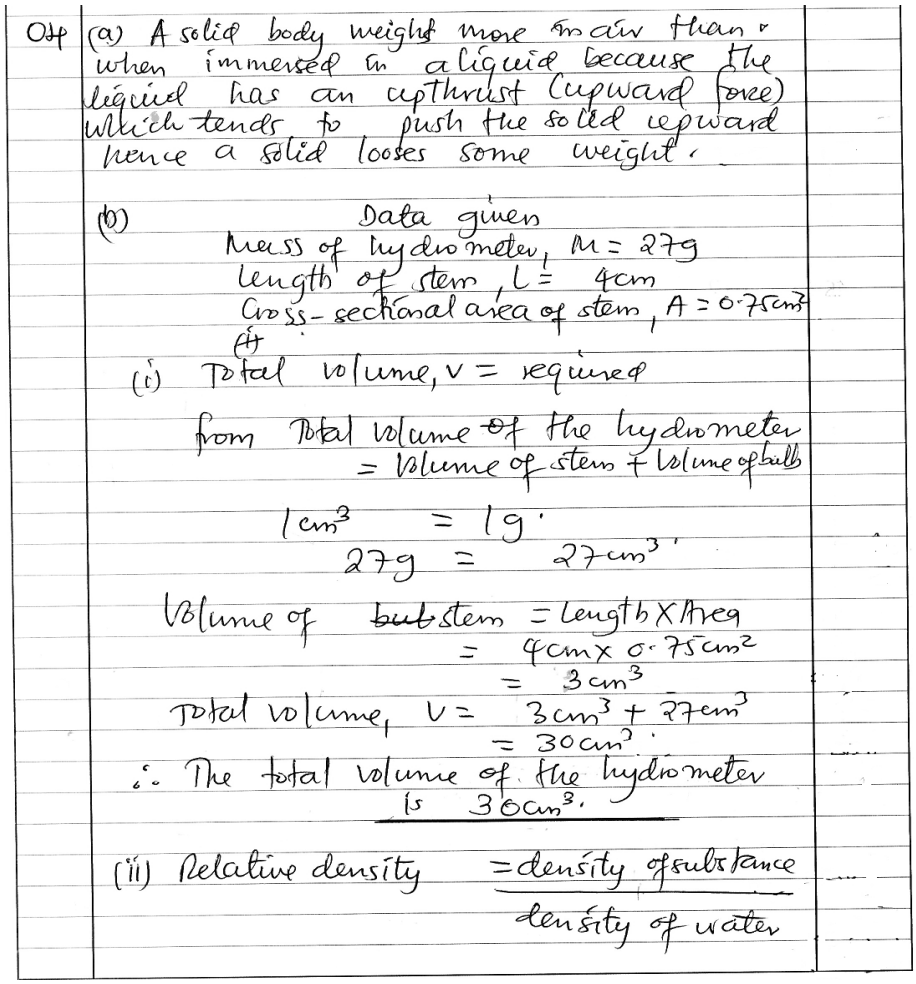
In Extract 1.1, the candidate failed to provide the reason for a solid body to weigh more in air than when immersed in a liquid and failed to explain the meaning of resolution of a force. The candidate also failed to draw a correct diagram, hence failed to use the principle of moment to calculate the position of an upward force of 3N.

Only 26 candidates scored full marks as they managed to provide clear and correct answers. These candidates managed to give the reason for a solid body to weigh more in air than when immersed in a

liquid. They used correctly the law of floatation to find the mass of water displaced and the relative density of the liquid. They also used correctly the principle of moment to calculate the position needed by an upward force of 3N to balance a metre rule.

Extract 1.2 is an example from the script of one candidate who managed to answer the question correctly.

Extract 1.2 (a)


Qtp (a) A solid body weighs more in air than when immersed in a liquid because the liquid has an upthrust (upward force) which tends to push the solid upward hence a solid looses some weight.

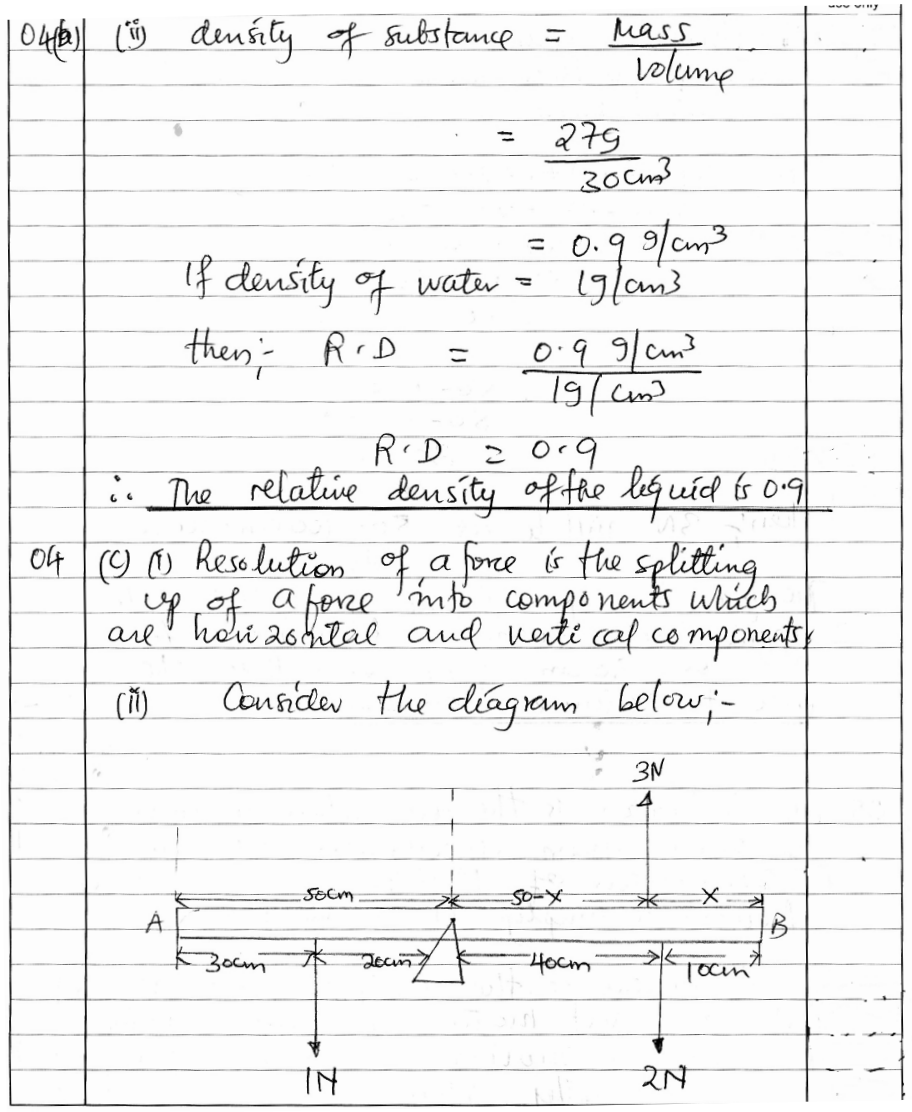
(b) Data given
Mass of hydrometer, M = 27g
Length of stem, L = 4cm
Cross-sectional area of stem, A = 0.75cm²

(i) Total volume, V = required
from Total volume of the hydrometer
= Volume of stem + Volume of bulb
1cm³ = 1g.
27g = 27cm³.
Volume of ~~bub~~stem = length X Area
= 4cm x 0.75cm²
= 3cm³
Total volume, V = 3cm³ + 27cm³
= 30cm³.
∴ The total volume of the hydrometer is 30cm³.

(ii) Relative density = density of substance / density of water

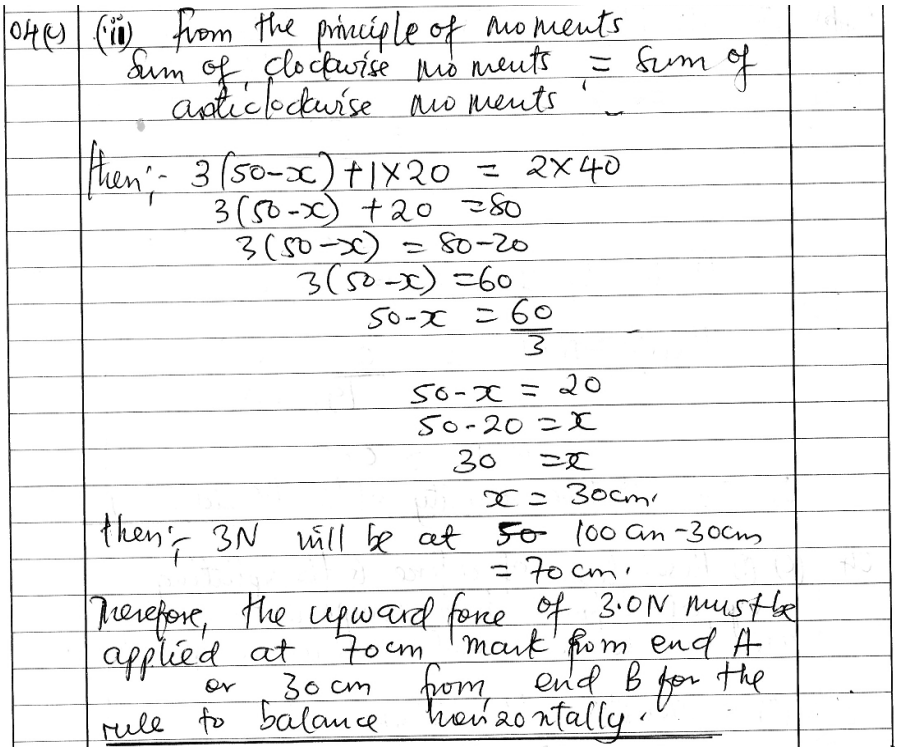
In Extract 1.2 (a), the candidate managed to provide the correct answers to part (a) and (b) (i) of the question by giving the reason for a solid body to weigh more in air than when immersed in a liquid and used correctly procedure in calculating the total volume of the hydrometer.

Extract 1.2 (b)



Extract 1.2 (b) shows how the candidate managed to attempt part b (ii) and c (i) of the question by calculating the required relative density and explained the meaning of resolution of a force respectively. In part (c) (ii) he/she managed to draw a correct diagram showing the component of forces.

Extract 1.2 (c)



Extract 1.2 (c) shows how the candidate used correctly the principle of moment to calculate the position 3.0N required to balance a metre rule horizontally.

2.2.2 Question 5: Newton's Laws of Motion

The question required the candidates to (a) define terms Newton, inertia and linear momentum. In part (b), the candidates were required to calculate (i) the time taken by the second stone in air before they meet (ii) the velocity of the second stone when they meet. Part (c) required the candidates to calculate (i) the velocity of part B. (ii) the total kinetic energy produced by the explosion.

This question was attempted by 95.3% of the candidates, out of which, 39.7% scored a 0 mark, 56.1% scored from 0.5 to 5 marks, 3.9% scored from 5.5 to 8 marks and 0.1% scored from 8.5 to 10 marks.

Those who scored 0 mark were not able to define terms Newton, inertia and linear momentum. These candidates failed to use the first equation of motion to calculate time and velocity of the second stone. They also failed to use the law of conservation of linear momentum which states that the total momentum before collision is equal to the

total momentum to find the velocity of part B. For example, one candidate wrote:

> *"Linear momentum is the scientific process of gaining than other during momentum place for attracts."*

Another candidate defined Newton and linear momentum as

> *"Newton is the position by the relative properties to goes under the Principle to controled by the passes into the real Principle of the calculation in the equation formation periodically in the level of empheseses on the reaction of the heat."*

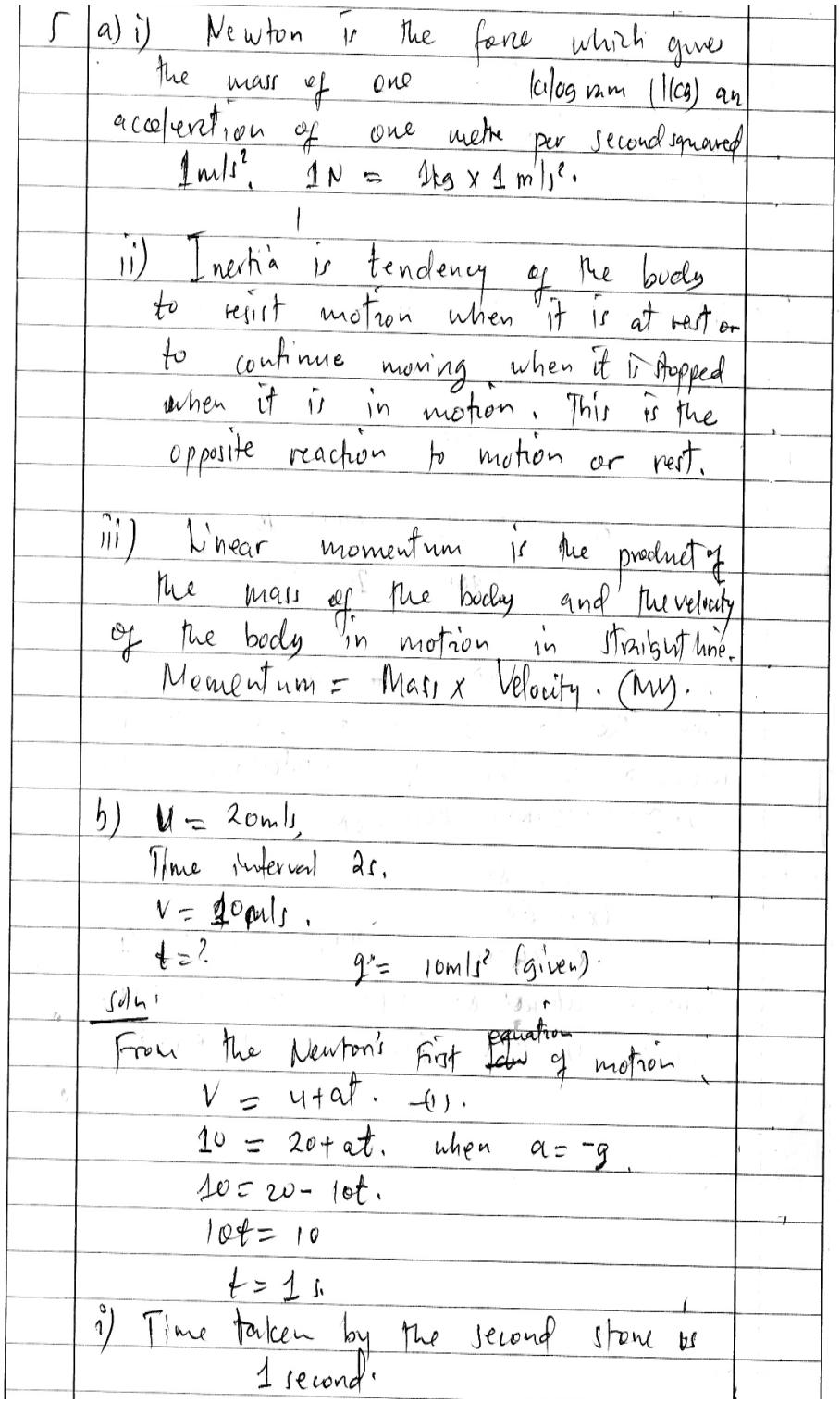
> *"Linear momentum This form of the principle of momentum it was undergoes by the principle of the level of the reaalities to be under their frinctional of the posses in the randomly of their posses of the equivalent on the in own proportion to do under their moment of force."*

Despite the difficulties in language, the candidates failed to give a correct definition. In attempting part (c) (ii), they failed to discover that total kinetic energy produced by the explosion is given by

$$\text{K.e} = \frac{1}{2} m_A v_A^{\,2} + \frac{1}{2} m_B v_B^{\,2}.$$

A sample from the script of one candidate was taken to show how he/she provided correct answers to almost all the parts of the question (see Extract 2.1)

Extract 2.1 (a)



a) i) Newton is the force which gives the mass of one kilogram (1kg) an acceleration of one metre per second squared $1 m/s^2$. $1N = 1kg \times 1 m/s^2$.

ii) Inertia is tendency of the body to resist motion when it is at rest or to continue moving when it is stopped when it is in motion. This is the opposite reaction to motion or rest.

iii) Linear momentum is the product of the mass of the body and the velocity of the body in motion in straight line.
Momentum = Mass x Velocity. (MV).

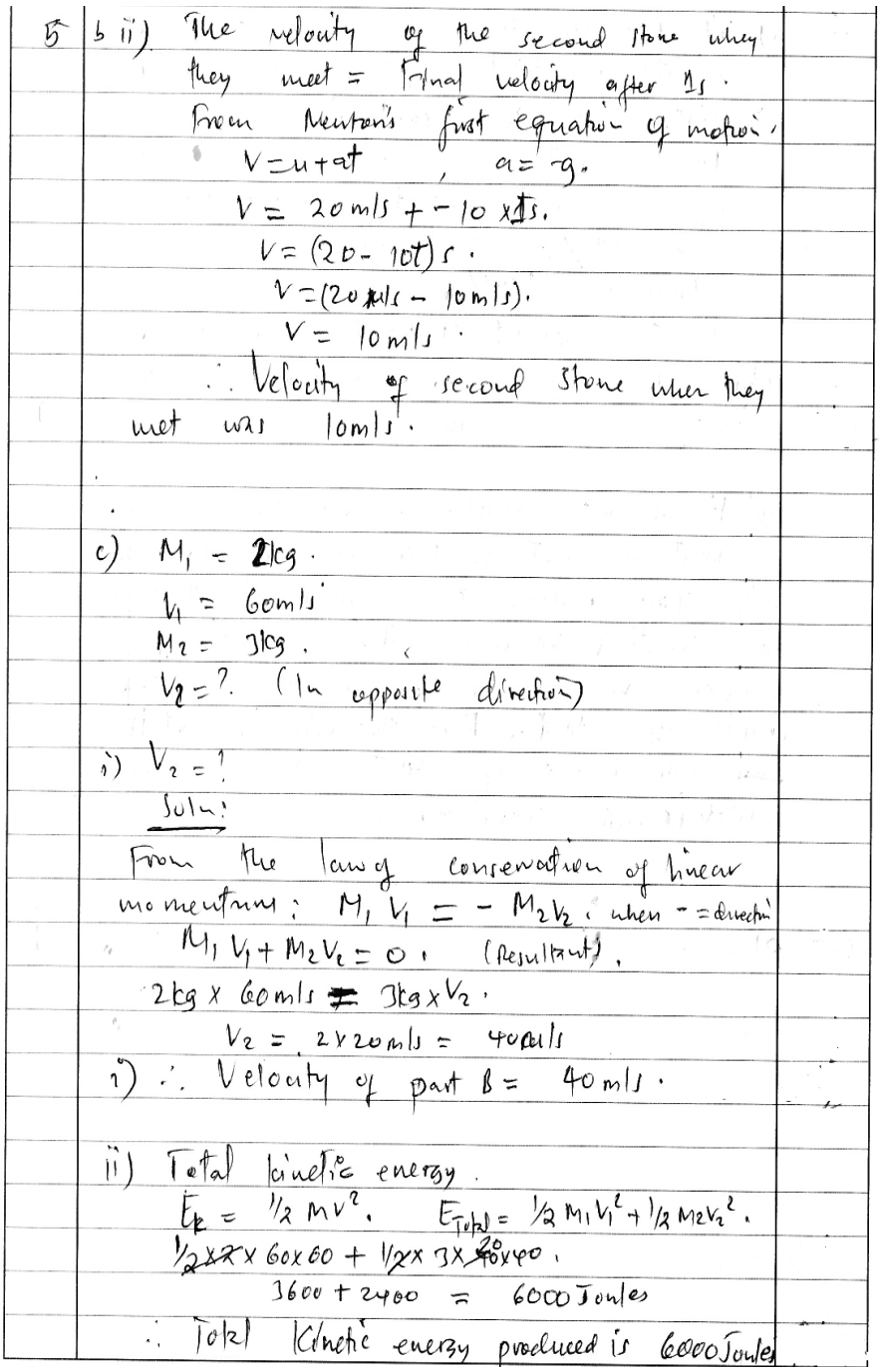
b) $u = 20 m/s$,
Time interval 2s.
$v = 0 m/s$.
$t = ?$ $g = 10 m/s^2$ (given).

Soln:
From the Newton's First equation of motion
$v = u + at$. -(i).
$10 = 20 + at$. when $a = -g$
$10 = 20 - 10t$.
$10t = 10$
$t = 1$ s.

ii) Time taken by the second stone is 1 second.

Extract 2.1 (a) shows that the candidate managed to provide the correct answers to parts (a) and (b) (i) of the question.

Extract 2.1 (b)



5 b ii) The velocity of the second stone when they meet = final velocity after 1s.
From Newton's first equation of motion:
$V = u + at$, $a = -g$.
$V = 20\,m/s + -10 \times 1s$.
$V = (20 - 10t)\,s$.
$V = (20\,m/s - 10\,m/s)$.
$V = 10\,m/s$.
∴ Velocity of second stone when they met was 10m/s.

c) $M_1 = 2kg$.
$V_1 = 60m/s$
$M_2 = 3kg$.
$V_2 = ?$ (In opposite direction)

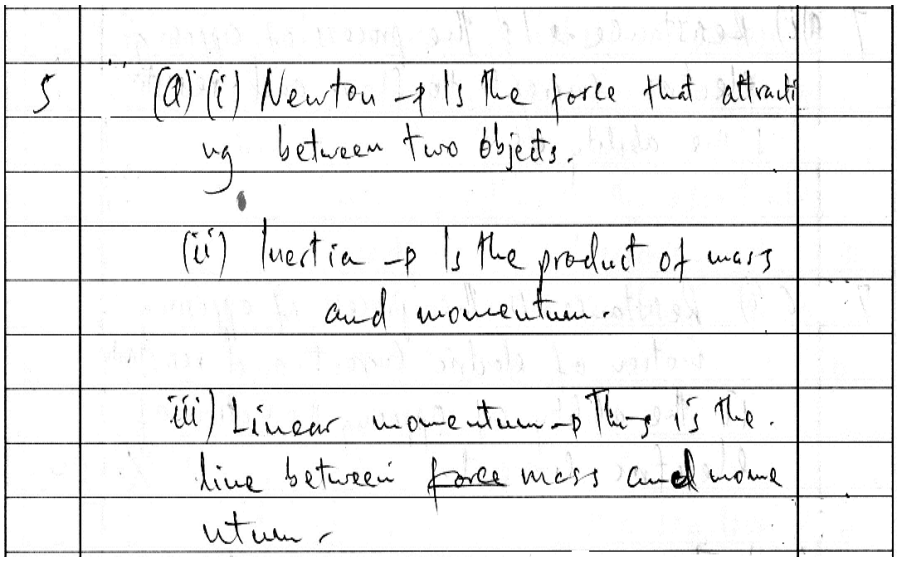
i) $V_2 = ?$
Soln:
From the law of conservation of linear momentum: $M_1 V_1 = -M_2 V_2$, when − = direction
$M_1 V_1 + M_2 V_2 = 0$. (Resultant).
$2kg \times 60m/s = 3kg \times V_2$.
$V_2 = 2 \times 20m/s = 40m/s$
ii) ∴ Velocity of part B = 40 m/s.

ii) Total kinetic energy.
$E_k = 1/2\,mv^2$. $E_{Total} = 1/2\,M_1V_1^2 + 1/2\,M_2V_2^2$.
$1/2 \times 2 \times 60 \times 60 + 1/2 \times 3 \times 40 \times 40$.
$3600 + 2400 = 6000$ Joules
∴ Total Kinetic energy produced is 6000 Joules

Extract 2.1 (b) shows that the candidate managed to provide the correct procedures in calculating the values of velocity of stone and the total kinetic energy produced by explosion.

Extract 2.2 shows a sample script of the candidate who failed to provide a correct answer.

Extract 2.2



Extract 2.2 shows that the candidate gave wrong definitions of the terms and therefore scored a 0 mark.

2.2.3 Question 6: Structure and Properties of Matter

This question required the candidates to: (a) (i) explain how gas exerts pressure on the walls of its container (ii) give a reason why it is not sensible to rub the canvas of a tent in wet weather. In part (b) they were required to explain two situations in which the phenomenon of surface tension is exhibited. Part (c) required them to (i) estimate the length of an oil drop and (ii) write the assumption made in estimating the length of an oil drop.

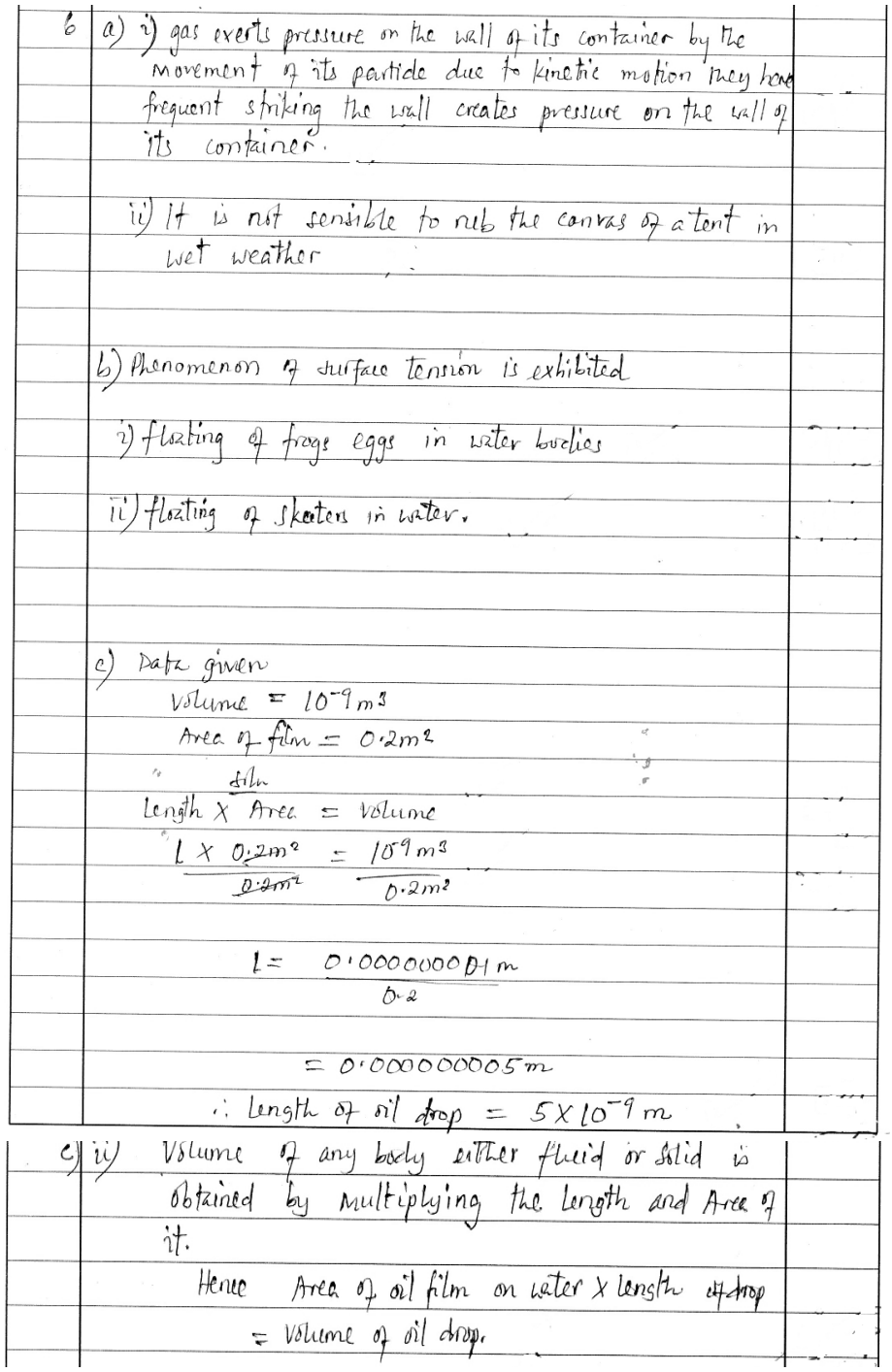
Ninety-five percent (95.3%) of the candidates attempted this question, whereby 80.3% scored a 0 mark, 19.1% of them scored from 0.5 to 4.5, and 0.4% scored from 5 to 10 marks.

Those who scored a 0 mark failed to provide the correct answers to all parts of the question. They failed even to explain two situations in which the phenomenon of surface tension is exhibited.

Only 2 candidates managed to provide the correct answers to all or some parts of the question (see extract 3.1). Among the candidates who had an average score, some of them failed to give a reason why it is not sensible to rub the canvas of a tent in wet weather while

others failed to write the assumption made in estimating the length of an oil drop.

Extract 3.1


6 a) i) gas exerts pressure on the wall of its container by the movement of its particle due to kinetic motion they have frequent striking the wall creates pressure on the wall of its container.

ii) It is not sensible to rub the canvas of a tent in wet weather

b) Phenomenon of surface tension is exhibited

i) floating of frogs eggs in water bodies

ii) floating of skaters in water.

c) Data given

Volume = $10^{-9} m^3$

Area of film = $0.2 m^2$

Length × Area = Volume

$\frac{l \times 0.2 m^2}{0.2 m^2} = \frac{10^{-9} m^3}{0.2 m^2}$

$l = \frac{0.000000001 m}{0.2}$

$= 0.000000005 m$

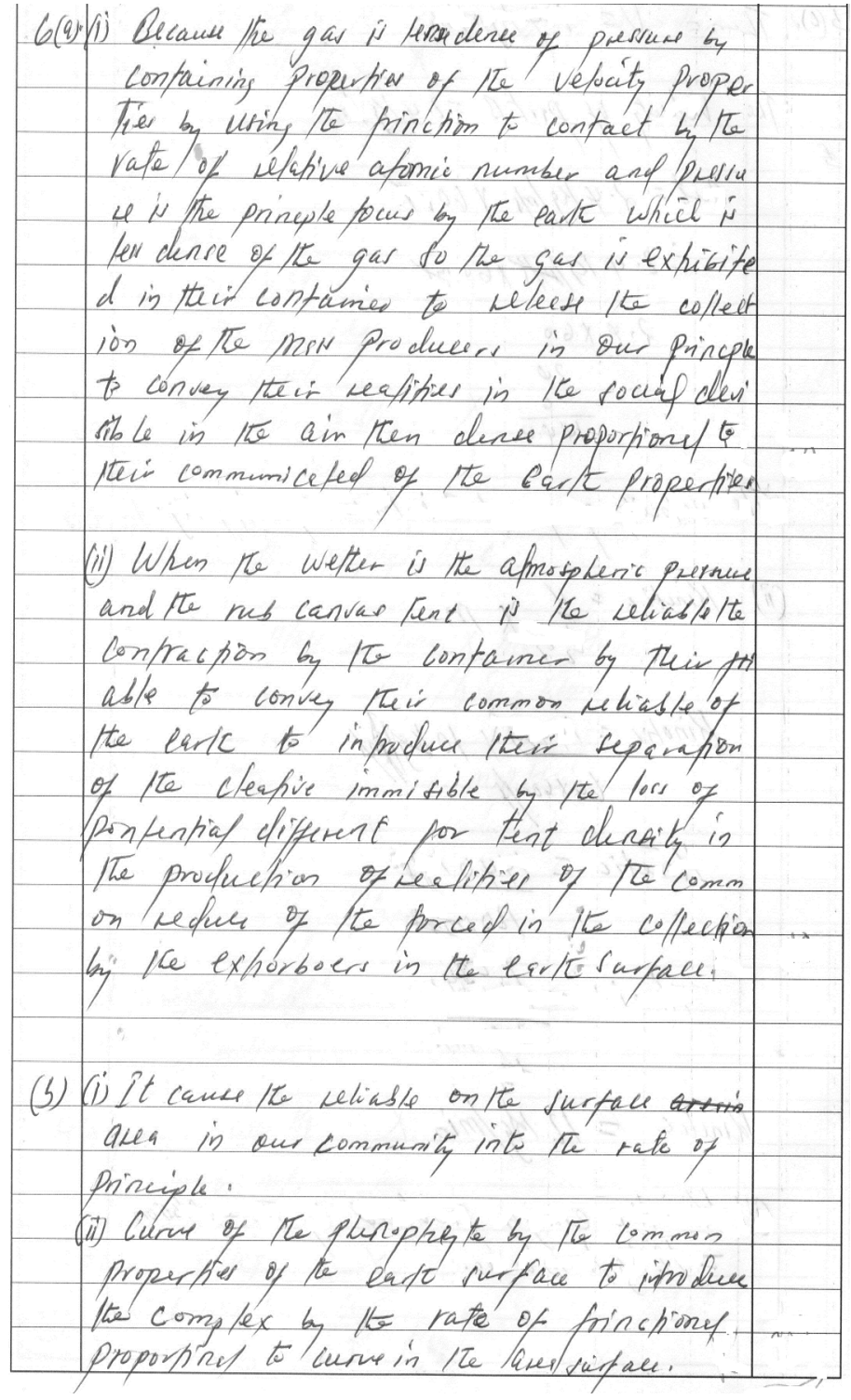
∴ Length of oil drop = $5 \times 10^{-9} m$

c) ii) Volume of any body either fluid or solid is obtained by multiplying the length and Area of it.

Hence Area of oil film on water × length of drop = Volume of oil drop.

Extract 3.1 is a sample from the script of one of candidates who managed to give the correct answer to part (a) (i), (b) and part (c) (i) but failed to provide the required answers to part (a) (ii) and (c) (ii).

Extract 3.2 (a)


6(a) (i) Because the gas is less dense of pressure by containing properties of the velocity properties by using the principle to contact by the rate of relative atomic number and pressure is the principle focus by the earth which is less dense of the gas so the gas is exhibited in their containes to release the collection of the MCH producers in our principle to convey their realities in the social desirable in the air then dense proportional to their communicated of the earth properties.

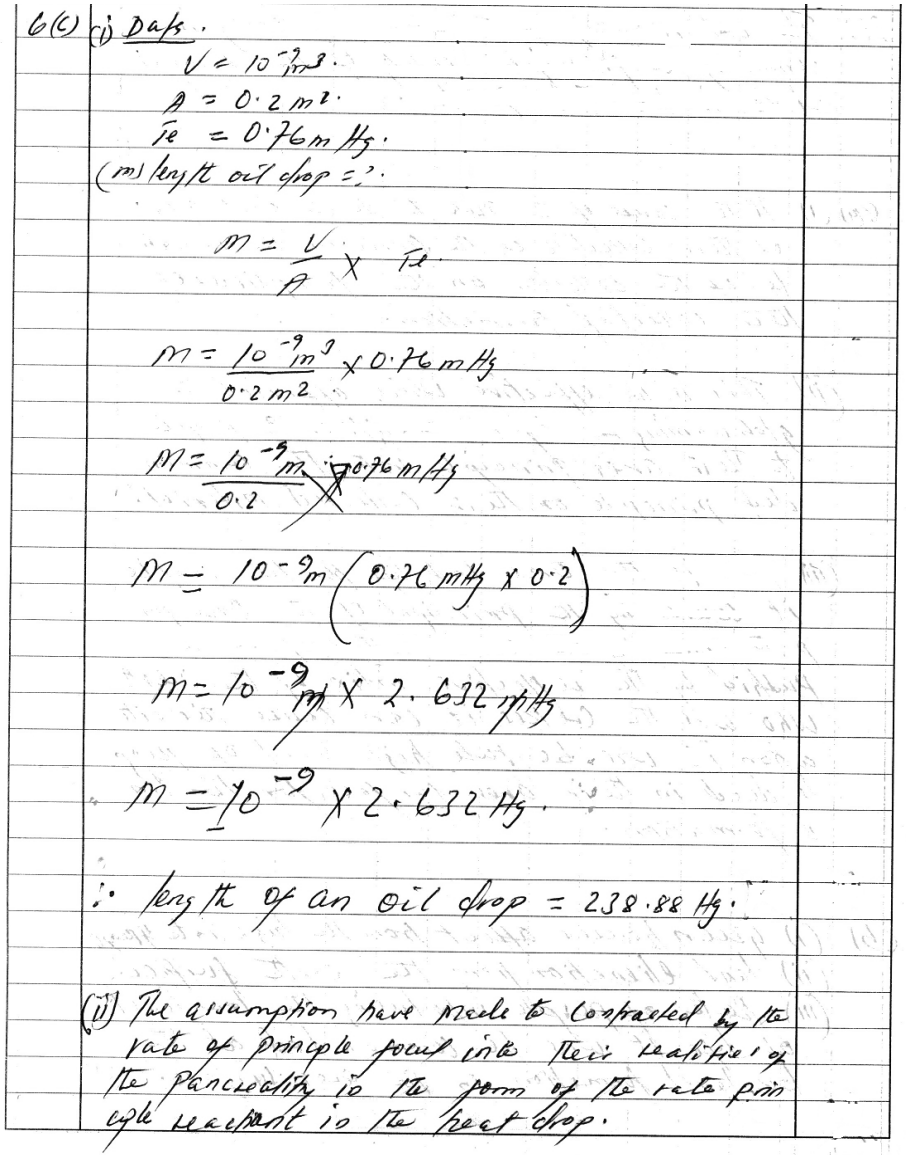
(ii) When the wether is the atmospheric pressure and the rub canvas tent is the reliable to the contraction by the container by their ph able to convey their common reliable of the earth to introduce their separation of the relative immisible by the loss of potential different por tent density in the production of realities of the common reduce of the forced in the collection by the exhorbers in the earth surface.

(b) (i) It cause the reliable on the surface ~~area~~ area in our community into the rate of principle.

(ii) Curve of the glucophyte by the common properties of the earth surface to introduce the complex by the rate of principal proportional to curve in the land surface.

Extract 3.2 (a) indicates that the candidate provided wrong explanations in part (a) and (b) of the question.

Extract 3.2 (b)



Extract 3.2 (b) shows that the candidate used wrong formulae in calculating the length of an oil drop and failed to provide the correct assumptions made in calculations.

2.2.4 Question 7: Current Electricity

In this question candidates were required to: (a) (i) give the difference between resistance and resistivity of a given conductor, (ii) give reason if it is possible for two cells in parallel arrangement to drive more current through a resistor than one cell and (b) (i) give the meaning of 1 KILOWATT-HOUR as applied to current electricity, (ii) give the meaning of a domestic electric bulb rated 60W, 240V. In part (c) they were required to find the cost of running five 60W lamps

and four 100W lamps for eight hours if electric energy costs Tshs.27/= per unit.

About ninety-five percent (95.3%) of the candidates attempted this question, whereby 68.9% scored a 0 mark, 27.7% scored between 0 and 4.5 marks and 3.4% scored above 4.5 out of 10 possible marks.

Those who scored 0 did not manage to provide the correct answers to all parts of the question, as they even failed to differentiate resistance from resistivity of a given conductor. For example, one candidate stated the difference between resistance and resistivity of a given conductor as*:*

> *"Resistance is the ration of current over volt while resistivity is the ration of crossection area over volt."*

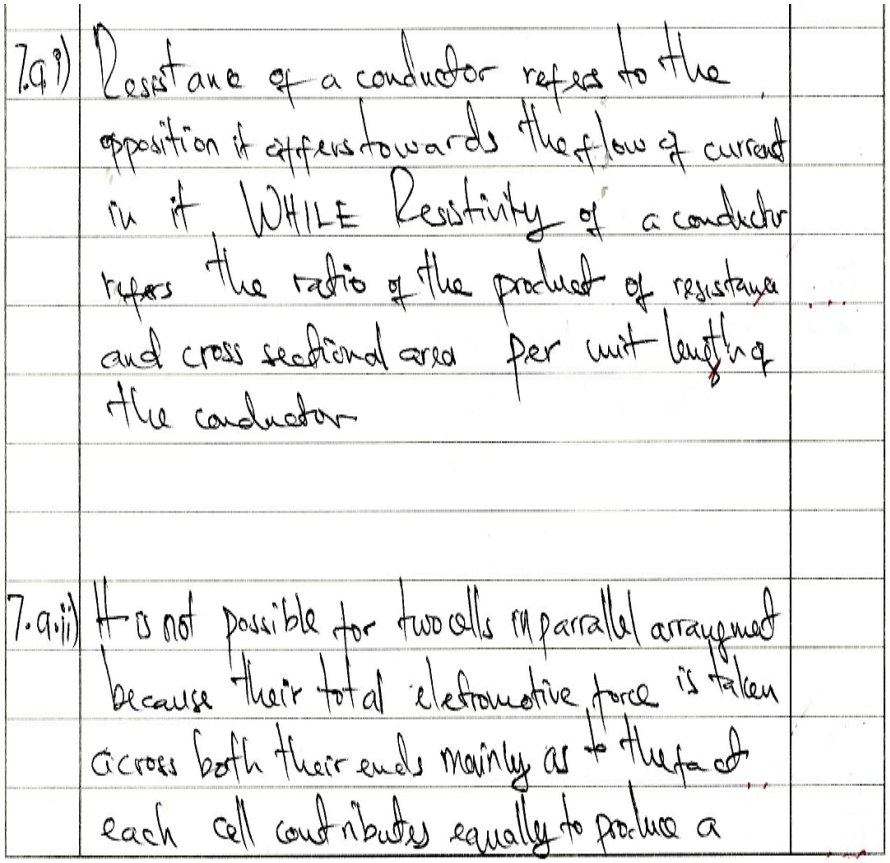
Another candidate explained the meaning of 1 KILOWATT-HOUR as:

> *"1 KILOWATT-HOUR is the SI unit or large quantity of power."*

They also failed to provide clear reason if it is possible for two cells in parallel arrangement to drive more current through a resistor than one cell. They seemed not to know that in parallel arrangement of cells electromotive force (e.m.f) is common.

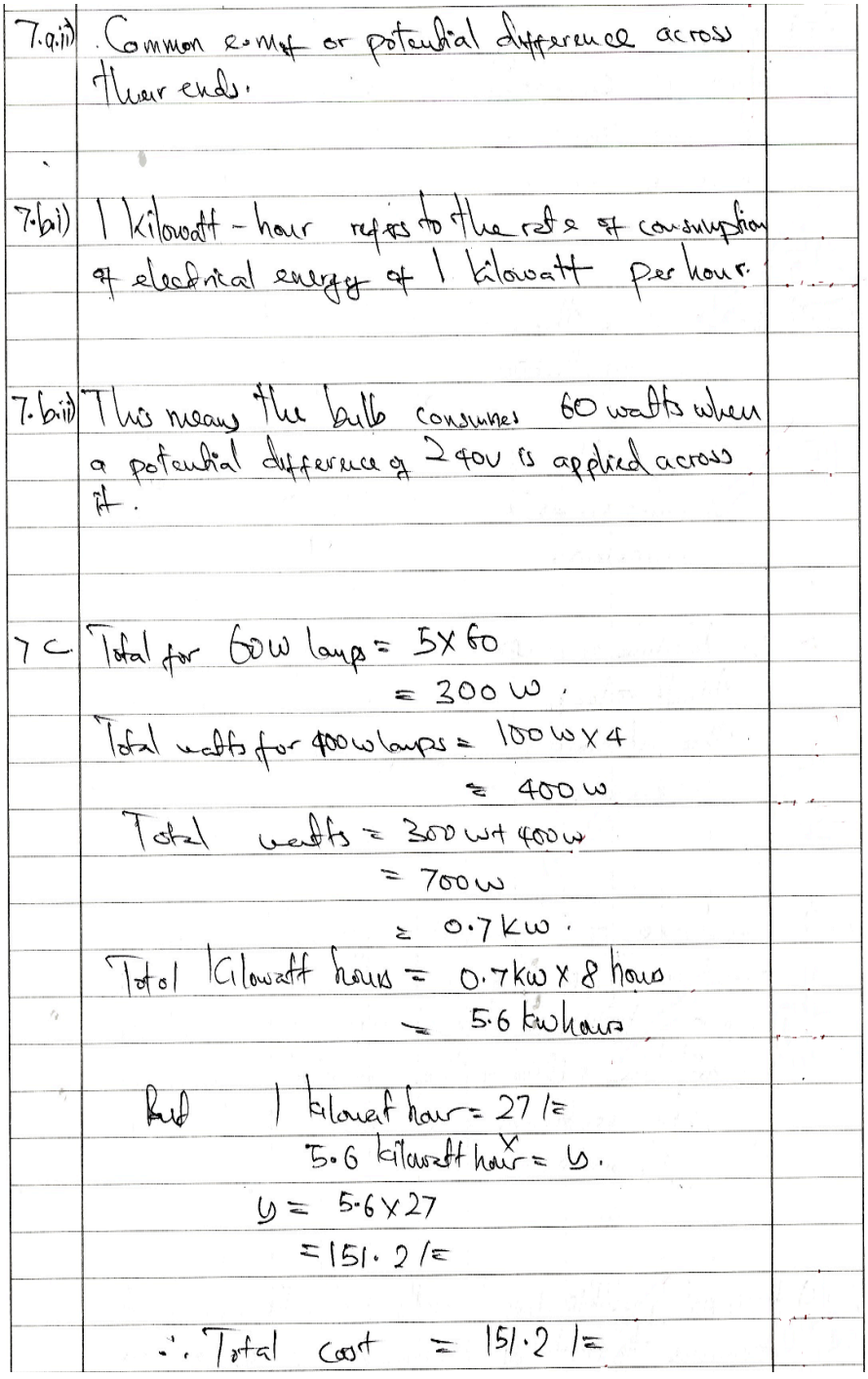
However, only 13 candidates managed to attempt this question as clearly seen in extract 4.1.

Extract 4.1 (a)



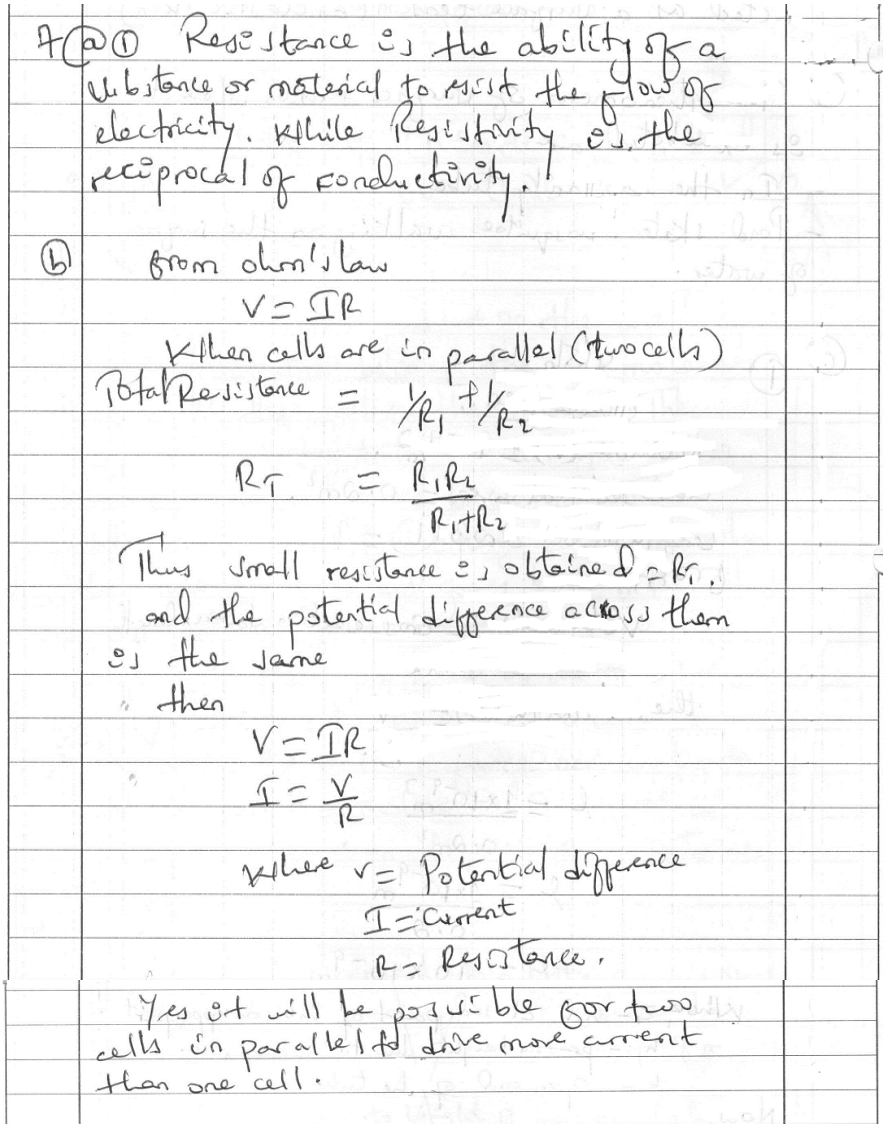
Extract 4.1 (a) indicates that the candidate managed to attempt part (a), by providing the correct difference between resistance and resistivity of a given conductor and give reason for two cells in parallel arrangement to drive more current through a resistor than one cell.

Extract 4.1 (b)



Extract 4.1 (b) indicates that the candidate managed to attempt part (b) and (c) by providing the correct meaning of 1 KILOWATT-HOUR as applied to current electricity and give the meaning of a domestic electric bulb rated 60W, 240V. The candidate used the correct procedures in calculating the cost of running five 60W lamps and four 100W lamps for eight hours.

Extract 4.2



Extract 4.2 indicates that the candidate failed to differentiate the two terms in part (a) and in part (b) he/she used incorrect formulae to verify if it is possible for two cells in parallel arrangement to drive more current through a resistor than one cell, hence scored 0 mark.

2.2.5 Question 8: Geophysics

This question consisted of three parts: a, b, and c. Part (a) required the candidates to: explain the meaning of terms (i) global warming, (ii) greenhouse effect and (iii) earthquake. Part (b) required the candidates to mention three effects of global warming, while part (c) required them to (i) explain three major causes of global warming (ii)

explain briefly three measures that can be taken to control global warming.

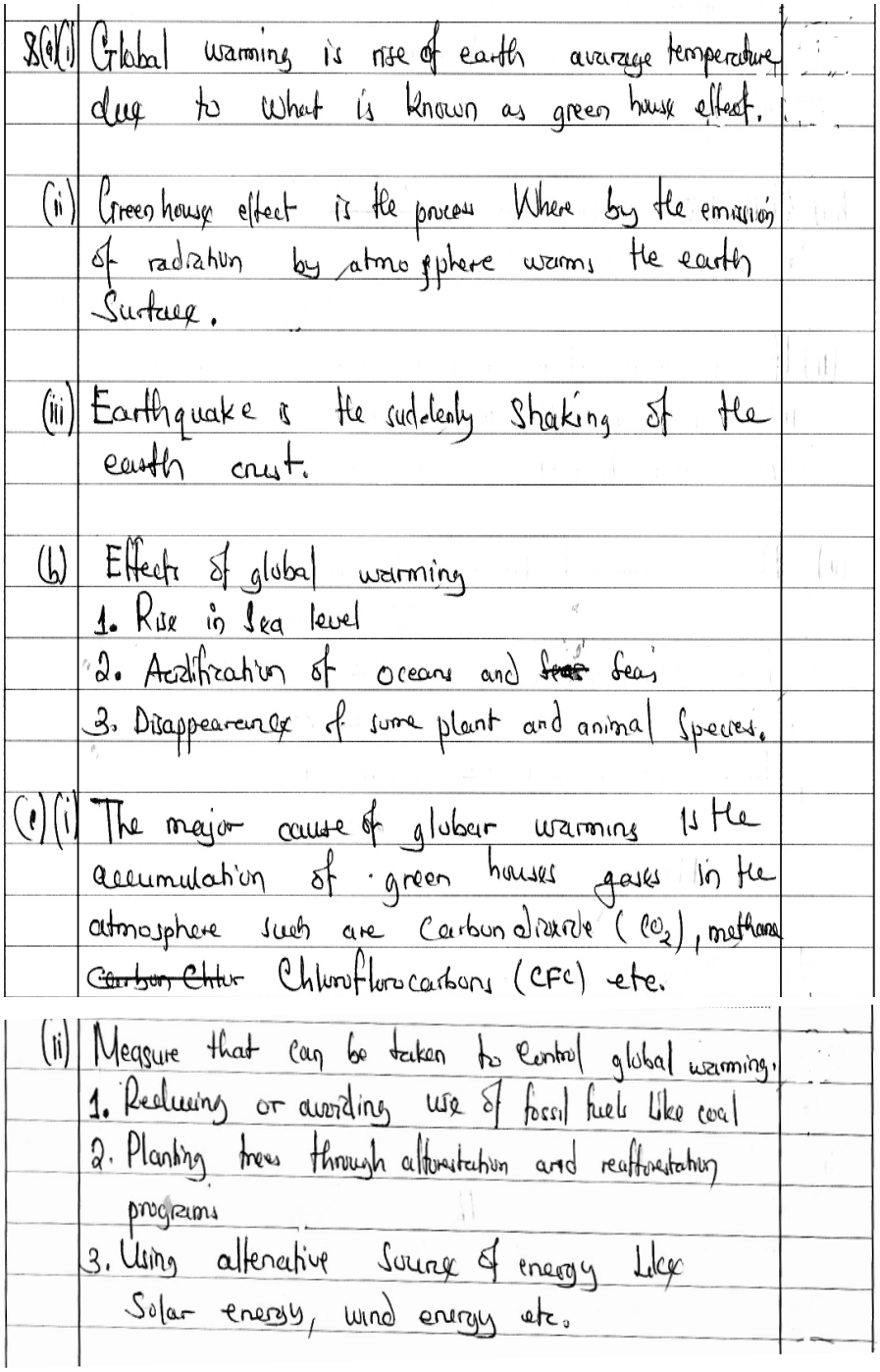
A total of 111,842 (95.4%) candidates attempted this question, whereby 15% scored 0 mark, 47.2% scored from 0.5 and 4.5 marks, 33% scored from 5 to 8 marks and 4.8% scored from 8.5 to 10 marks.

Those who scored 0 failed to provide the correct answers to all parts of the question. They failed even to mention three effects of global warming.

Very few candidates (1.2%) managed to explain the terms given, to mention three effects of global warming and explain correctly three major causes of global warming and three measures that can be taken to control global warming, hence scored full marks.

Extract.5.1 is a sample from the script of one candidate who attempted the question correctly.

Extract 5.1



8(a)(i) Global warming is rise of earth average temperature due to what is known as green house effect.

(ii) Green house effect is the process where by the emission of radiation by atmosphere warms the earth surface.

(iii) Earthquake is the suddenly shaking of the earth crust.

(b) Effects of global warming
1. Rise in sea level
2. Acidification of oceans and ~~seas~~ seas
3. Disappearance of some plant and animal species.

(c)(i) The major cause of globar warming is the accumulation of green houses gases in the atmosphere such are Carbon dioxide (CO_2), methane ~~Carbon Ether~~ Chlorofluorocarbons (CFC) etc.

(ii) Measure that can be taken to control global warming.
1. Reducing or avoiding use of fossil fuels like coal
2. Planting trees through afforestation and reafforestation programs
3. Using alternative source of energy like solar energy, wind energy etc.

Extract 5.1 shows that the candidate managed to provide the correct answers to parts (a), (b) and (c) of the question hence scored full marks.

2.2.6 Question 9: Radioactivity

The question required the candidates (a) to define the terms binding energy and thermonuclear fusion. In part (b) they were to: (i) explain the meaning of background count and give two sources of radiation which are always present in a neighbourhood of a detector; (ii) to explain how the rate of escape of electrons from a metal relates to its temperature and (iii) to calculate the sample of iodine-131 remain undecayed after 40 days while in part (c) they were required to write down the composition of nucleus during the end of the following stages of disintegration (i) the emission of an alpha-particle (ii) further emission of a beta-particle and (iii) the further emission of a gamma-radiation.

A total number of 111,781 (95.3%) candidates attempted this question. Out of which 41% scored between 0 and 5 marks, 4.9% scored between 5.5 and 8 marks and 0.2% scored from 8.5 to 10 marks. The majority of the candidate (53.9%) scored a 0 mark.

The candidates, who scored a 0 mark failed to provide the correct answers to all parts of the questions. For example, one of the candidates defined binding energy as:

> *"This is the energy which producing from the various materials."*

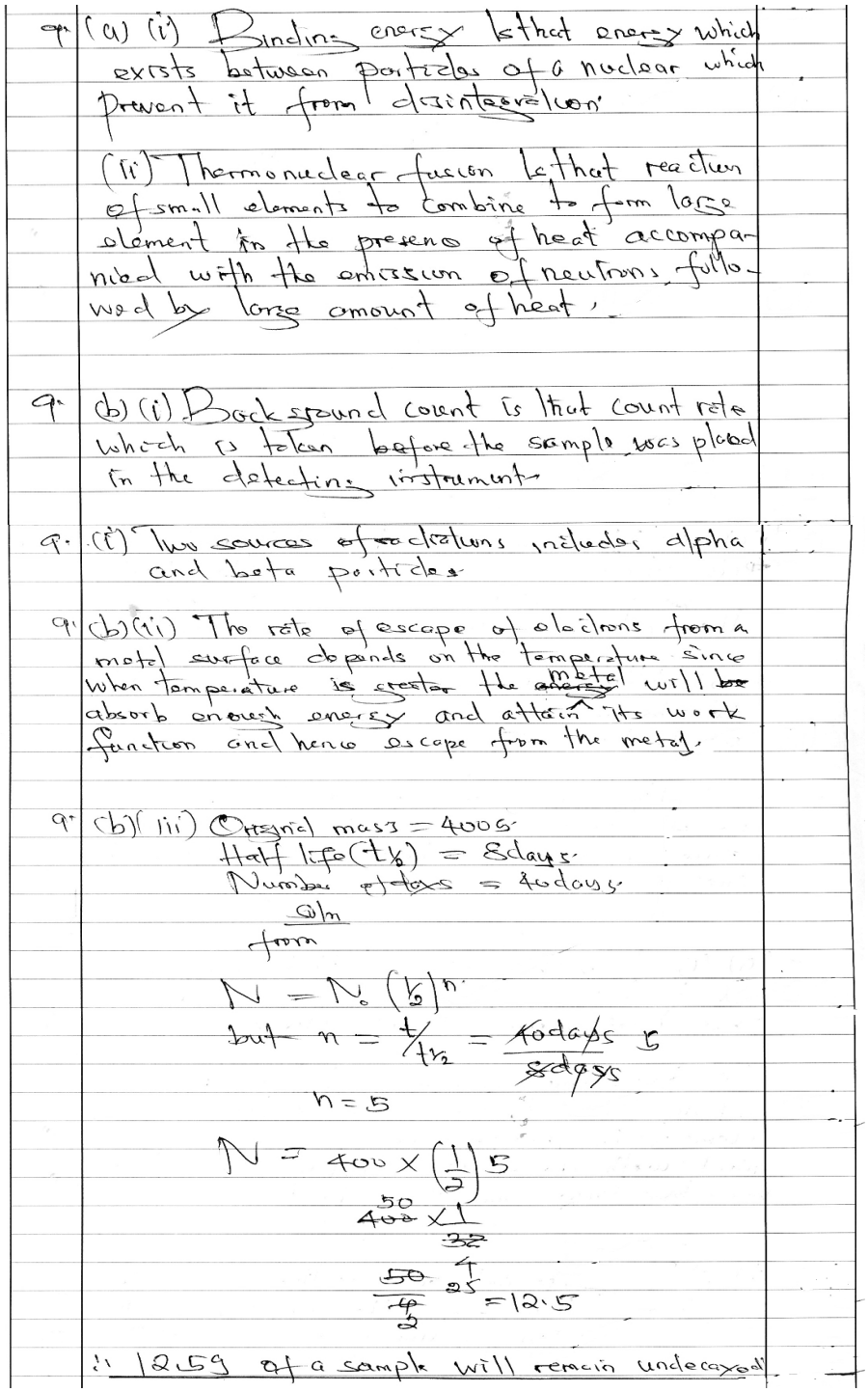
Another candidate defined thermonuclear fusion as:

> *"Thermonuclear fusion is the fusion of nuclear by using of temperature."*

Those candidates who had an average score, some of them failed to give two sources of radiations present in a neighbourhood of a detector while other failed to explain how the rate of escape of electrons from a metal relates to its temperature.

Extract 5.1 is an example from the script of one candidate who managed to answer the question correctly.

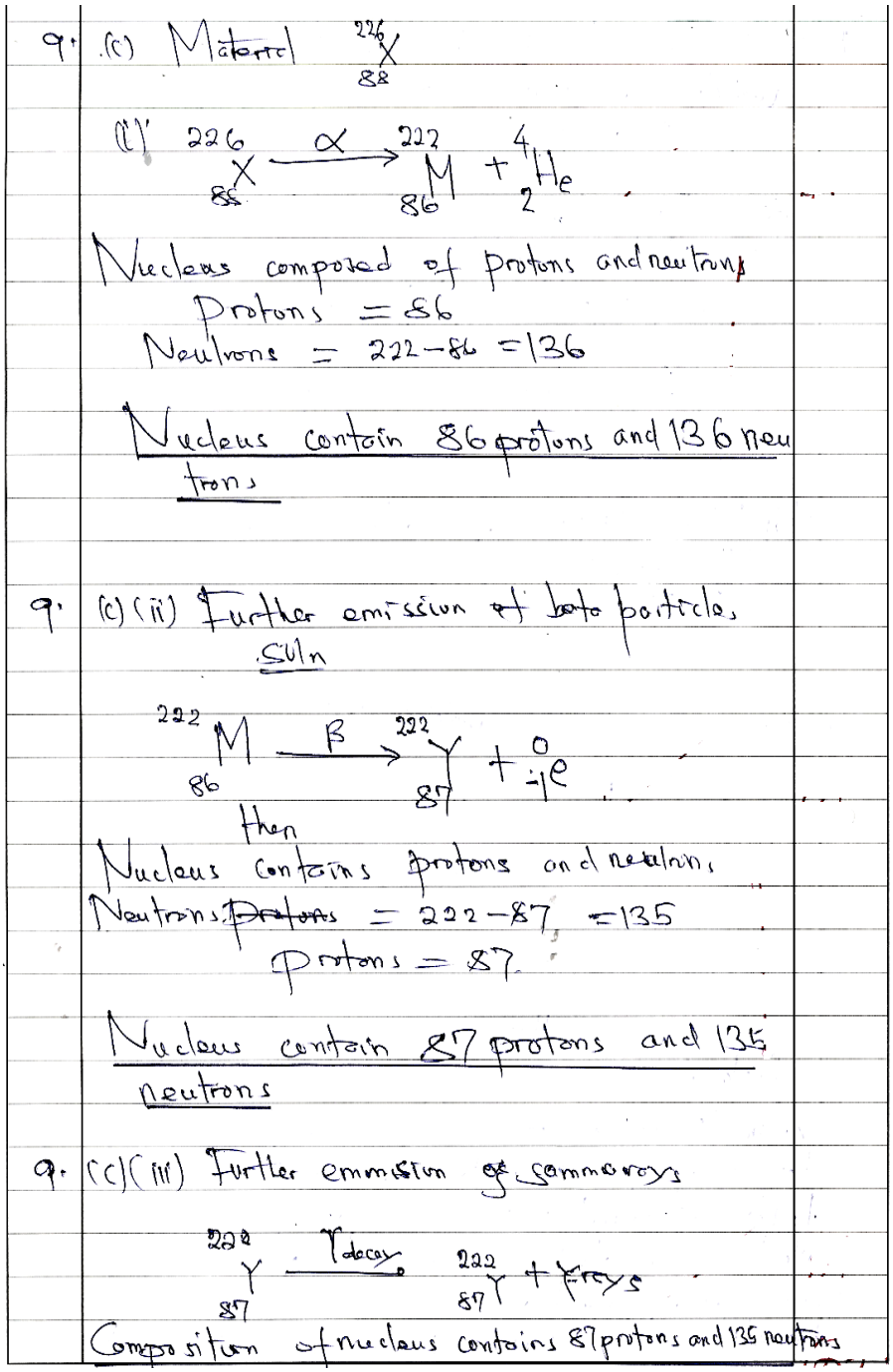
Extract 5.1 (a)



Extract 5.1 (a) indicates that the candidate managed to define the terms in part (a) but failed to give the meaning of background count and two sources of radiation in part (b) (i). He/she also managed to state the relationship between the rate of escape of

electrons and temperature. The candidate used correct formula to find the sample of element undecayed.

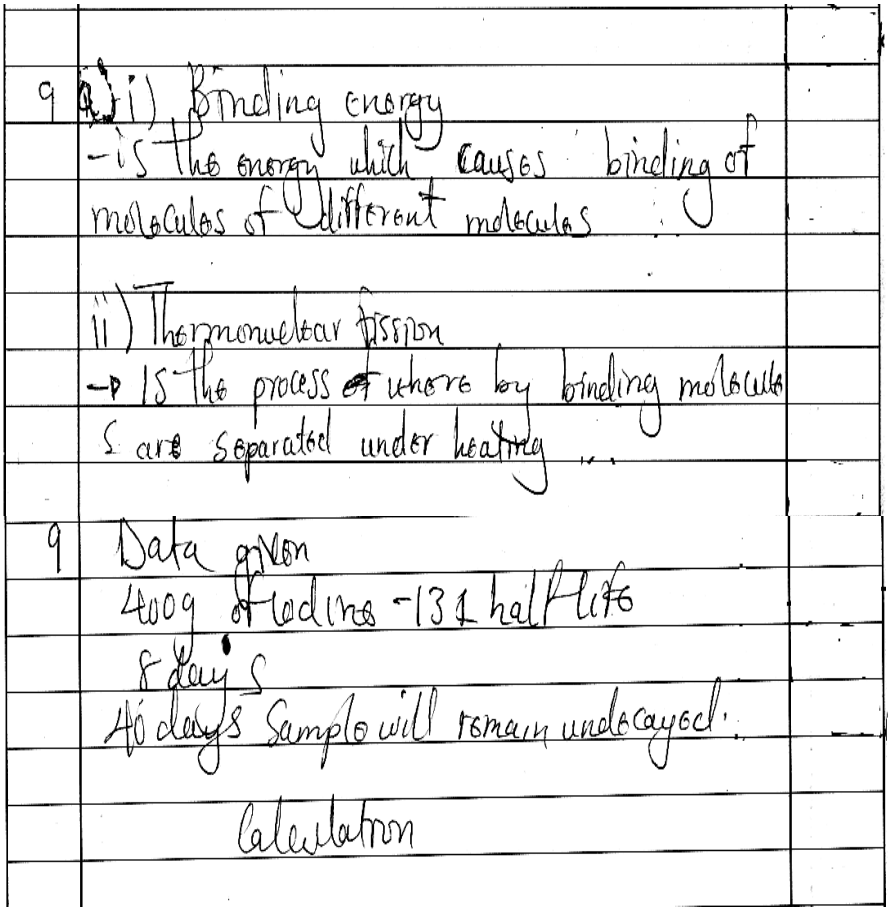
Extract 5.1 (b)



Extract 5.1 (b) shows that the candidate managed to write the composition of the radioactive nucleus during the end of the three stages of disintegration.

Extract 5.2 is a sample answer from the script of one candidate who performed poorly in this question.

Extract 5.2



Extract 5.2 shows how the candidate failed to meet the requirements of the question by providing incorrect definitions and failed to answer other parts of the question.

2.3 SECTION C

2.3.1 Question 10: Electronics

This question required the candidates to (a) (i) define transistor (ii) mention two applications of transistor. Part (b) required them to (i) list down two types of diodes (ii) explain briefly the mode action of a forward bias in a p-n junction. In part (c) they were required to: (i) explain why the given circuit was named as a common-emitter amplifier and (ii) explain the function of capacitor C_1 and C_2.

The question was attempted by 85,900 (73.2%) candidates out of which 49.3% scored 0 mark, 46.2% scored between 0 and 5 marks and 4.5% scored above 5 marks.

Those who scored a 0 mark failed even to list types of diodes. For example one of the candidates listed *"positive diodes"* and *"negative diodes"* as types of diodes instead of *semiconductor diodes*, *metal-semiconductor diode*, *light-emitting diode*, *zener-diode* and *vacuum diode*. Other candidates wrote the function of capacitor C_1 and C_2 as *to produce current* instead of providing d.c isolation at the input and output of the amplifier since the input signal is fed to the base-emitter circuit and the amplified signal is tapped from the collector-emitter circuit. But those who had an average score did not manage to attempt all parts of the question.

Extract 6.1 indicates parts of the work done by the candidate who managed to provide the correct answers and therefore scored all the marks.

Extract 6.1

10.(a) (i) A transistor is a device consisting of sandwitched semiconductor and is used to amplify alternating current or voltage or switching.

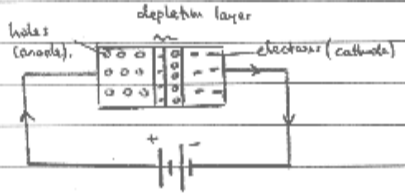
(ii) Application of a transistor

1. Amplification of A.C current or voltage.
2. Switching.

10(b). (i) types of diodes.

1. Semiconductor diode.
2. L.E.D (Light Emitting diode).

10(b) (ii). Forward bias in a p-n junction occurs when the anode (side with holes) is connected to the positive terminal and the cathode (side with electrones) is connected to the negative terminal such that the like chargers repel and diminish the depletion layer. This then reduces the resistance of the p-n diode and so the diode conducts electricity.



10(c) (i) the circuit is common emitter amplifier circuit because the emitter of the transistor is shared by the source and the output. It is an amplifier because the input current is amplified as it passes through the transistor. $\beta = I_B / I_C$

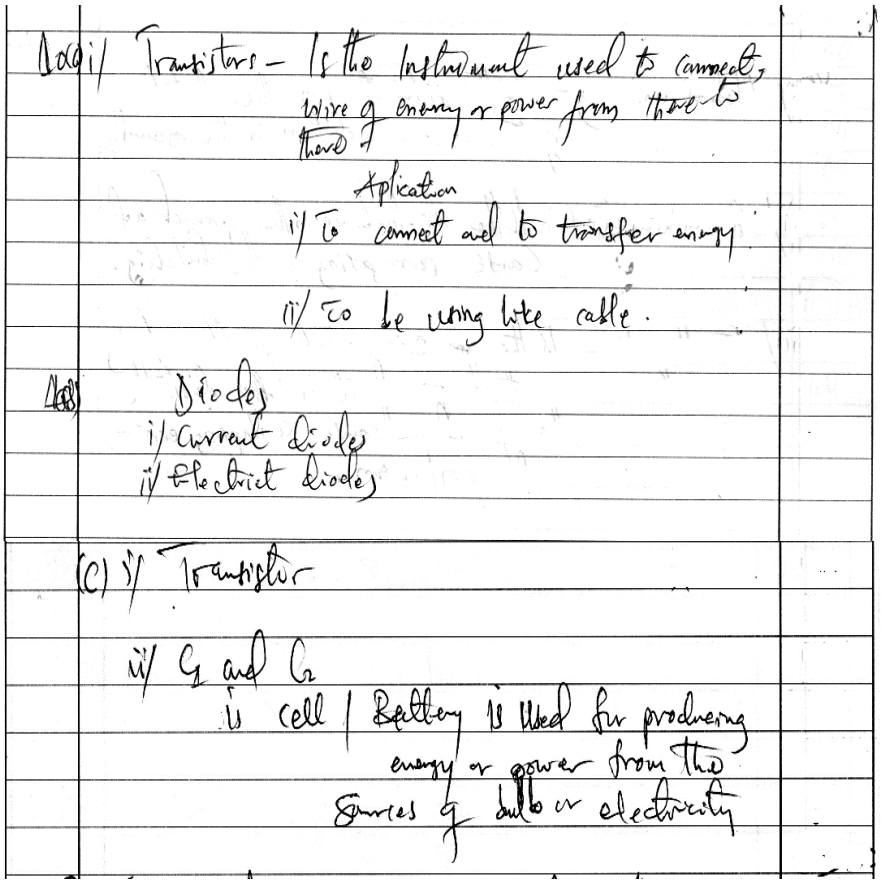
(ii). C_1 - absorbs any dc component from the external circuit which may distort the output. as they get amplified.

C_2 - absorbs any d.c component that managed to pass through C_1 and prevents them from reaching the output.

Extract 6.1 shows a sample answer from one of the candidates who gave the correct answers to part (a) (ii), (b) and (c) of the question but failed to define a transistor properly.

Extract 6.2 is a sample answer from the script of one of the candidates who attempted the question poorly.

Extract 6.2



Extract 6.2 shows a response of the candidate who gave incorrect definition, applications, two types of diode and failed to provide the functions of C_1 and C_2 correctly, hence scored a 0 mark.

2.3.2 Question 11: Pressure

The question required the candidates to (a) state the application of manometer, hygrometer and barometer. Part (b) required the candidates to (i) explain the meaning of siphon (ii) explain with the aid of diagram the principle on which the siphon operates. In part (c) the candidates were required to: (i) explain briefly why a bubble of air increases in volume as it rises from the bottom of a pond to the surface (ii) calculate the depth of the open end below the mercury surface.

A total of 26,033 (22.2%) candidates attempted this question, out of which 51.6% score a 0 mark, 27.4% scored between 0.5 and 5.5 and

0.2% scored from 6 to 8 marks. Only 1 candidate scored 9 out of 10 allocated marks.

The candidates, who scored a 0 mark failed to provide the correct answers to all parts of the questions. They failed to state the application of apparatus in part (a). For example, one of the candidates wrote;

> *"manometer is a substance which used to increase the density of liquid under given pressure* instead of *"manometer is an instrument used to measure gas pressure."*

A candidate who scored 9 out of 10 marks failed to explain just a part of principle on which the siphon operates.

Extract 7.1 is a sample answer from the script of one candidate who had good performance in this question.

Extract 7.1 (a)

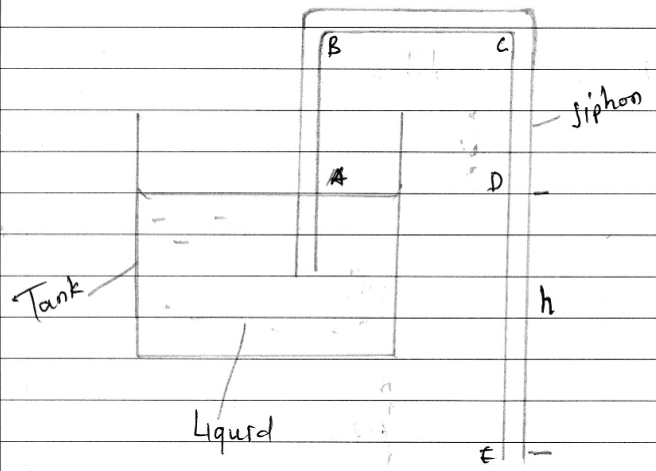
11 a) i) Manometer used in measuring gas pressure.

ii) Hygrometer used in measuring humidity of air.

iii) Barometer used in measuring atmosphere pressure.

11 b) i) Siphon is a tube used principle of atmosphere pressure to drow liquid from one place to another.

11 b) ii)



Extract 7.1 (a) is a sample from the script of one of candidates who managed to give the correct answer to part (a) and part (b) by drawing and showing the application of a siphon.

Extract 7.1 (b)

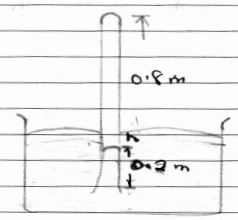
11 b) ii) The pressur at A and D are equal ~~and~~ to atmosphere pressure. The liquid from vessel is drown by pressure due to ρhg at DE for the liquid to be drown the height AB and DC must be to be large that barometre heigh of liquid

11 c) i) The bubbles increases as it rises from bottom of pond because as it rises the pressure is reduced, For from Boyles law

$$V \propto \frac{1}{P}$$

There pore as pressur reduced volume increasing

11 c) ii) Solution



11 c) ii) from boyles law

$P_1 V_1 = P_2 V_2$

$P_1 = 0.76m$

$V_1 = 1m \times A$

$P_2 = 0.76 + h$

$V_2 = 0.8 \times A$

$0.76 \times 1A = 0.8A\,(0.76 + h)$

$0.76 + h = \frac{0.76}{0.8}$

$0.76 + h = 0.95$

$h = 0.95 - 0.76$

$h = 0.19\,m$

length of end of tube below mercury surface $s = 0.19\,m + 0.2\,m$

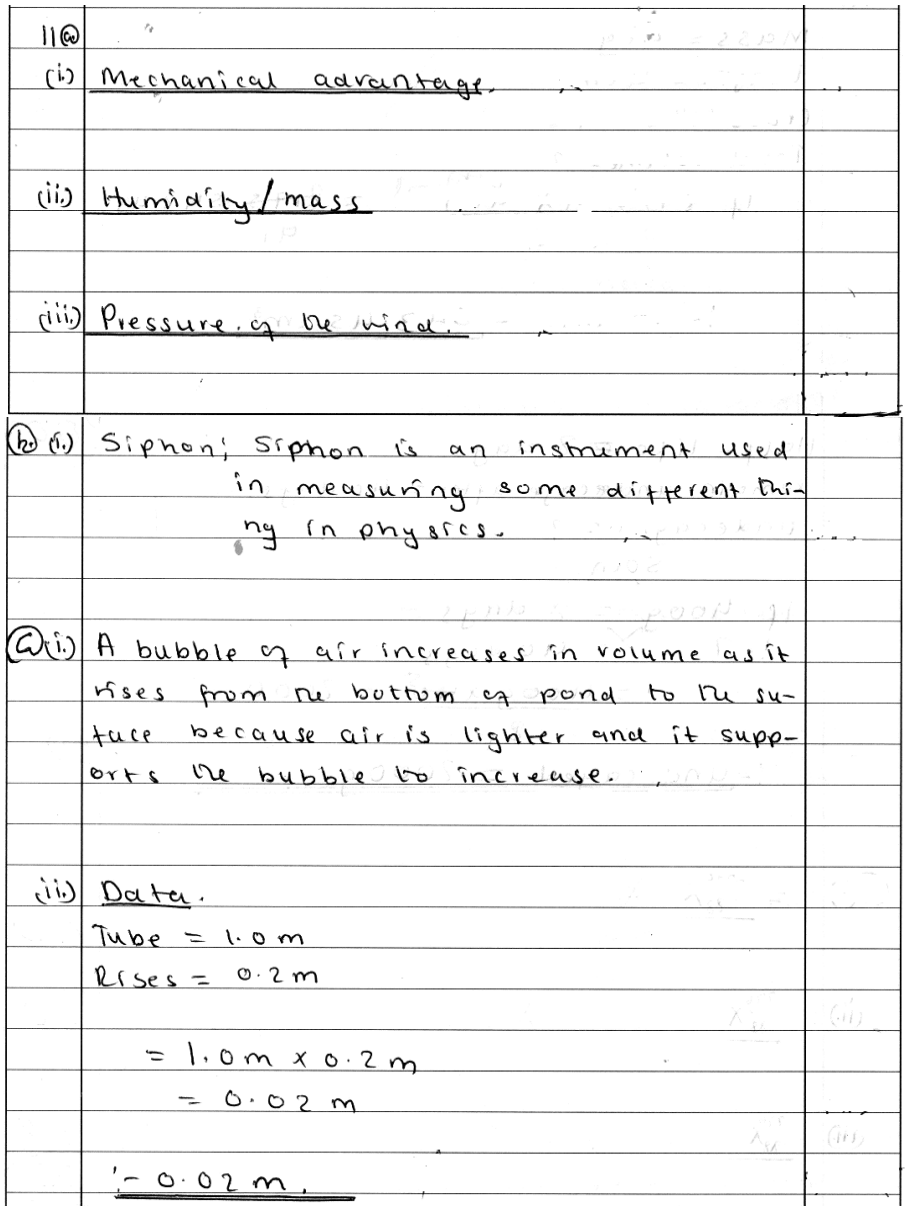
$= 0.39\,m$

∴ The depth of end of tube below the mercury surface is 0.39 m

Extract 7.1 (b) shows that the candidate managed to provide the correct answers to part (b) (ii) and (c) through the use of the correct formula in calculating the depth of open end below the mercury surface.

Extract 7.2 is a sample from the script of one candidate who provided incorrect answers to all parts of the question.

Extract 7.2



Extract 7.2 shows how the candidate failed to meet the requirements of the question by providing incorrect answers and therefore scored a 0 mark.

3.0 CONCLUSION

The analysis of the candidates' performance in this report clearly highlights the problems which the candidates had while doing this examination, these includes poor understanding of the content and the requirement of the questions, of misconception and poor conceptualization of the subject matter. These problems have led to low general performance as compared to last year's examination.

It is expected that the feedback given in this report will enable the stakeholders, students and teachers, to take the necessary measures to improve the candidates' performance in CSEE Physics examinations.

4.0 RECOMMENDATIONS

In order to have good performance in future, it is recommended that:

(a) Candidates should have good preparations for the examinations and they have to carefully read and understand the demands of the questions when doing examinations.

(b) Candidates should concentrate on theories and the subject matter of each topic covered under the syllabus and not to rush to solve questions without sufficient theoretical knowledge.

(c) Physics is related to mathematics subject. So the candidates have to put an emphasis on acquiring mathematical skills, which will enable them to clearly solve physics problems.

(d) Teachers should cover the topics stipulated in the syllabus in time to enable the students to have ample time for making revision.

(e) Teacher should promote the spirit of understanding the subject matter per topic and not the art of working through the questions before conceiving the necessary knowledge required.