

Aga Khan University Examination Board
Notes from E-Marking Centre on SSC I Physics Examination May 2014

Introduction

This document has been produced for the teachers and candidates of SSC Part I (Class IX) Physics. It contains comments on candidates' responses to the 2014 Secondary School Certificate (SSC-I) Examination, indicating the quality of the responses and highlighting their relative strengths and weaknesses.

General Comments

This report includes overall comments on students' performance on every question and *some* specific examples of students' responses which support the mentioned comments. Please note that the descriptive comments represent an overall perception of the better and weaker responses as gathered from the e-marking session. Whereas, the candidates' responses shared in this document represent some specific example(s) of the mentioned comments.

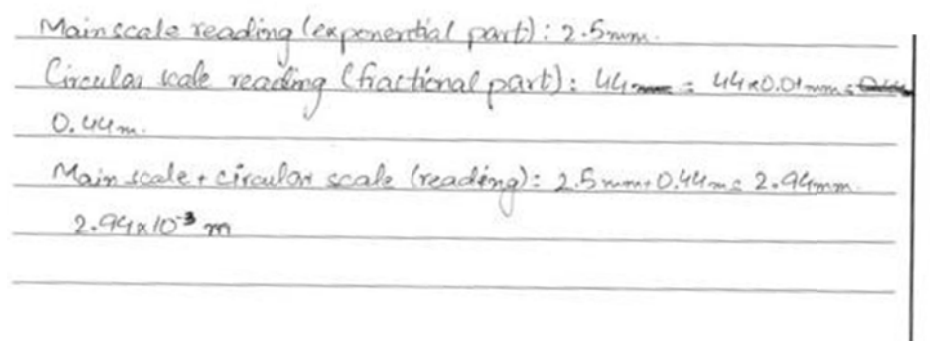
Teachers and candidates should be aware that examiners may ask questions that address the Student Learning Outcomes (SLOs) in a manner that requires candidates to respond by integrating knowledge, understanding and application skills they have developed during studying the course. Candidates are advised to read and comprehend each question carefully before writing the response to fulfil the demand of the question.

Candidates need to be aware that the marks allocated to the questions are related to the answer space provided on the examination paper as a guide to the length of the required response. A longer response will not in itself lead to higher marks. Candidates need to be familiar with the command words in the Student Learning Outcomes which contain terms commonly used in examination questions. However, candidates should also be aware that not all questions will start with or contain one of the command words. Words such as 'how?', 'why?' or 'what?' may also be used.

Question 1:

Better responses correctly found M.S.R, C.S.R, L.C and F.P and also calculated the diameter.

Example:



Weaker responses neither found the M.S.R, C.S.R, L.C and F.P nor were the candidates able to correctly calculate the diameter of the copper wire.

Example:

$v_1 = 45$ Copper wire measured by a screw
 $v_2 = 40$ gauge. The 45 is the value
 $v_1 + v_2$ of v_1 and the 20 is the
 value of v_2 is added and
 85 mm Ans. answer is given below.
 the answer is 85 mm.

Question 2a:

Better responses were able to calculate the correct distance, deceleration and average speed of the whole journey.

Example:

(i) Area of $\Delta = \frac{1}{2} \times b \times h = \frac{1}{2} \times 15 \times 20$ $\frac{1}{2} \times 20 \times 20 = 200$	(iii) Total distance: Area of $\square = s \times b$ Area of $\Delta = \Rightarrow 20 \times 20 = 400$
The distance travelled during first 15 seconds is 150m.	$\frac{1}{2} \times b \times h = \frac{1}{2} \times 20 \times 20 = 200$ $\times 2$ (total dist. = $400 + 200$)
(ii) $(x_1, y_1) = (45, 10)$ and $(x_2, y_2) = (55, 0)$ slope = $\frac{y_2 - y_1}{x_2 - x_1} = \frac{0 - 10}{55 - 45} = \frac{-10}{10} = -1 \text{ m/s}^2$	Avg. Spd = $\frac{\text{Total Dist.} : 750}{\text{Total Time} : 55} = 13.6 \text{ m/s}$

Weaker responses either calculated distance or deceleration.

Example:

i) $v = \frac{d}{t} \Rightarrow d = vt$ $d = 20 \times 15$ $d = 300 \text{ m}$	iii) average speed = $\frac{\text{total distance}}{\text{total time}}$ $= \frac{145 \text{ m}}{55 \text{ s}}$ $= 2.6 \text{ m/s}$
ii) $a = \frac{v_f - v_i}{t} = \frac{0 - 10}{10}$ $= \frac{-10}{10} \therefore a = -1 \text{ m/s}^2$	$= \frac{775 \text{ m}}{145 \text{ s}}$ $= 5.3 \text{ m/s}$

Question 2b:

Better responses found the time in seconds when a paratrooper opened his parachute along with the two correct names of forces applied on it.

Example:

i. After how many seconds does he open his parachute?
After 5 seconds he opened his parachute.

ii. Name the force that pulls the paratrooper down.
Gravitational force pulls the paratrooper down.

iii. Name the force that acts in an upward direction.
Upthrust force is acting in upward direction

Weaker responses were unable to calculate the time in seconds when the paratrooper opened his parachute. They also did not write the correct names of the two required forces.

Example:

i. After how many seconds does he open his parachute?
~~10~~ 5 sec after.

ii. Name the force that pulls the paratrooper down.
Gravitational force & Drag force of pulling.

iii. Name the force that acts in an upward direction.
Gravitational force & weight of the body on Drag force.

PLEASE TURN OVER THE PAGE

Question 3:

Better responses suggested two correct changes to open the door easily and also mentioned the value of angle at which the turning effect will be maximized.

Example:

The two changes that person can make in order to open the door more easily are:

1) Apply more force
2) The distance between the hinge and the point where he applies force should be more.

b. At what angle does the turning effect have maximum value? (1 Mark)
At 90° angle the turning effect has maximum value.

Weaker responses were unable to write the proper answers.

Example:

1) The person can open the door more easily if he ~~is~~ opens it away from the door ^{hinge} near the door knob.
2) He ~~can~~ have to apply less force if he apply force away from the hinge and the door will be opened easily.

b. At what angle does the turning effect have maximum value? (1 Mark)
At 45° angle turning effect have maximum value.

Question 4:

Better responses agreed with the given statement and wrote two conditions of the third law of motion.

Example:

Yes Newton's Law of Gravitation is consistent with Newton's third law of motion. Newton's third law of motion states "To every action there is always an equal but opposite reaction."
Conditions of Third law of Motion are action is equal but the reaction is in opposite direction.

Weaker responses did not agree with the given statement and also failed to provide the relevant conditions.

Example:

No Newton's law of gravitation is not consistent with Newton's third law of motion. Newton's third law of motion conditions are (i) when a body makes an acceleration and covers a distance which is multiplied by 2. (ii) when v_f and v_i both are given along with ^{distance} acceleration. (ii) When v_f , acceleration and distance is given but not ~~the~~ v_i .

Question 5a:

Better responses correctly described the process of power generation and conversion of different forms of energy.

Example:

Ans: - Hydro-electric generation uses water to generate electricity. Water has potential energy, when it moves downward this energy is converted into kinetic energy. This kinetic energy is used to turn a turbine. Water moving with more kinetic energy exerts pressure and turns a turbine, which is connected to a generator. The generator generates power giving off heat and sound energy.

Weaker responses showcased that candidates gave irrelevant details regarding conversion of different forms of energy. They were also unable to explain the process of power generation. Moreover, some of the candidates have digressed from the main thing asked in the question instead they wrote uses and effects of the process of generating electricity.

Example:

Hydroelectrical power generators are form to give light. The hydroelectric are convert in electrical energy which is most important for us elect is used in homes are every where. It is a proces uper reservoirs, water pipe then turbines and go lower.

Question 5b:

Better responses, stated the three correct disadvantages of hydroelectric power generation.

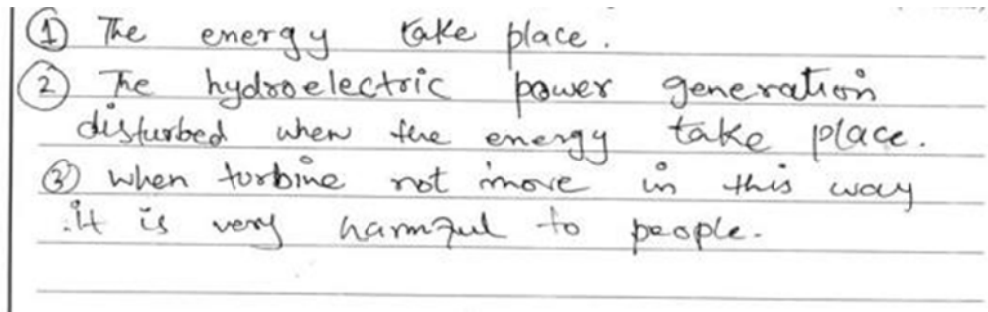
Example:

Three disadvantages of hydroelectric power generation are:

1. Destruction of plants and animals habitat for setting hydroelectric power generation.
2. If the water of hydroelectric power generation over flows it causes floods.
3. Expensive to set up and turbine causes noise pollution.

Weaker responses, indicated that the candidates wrote incorrect disadvantages of hydroelectric power generation.

Example:

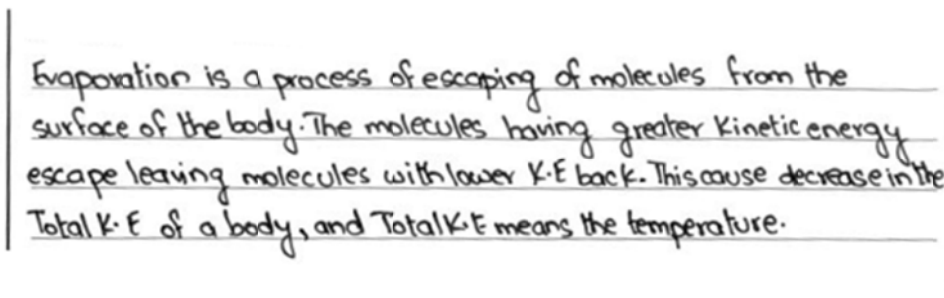


① The energy take place.
② The hydroelectric power generation disturbed when the energy take place.
③ when turbine not move in this way .it is very harmful to people.

Question 6a:

Better responses indicated the correct reason and also used the correct terms regarding decrease in kinetic energy and decrease in body temperature in order to support their reasons and to substantiate their answers.

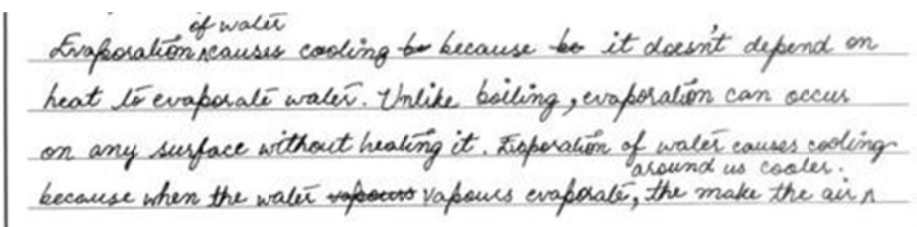
Example:



Evaporation is a process of escaping of molecules from the surface of the body. The molecules having greater Kinetic energy escape leaving molecules with lower K-E back. This cause decrease in the Total K-E of a body, and Total K-E means the temperature.

Weaker responses only mentioned the definition of evaporation.

Example:



Evaporation ^{of water} causes cooling ~~to~~ because ~~to~~ it doesn't depend on heat to evaporate water. Unlike boiling, evaporation can occur on any surface without heating it. Evaporation of water causes cooling around us cooler. because when the water ~~apocess~~ vapours evaporate, the make the air

Question 6b:

Better responses, correctly gave the correct reason of why conduction and convection are not involved in the transfer of heat from the Sun to the Earth i.e. as there is no medium between the sun and the earth.

Example:

Conduction and convection ^{are} not involved in the transfer of heat from the sun to the Earth because ^{both} of them requires a molecular medium but radiation does not ^{need} any molecular medium. Radiation is the process from which sun's rays reaches us through electromagnetic ^{waves}.

Weaker responses indicated that the candidates did not understand this concept correctly and failed to provide the reasoning behind it.

Example:

because heat is given by the sun. conduction and convection are not given heat from the sun to the earth. so conduction and convection not involved in the transfer of heat.

Question 7a:

Better responses, correctly derived the Newton's second equation of motion by showing all possible mathematical steps of derivation.

Example:

Consider a body of mass "m" moving with initial velocity " v_i " with some acceleration " a " for a period of time " t ". The distance covered by the body at this time is " S ". We know that:

$$S = v_{av} \times t \quad \therefore v_{av} = \frac{v_f + v_i}{2}$$

Put the value of v_{av} in eq

$$S = \frac{v_f + v_i}{2} \times t \quad \therefore v_f = v_i + at$$

Put the ² value of v_f in eq

$$S = \frac{v_i + at + v_i}{2} \times t$$
$$S = \frac{2v_i + at}{2} \times t \quad \therefore S = \frac{2v_i t}{2} + \frac{at^2}{2}$$
$$S = v_i t + \frac{1}{2} at^2$$

Weaker responses indicated only one or two mathematical steps of derivation.

Example:

(a)
$$s = v_i t + \frac{1}{2} a t^2$$

Consider an object moving with initial velocity ' v_i ' after covering some distance ' s ' in time ' t ', the body attains its final velocity ' v_f ', with acceleration ' a '. The second equation of motion can be derived as:-

Thus
$$v_{av} = \frac{v_f + v_i}{2}$$

As because the equation is free from v_f therefore $v_f = v_i + at$

$$= v_i + at + \frac{v_i}{2}$$
$$s = 2v_i t + \frac{1}{2} a t^2 \quad \left(\text{This is known as the second equation of motion} \right)$$

Question 7b:

Better responses mentioned the right reason of why balloons remain suspended in the air. They also correctly mentioned the names of forces which are responsible for it.

Example:

The balloons remain suspended in air due to the convection currents. The hot air that rises up from land produces these currents. The hot, less dense air which was moving up is collected in a balloon and enable it to be in air. There are even heat supplier in the balloons which keep the air hot and dense and prevents from falling. The two forces acting on balloons are gravitational force that is acting downward and air resistance that is acting upward. Both these forces are equal and cancel out their effect therefore the net force acting on body is 0. If there is no net force acting on it, then the body is said to be in equilibrium. This equilibrium helps the balloons to be suspended in air also.

Weaker responses indicated that candidates mentioned irrelevant forces e.g. centripetal force, frictional force as the reason why balloons remain suspended in the air. Candidates were confused and unable to describe that hot air rises and that is why balloons remain suspended in the air and also relate it to the concept of weight which is equal to the up thrust.

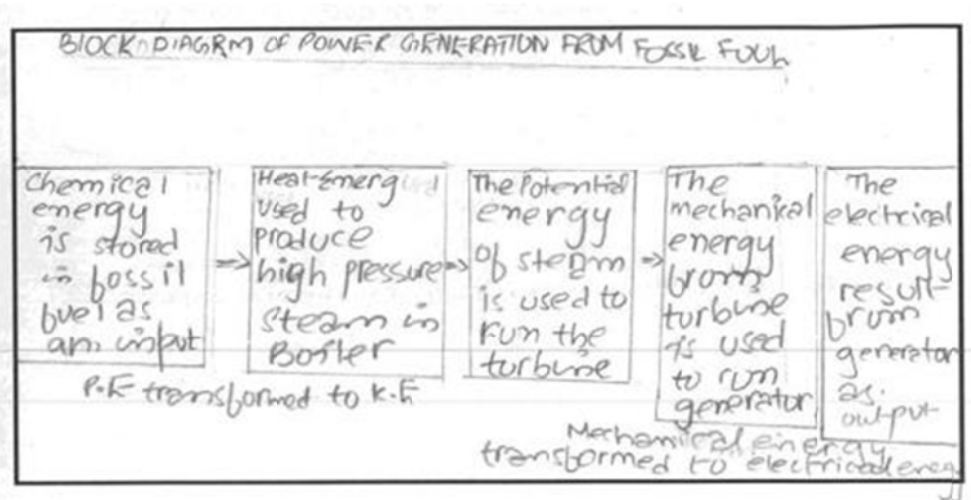
Example:

(b). because the balloons remain suspended
 our air. There are two force: Centripital force
 and gravitation. The Centripital force are
 keeps of unit per time of a force.
 The balloons are suspended in the air
 The balloons is given the gas in fill they
 fill are not then balloons is not a
 suspended air. when the air is lose to
 the balloons are downwards and down the
 direction. There are the 10mm is a long
 travelling in the balloons. The air pressure
 is outside to the balloons be a outside
 They are the mean position is and.
 The Statement of balloon in the air.

Question 8a:


Better responses, clearly and completely described the process of power generation from fossil fuel with the help of block diagram. They also managed to give the conversion and name of different forms of energy.

Example:



Weaker responses while correctly described the process but were unable to draw a block diagram as per the demands of the question.

Example:



chemical energy is stored in the fossil fuel like coal, natural gas, mineral etc and chemical energy is converted in kinetic energy or potential energy, light then potential and kinetic energy are used to generate energy and from heat energy chemical energy is converted into electrical energy which is then converted into sound, light, wave etc energies and these energies also contain kinetic and potential energy.

Question 8b:

Better responses, explained vividly the reason, based on kinetic molecular theory i.e. gases exert greater pressure due to the number of molecules increased or increase of collision between them.

Example:

When gases are squeezed into smaller space they exert greater pressure. Pressure depends upon the contact area which is inversely proportional. If the contact area would be more, less pressure will be exerted whereas, if there will be large surface & contact area so the greater the pressure will be exerted. The particles of gas are in continuous random motion, moving vigorously and possess more kinetic energy, so the particles strike to the walls of the container and exert more pressure. Into a smaller space, particles will strike more fastly as the space is less and they are energetic.

Weaker responses gave irrelevant explanation i.e. gases exert greater pressure when they are squeezed into smaller space.

Example:

The pressure in a pressure cooker is a limited space pressure cooking is very faster and high speed any dish any 40 15 mins ^{only} will completely ready ^{for dish} with the help of pressure cooker. "pressure cooker" include a signal and the volume sound name etc because dish ready speak signal. Next pressure is a size a small inside not a large "pressure cooker" in a metal more gases add up in the "pressure cooker" dish for ready "pressure cooker" surface hole up the cap included dish ready cap up ^{moves} word is gas a easy free to move gas every pressure.

Question 9a:

Better responses indicated the correct reason with respect to kinetic energy, temperature, collision and velocity.

Example:

Temperature is basically the degree of hotness or coldness of a body. It is basically the average kinetic energy of the body. Therefore, if we will provide heat or thermal energy to a body so, ultimately there will be a rise in its average kinetic energy. At first the particles of the body were in a slow and constant motion but, as we increased their temperature by increasing the amount of heat so, the particles started vibrating more vigorously, colliding with one another consistently at high motion. This increases the kinetic energy and produces heat energy. As a result, the average kinetic energy rises. Therefore, rise in temperature of a body means an increase in its internal energy.

Weaker responses were unable to explain the concept with respect to kinetic energy or collision.

Example:

* Living body very fastly absorb heat. Because body had its mean mostly peoples hair colour is black so, heat & fire very quickly attract for black colour. Suppose your dress colour is black & you covered this dress after some time you feel very hot & you feel very hot surrounding.
OK Your face turn over the sun so, you feel very hot because your body absorb infrared energy & you want to drink water & you want to very cold surrounding.
but sunlight energy is very hot but it is very good this heat enter your body & melt the fat & fat change the the form of water. & it show your skin.
This fat water is very cheap & leaked by smell.

Question 9b:

Better responses provided the correct explanation by giving the correct reason i.e. walls are filled with fibre glass and lined with crinkled aluminium.

Example:

The walls of the refrigerator are filled with fiber glass because fiber glass is a good insulator of heat and in order to prevent the outer ^{heat} heat to enter in the refrigerator the fiber glass covering is made. As well as the walls are of the refrigerator are lined with crinkled aluminium because through this radiation could be prevented as crinkled aluminium has a shiny lustre (look) therefore it reflects the radiation of heat as well as it is a bad absorber of heat so it does not absorb the heat and maintain the cooling inside the refrigerator letting the outside ^{supports to} heat (radiation) stay out.

The reason why both these methods (filling wall with fiber glass & lining with crinkled aluminium) were used is to keep the hotness out of the refrigerator by preventing conduction & radiation (methods of transfer of heat) and keeping the hotness out so the coolness in refrigerator could be maintained.

Weaker responses highlighted the properties of fibre glass and aluminium instead.

Example:

The walls of a refrigerator are filled with fibre glass because it is viable. The walls of a refrigerator are lined with crinkled aluminium because it has a low freezing point, high boiling point, small specific heat capacity and it would not wet the walls of the refrigerator.