

Aga Khan University Examination Board
Notes from E-Marking Centre on SSC Part II Physics Examination May 2016

Introduction

This document has been produced for the teachers and candidates of SSC Part II (Class X) Physics. It contains comments on candidates' responses to the 2016 Secondary School Certificate (SSC-II) Examination, indicating the quality of the responses and highlighting their relative strengths and weaknesses.

E-Marking Notes

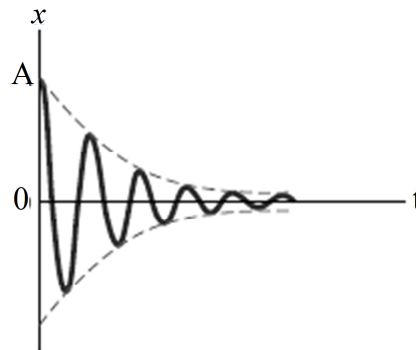
This includes overall comments on candidates' performance on every question and some specific examples of candidates' responses which support the mentioned comments. Please note that the descriptive comments represent an overall perception of the better and weaker responses as gathered from the e-marking session. However, 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 the course of study. 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

A graph of displacement versus time for an oscillatory system is shown below.



- State the type of oscillatory system shown in the graph.
- What does the graph suggest?
- Write the reason of the phenomenon shown in the graph by mentioning TWO points.

Better responses correctly stated the type of oscillatory system shown in the graph, i.e. damped system. In the second part, candidates correctly suggested that the graph shows decrease in amplitude with time/ decrease in distance/ displacement with time. In the third part, candidates wrote the correct reason for the phenomenon shown in the graph by mentioning that in all real mechanical systems, forces of friction retard the motion, so the systems do not oscillate indefinitely/ the friction reduces the mechanical energy of the system as time passes, and the motion is said to be damped/ air resistance decreases the amplitude of a vibrating body.

Example:

a.

Damped oscillation.

b.

It suggests that the amplitude of the waves decrease over the time passes.

c.

- Resistive force, force of friction will opposes the motion of the body. due to that it'll have finite vibrations.
- Due to friction the mechanical energy of the system reduces therefore, it will have definite vibrations, reduce the amplitude.

Weaker responses either failed in stating the type of oscillatory system shown in the graph or were unable to write the correct reason of the phenomenon shown in the graph by mentioning all the given points. Most of the candidates wrote transverse/ longitudinal wave while stating the type of oscillatory system. In second part of the question, some of the candidates wrote that when the frequency is decreasing step by step, then time is also decreasing and at the end, time becomes zero. In a few responses, candidates wrote that higher frequency leads to higher pitch of sound, and when the eardrums vibrate rigorously, sound will be better and louder.

Example:

a.	The graph is showing transverse waves, which is a type of simple harmonic motion.
b.	It suggests the the displacement of the object is lessening as the time goes on.
c.	This phenomenon is caused by vibratory periodic motion of the object. And also caused by restoring force, acceleration and displace displacement of the object.

Question 2

State laws of refraction.

Better responses correctly stated the laws of refraction by mentioning the given points.

- i. The incident ray, the refracted ray and the normal at the point of incidence, all lie in the same plane.
- ii. When a ray of light passes from one particular medium to another, the ratio of the sine of the angle of incidence to sine of the angle of refraction is constant. This constant ratio is called the refractive index.

Example:

1. The incident ray, the normal and the refracted ray at the point of incidence all lie in the same plane.

2. The ratio of the sine of angle of incidence to the sine of angle of refraction is always equal to constant. i.e. $n = \frac{\sin i}{\sin r}$

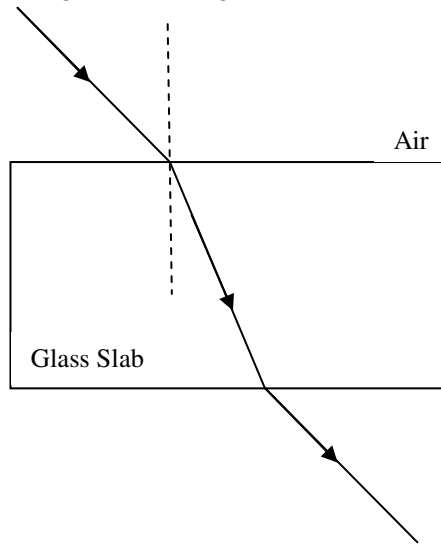
Weaker responses failed to state the laws of refraction and wrote about the definition of reflection and refraction. Some of the candidates wrote only the ratio of the sine of the angle of incidence to sine of the angle of refraction. In few responses, candidates described the passage of light through a glass slab.

Example:

Ans) If a ray of light is refracted to a glass slab and the refracted ray bends towards the normal ray and the angle of incidence is greater than the angle of refraction is called laws of refraction.

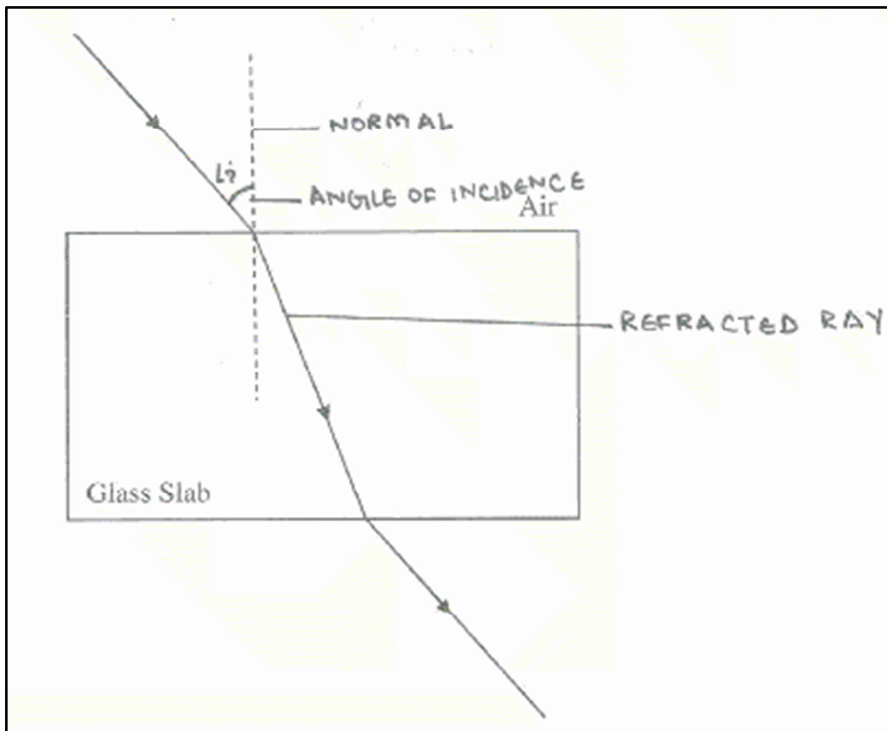
Question 3

Label the given diagram by putting (normal, angle of incidence and refracted ray) in appropriate positions.



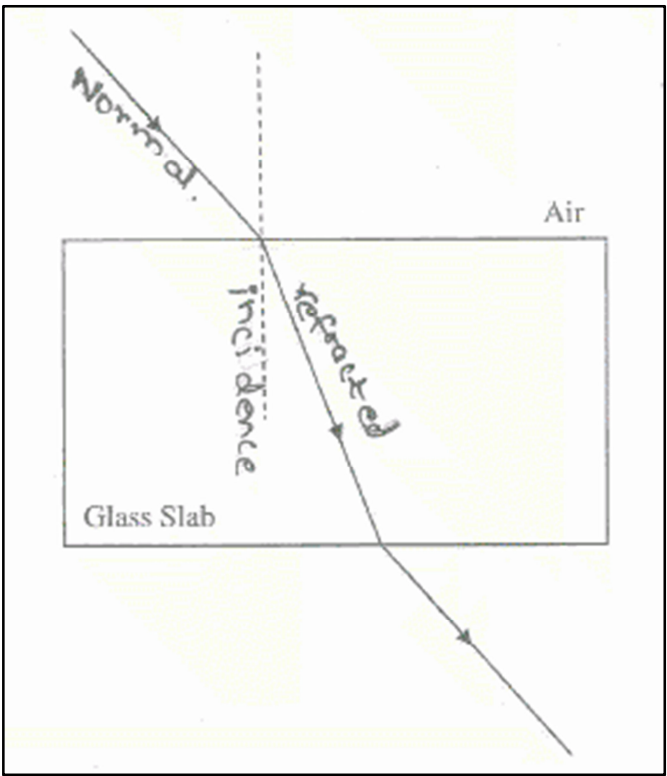
Better responses correctly labelled the diagram by putting normal, angle of incidence and refracted ray in appropriate positions.

Example:



Weaker responses were confused in labelling normal, angle of incidence and refracted ray. Some of the responses labelled normal at the incidence ray, angle of incidence at the normal position and refracted ray which is incorrect. Moreover, in few responses, candidates mentioned emergent ray, angle of refraction and rare and denser medium in the diagram.

Example:



Question 4

Two different capacitors of capacitance $6 \mu\text{F}$ and $12 \mu\text{F}$ are connected in series combination. If a battery of 12 V is connected with the circuit, then find the equivalent capacitance of the combination. Also draw a circuit diagram of this combination.

Better responses correctly found the equivalent capacitance of the combination and also drew a circuit diagram of this combination. Candidates wrote the correct formula of equivalent capacitance

$$\frac{1}{C_E} = \frac{1}{C_1} + \frac{1}{C_2}, \text{ and calculated the correct answer } C_E = 4 \mu\text{F (OR)} 4 \times 10^{-6} \text{ F.}$$

Example:

Data:- $C_1 = 6 \mu\text{F}$, $C_2 = 12 \mu\text{F}$, $V = 12\text{V}$, type: series

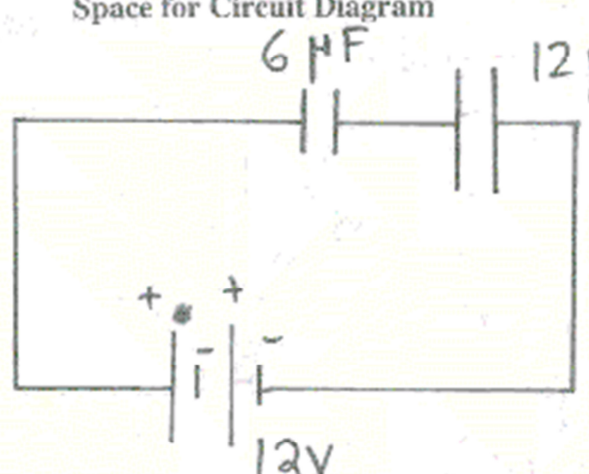
Solution:- $\frac{1}{C_{eq}} = \frac{1}{C_1} + \frac{1}{C_2}$ | $\frac{1}{C_{eq}} = \frac{3}{12}$

$\frac{1}{C_{eq}} = \frac{1}{6} + \frac{1}{12}$ | $\frac{1}{C_{eq}} = \frac{1}{4}$

$\therefore C_{eq} = 4 \mu\text{F}$

~~Result:-~~ Result:- Equivalent capacitance is $4 \mu\text{F}$.

Space for Circuit Diagram



The circuit diagram shows a rectangular loop. At the bottom, there is a battery labeled '12V' with a '+' sign on the left and a '-' sign on the right. At the top, there are two capacitors connected in series. The left capacitor is labeled '6 μF' and the right capacitor is labeled '12 μF'. To the right of the circuit, there is a box containing the text 'Ceq = 4 μF'.

Weaker responses failed to find the equivalent capacitance of the combination and also drew an incorrect circuit diagram. Candidates added up both the capacitance of the capacitors and multiply it with voltage of the battery. Most of the candidates joined batteries in place of capacitors which showed that they were confused between the symbols of capacitors and batteries. In few responses, candidates joined the capacitors in parallel combination.

Example:

$V(C_1 + C_2)$	Volt = 12
$12(6 + 12)$	Capacitance of 1st capacitor = $6\mu F$
$72 + 144$	Capacitance of 2nd capacitor = $12\mu F$
$216 \text{ V}\mu F \text{ Answer}$	

Space for Circuit Diagram

$6\mu F$

C_1

$12\mu F$

C_2

Question 5

According to the safety measures, arrange the given points so that a fuse can protect an electrical circuit.

- fuse wire heats up
- circuit is broken so current stops
- current becomes too high

Better responses correctly arrange the points as per the safety measures. Like,

- Current becomes too high
- Fuse wire heats up
- Circuit is broken so current stops

Example:

1. Current becomes too high.
2. Fuse wire heats up.
3. Circuit is broken so current stops.

Weaker responses showed lack of understanding about the topic. Most of the candidates jumbled up the sequence/ arrangement of safety measures that a fuse can protect an electrical circuit. A sample of wrong order is given below.

Example:

1. circuit is broken so current stops
2. current becomes too high
3. fuse wire heat up.

Question 6

State TWO conditions that must be fulfilled for a charge to experience magnetic force when it is placed in a magnetic field and state how the magnetic force could be varied.

Better responses correctly stated the two conditions that must be fulfilled for a charge to experience magnetic force. Such candidates also stated that the magnetic force depends upon the size of the charge q and the magnitude of the magnetic field B . Some of the examples of the candidates' responses who got full marks are as under:

- Current should flow in the conductor.
- The conductor/ charges should be perpendicular.
- By changing the amount of current/ number of coils/ strength of magnet.
- The charge must be moving, because no magnetic force acts on a stationary charge.
- The velocity of the moving charge must have a component that is perpendicular to the direction of the magnetic field.

Example:

(i) Charge should be perpendicular to magnetic field line, so that it could experience more magnetic force.

(ii) It should be supported with axle, so that they could easily rotate. wherever the magnetic force would be maximum they'll experience a ^{more force.}

(i) By increasing the current (ii) by increasing the number of turns (iii) by using more strengthen permanent magnet. Magnetic force could be varied.

Weaker responses were unable to provide the two conditions that must be fulfilled for a charge to experience magnetic force. Most of the candidates wrote about the phenomenon of magnetism and electromagnetism in electric motor and electric generator. In few responses, candidates wrote the definition of magnetic force and magnetic field.

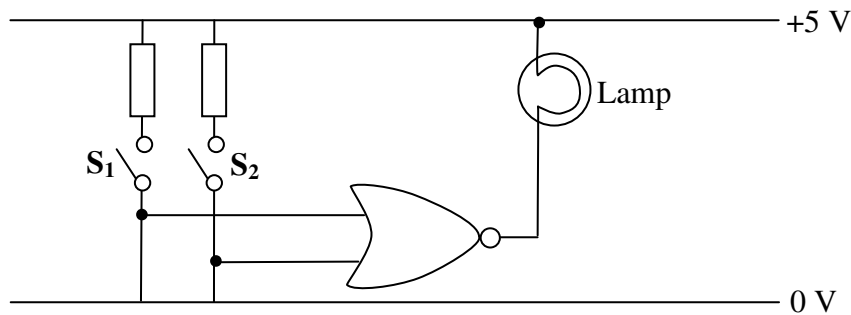
Example:

* When the magnetic force is positive and the charge is positive the charge is repelled. because like charges should repel each other.

* When the magnetic force is positive and the charge particle is negative. they can attract because unlike charges should attract each other.

Question 7

The given diagram shows a logic gate connected in a circuit.



a. Make a truth table for the above logic gate.

S ₁	S ₂	Output

b. How would the switches S₁ and S₂ light the lamp?

Better responses correctly made the truth table for the logic gate connected in a circuit like the one given below. They also explained how switches S_1 and S_2 can light up the lamp by writing that when both switches S_1 and S_2 are at open/ off/ low position, then the output will be '1'; this will light up the lamp.

Example:

a.

S_1	S_2	Output
0	0	1
0	1	0
1	0	0
1	1	0

b.

Switches S_1 and S_2 are open so these switches should be closed to light the lamp

Weaker responses incorrectly made the truth table for the logic gate connected in a circuit. Most of the candidates wrongly put the binary number in the truth table as under.

S_1	S_2	Output
0	0	0
0	1	1
1	0	1
1	1	1

S_1	S_2	Output
0	0	0
0	1	0
1	0	0
1	1	1

S_1	S_2	Output
0	0	0
0	1	0
1	0	0
1	1	0

S_1	S_2	Output
0	0	1
0	1	1
1	0	1
1	1	1

Some of the candidates wrote that if one or any one switch is at off/ low/ open position, then this will light up the lamp.

Example:

a.

S_1	S_2	Output
0	0	0
0	1	1
1	0	1
1	1	1

b.

If any one of the switch^{is close} or both of the switches are closed they will light the lamp.

Question 8

If the half-life of Krypton is 3.16 minutes, then how many grams of Krypton out of 100 grams will remain disintegrated after 9.48 minutes.

Better responses correctly calculated the half-lives and mass of Krypton after first, second and third life 50 grams, 25 grams and 12.5 grams respectively. Some of the important steps of this numerical mentioned by the candidates are given below.

$$\text{Number of half-lives in 9.48 minutes} = 9.48 / 3.16 = 3 \text{ T}$$

$$\text{After first half-life the amount of Krypton} = \frac{100}{2} = 50 \text{ g}$$

$$\text{After second half-life} = \frac{50}{2} = 25 \text{ g}$$

$$\text{After third half-life} = \frac{25}{2} = 12.5 \text{ g}$$

Example:

half life:- 3.16min $N_0 = 100\text{g}$ time passed:- 9.48min

$$\frac{9.48}{3.16} = 3 \text{ half lives}$$
$$N = N_0 \frac{1}{2^T}$$
$$N = 100 \times \frac{1}{2^3}$$
$$N = \frac{100}{8}$$
$$N = 12.5$$

After 9.48 minutes 12.5g of Krypton has disintegrated.

Weaker responses failed to calculate the half-lives and mass of Krypton correctly. Most of candidates just copy-paste the data given in the question. Some of the responses correctly calculated the half-lives but were unable to find the correct mass of Krypton. They only divided 100 grams of Krypton by 3 half-lives and wrote their final answer, like the one below.

Example:

Half life of krypton = 3.26 minutes
amount of krypton = 100 gram
disintegrated time = 9.48 minutes
amount of Krypton after disintegrated time = ?
$\frac{9.48}{3.26} = 3$
$\frac{100}{3} = 33.3$
33.3 grams of krypton will be remain after disintegration

Extended Response Questions (ERQs)

These questions offered a choice between part **a** and **b**

Question 9a

How are mechanical and electromagnetic waves different from each other? Describe in FIVE points.

Better responses correctly differentiated between mechanical and electromagnetic waves in five points. Some of the important differences described by the candidates in their answers are given below.

Mechanical waves:

- They have low speed.
- These waves display particle-like behaviour.
- Examples are water waves/ sound waves.
- They can be longitudinal/ transverse waves.
- Mechanical waves need a material medium for their propagation.
- The energy of the mechanical waves depends on the amplitude of the wave.
- These waves are produced due to the vibrations of the particles of the medium.

Electromagnetic waves:

- They have high speed.
- They are only transverse waves.
- Examples are X-rays/ radio waves.
- These waves do not display particle-like behaviour.
- They occur due to change in electric and magnetic fields.
- The energy of the electromagnetic waves depends only on the frequency.
- Electromagnetic waves do not need any material medium for their propagation.

Example:

Mechanical Waves	Electromagnetic waves
1. These waves need a medium to travel from one place to another.	These waves do not require a medium to travel from one place to another.
2. Energy carried by a mechanical wave depends upon its amplitude.	Energy carried by an electromagnetic wave depends upon its frequency.
3. These waves are relatively slower.	These waves travel at the fastest possible speed i.e 3×10^8 m/s.
4. Mechanical waves are of two types i) longitudinal ii) transverse.	Electromagnetic waves do not have any types.
5. Examples include: Sound waves etc.	Examples include: Light waves, X rays, gamma rays UV rays etc.

Weaker responses were unable to differentiate mechanical and electromagnetic waves in complete five points. Most of the candidates wrote the differences between longitudinal and transverse waves. Some of the responses mixed up the difference between the mechanical and electromagnetic waves and discussed the transfer of energy in their answers. In some responses, candidates wrote the definition of mechanical and electromagnetic waves.

Example:

- Ans) ①) the mechanical waves are those which transfer energy from one place to another. like sound wave, water waves etc.
- ②) Electromagnetic waves are those which carries free electrons when electrons passing through a conductor, then the magnetic fields occur that's called Electromagnetic waves.
- ③) Mechanical waves are those which varies energy automatically.
- ④) Electromagnetic waves ~~was~~ carries ~~out~~ ~~to~~ ~~etc~~ electromagnetic fields.

Question 9b

Acoustics is the study of waves, vibrations and sound. Acoustic protection is the application of soft and porous material to protect individuals against undesirable sounds and noises.

Describe any FIVE points to highlight the significance of acoustic protection.

Better responses correctly described the significance of acoustic protection in five points. Some of the important significances described by the candidates in their answers are given below:

- Acoustic protection is employed not only for physical health, but for psychological well-being as well.
- A student's performance, employees' productivity, and an individual's sleep/ rest are all affected by surrounding noise and sounds.
- Animals and birds also express discomfort due to higher noise and sound levels.
- Acoustic protection is also necessary to minimise stress levels generated due to high level of noise.
- Acoustic protection may also be required to protect structures against vibrations generated by objects such as trains/ earthquakes and noise generated during construction and development activities.

Example:

Acoustic protection is very significant for human health. Especially humans living in a crowded or a noisy place or near airport.

Noise is actually an undesirable sound that is unpleasant to our ears and may lead to damage to ears. For eg: hear loss.

Acoustic protection helps to overcome these problems by absorbing noise. This protection the noises get absorbed and are not reflected back.

- 1- The person doesn't get any hear loss.
- 2- Any problems such as hypertension, hearing damage, increased heart rate. does not occur.
3. People living near airport get annoyed of the noises but after the protection, it is much safer.
4. Acoustic protection helps us from getting any injury.
5. The pilots of helicopter, ^{or airplanes} have their helmets specially designed to reduce the sound of roaring engine to a quite hum.

Weaker responses failed to describe the significance of acoustic protection in all five points. Some of responses explained the hazards of noise pollution and properties of sound waves, like, reflection, refraction, absorption of sound, sound intensity and speed of sound. Most of the candidates attempted part (a) of this question and very few attempted this part.

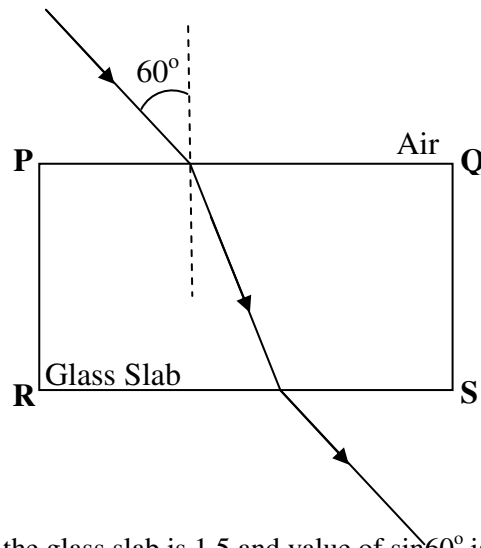
Example:

Significance of acoustic protection .

- Soft porous materials can absorb undesirable sound.
- They can reduce the sound for eg if some one's living in commercial area, he can use porous material such as draperies, carpets, ^{rugs, curtains} to absorb the unwanted sounds.
- They are use to keep hearing skills healthy and can have healthy life by using acoustic protection.
- Houses are usually made with hollow brick so sound can be absorbed in the vacuum.
- Many people working in heavy industries use acoustic sound protection to keep themselves safe. also the pilots of fighter planes so that their hearing skills remains healthy and are not affected by loud sounds of engines.

Question 10a

The given diagram shows a glass slab **PQRS**. A ray of light incident on the side **PQ** of the glass slab is making an angle of 60° .



If the refractive index of the glass slab is 1.5 and value of $\sin 60^\circ$ is 0.866, then calculate the angle of refraction and sine of critical angle ($\sin \angle C$) for the given glass slab.

(Where $\sin^{-1}(0.577) = 35.2^\circ$)

Better responses correctly calculated the angle of refraction and sine of critical angle ($\sin \angle C$) for the given glass slab by showing the following important steps in their answers.

$$\text{Refractive index of the glass} = \frac{\sin \angle i}{\sin \angle r}$$

$$\sin \angle r = 0.577$$

$$\text{Angle of refraction} = 35.2^\circ$$

$$\sin \angle C = \frac{1}{n}$$

$$\sin \angle C = 0.666$$

Example:

Data:- $\angle i = 60^\circ$, $\eta = 1.5$, $\angle r = ?$, $\sin \angle c = ?$

$$\eta = \frac{\sin \angle i}{\sin \angle r}$$

$$1.5 = \frac{\sin 60^\circ}{\sin \angle r}$$

$$1.5 = \frac{0.866}{\sin \angle r}$$

$$\sin \angle r = \frac{0.866}{1.5}$$

$$\sin \angle r = 0.577$$

$$\angle r = \frac{0.577}{\sin}$$

$$\angle r = \sin^{-1}(0.577)$$

$$\text{since } \sin^{-1}(0.577) = 35.2^\circ$$

$$\therefore \angle r = 35.2^\circ$$

Result: Angle of refraction is 35.2° .

Now finding sin of critical angle :-

we know that sin of critical angle is the reciprocal of the refractive index of the given medium;

$$\therefore \eta = \frac{1}{\sin \angle c}$$

$$1.5 = \frac{1}{\sin \angle c}$$

$$\sin \angle c = \frac{1}{1.5}$$

$$\sin \angle c = 0.66$$

Result :- sin of $\angle c$ is 0.666.

Weaker responses failed to calculate the angle of refraction and sine of critical angle ($\sin \angle C$) for the given glass slab. Some of the candidates wrote wrong formula of refractive index of glass, i.e. $\frac{\sin \angle i}{\sin \angle r}$ and, therefore, were unable to calculate the angle of refraction. Some responses calculated the correct value of angle of refraction but failed to get the correct value of sine of critical angle ($\sin \angle C$).

Example:

a) Data

$\sin \angle r = 0.866$

$\sin \angle i = 0.577$

glass slab = 1.5

Formula = $\frac{\sin \angle r}{\sin \angle i}$

$= \frac{0.866}{0.577}$

$= 1.5008^{\circ}$

Question 10b

An object is placed at a distance of 12 cm from a convex lens of focal length 8 cm. Find the position and state the nature of image.

(Note: Extract data from the given question and provide your answer in SI unit.)

Better responses correctly found the position and stated the nature of image by writing the correct data, lens formula $\frac{1}{f} = \frac{1}{p} + \frac{1}{q}$, answer with unit $q = 24$ cm and nature of image formed, i.e. real and inverted.

Example:

Sol:-

$$\frac{1}{8\text{cm}} - \frac{1}{12\text{cm}} = \frac{1}{q}$$
$$\frac{3-2}{24} \Rightarrow \frac{1}{24} = \frac{1}{q}$$

$24\text{cm} = q = \text{position of the image.}$

The image formed is real, inverted and greater in size,
As the object is placed b/w F and $2F$, the image formed
is beyond $2F$.

Weaker responses only collected data from the question, or wrote the lens formula correctly, but were unable to calculate the position. They did not state the nature of image either. Some of the responses showed negative sign with the position of image and also found the magnification which was not the requirement of the question. In few responses, candidates wrote the nature of image as larger in size, virtual, erect and formed behind the object/ lens.

Example:

$f = 8 \text{ cm}$	
$p = 12 \text{ cm}$	
$q = ?$	
$\frac{1}{f} = \frac{1}{p} - \frac{1}{q}$	$\frac{-1}{q} = \frac{1}{8} - \frac{1}{12}$
$\frac{-1}{q} = \frac{1}{f} - \frac{1}{p}$	$\frac{-1}{q} = \frac{3-2}{24}$
$\frac{-1}{q} = \frac{1}{24}$	<p>The image will be double the size of the object.</p> <p>The image will be virtual, erected behind the object. <u>Ans</u></p>
$q = -24 \text{ cm}$	
$m = \frac{q}{p}$	
$m = \frac{24}{12}$	
$m = 2$	

Question 11a

Describe in any FIVE points, how electrostatic induction is used in spray painting and in the extracting of dust from dirty carpets and from the chimneys of industrial machinery.

Better responses correctly described how electrostatic induction is used in spray painting and in the extracting of dust from dirty carpets and from chimneys of industrial machinery in complete five points. Some of the points described by the candidates in their answers are given below:

- When the gas containing smoke and other particles passes through the space surrounding the positively charged wire gauze, a positive charge is produced on these particles. These positively charged smoke and other particles are attracted by the plate due to the presence of negative charges on its surface. These particles, on reaching the plate, are deposited there. Then, the smoke and other particles are removed from the gas coming out of the chimney.
- When the particles of paint emerge out of the nozzle of the spray machine, they acquire positive charge. When these positively charged particles reach near the body of the car, they induce negative charges on its surface due to electrostatic induction. These negative charges attract the incoming positively charged paint particles.

Example:

Electrostatic induction is used in spray painting and in extracting of dust ~~because~~ in the following ways:-

- ① In spray painting, the nozzle of the spray is charged so that when it is pressed, mutual repulsion takes place and a fine mist of spray paint is formed.
- ② On the other hand, in accordance with electrostatic induction the material to be painted is given an opposite charge.
- ③ Hence, according to the principle of electrostatic induction, the spray particles get attracted by the ^{charged} material and sticks themselves to the body of the material, hence painting it.
- ④ In case of dust extraction, an air sucker is used which enters the air with dust and pollen. ~~The~~ The charge on the parallel plates attracts these ~~the~~ airborne particles.
- ⑤ While, the ~~other the~~ remaining air is repulsed and thrown out of from the extractor of the dust extracting machine.
- ⑥ The chimneys in industrial ~~into~~ machinery also works on the principles of electrostatic induction, where the unnecessary airborne particles are attracted by some part having an opposite charge and then this dust is repulsed by a similar charge and is extracted from the chimney of the machinery.

Weaker responses failed to describe in all five points that how electrostatic induction is used in spray painting and in the extracting of dust from dirty carpets and from the chimneys of industrial machinery. Some of the responses described the process of charging and discharging by one another through different materials. Other described only one of the uses of electrostatic induction, either spray painting or extracting dust from dirty carpets or from the chimneys of industrial machinery.

Example:

Electrostatic induction is used in spray painting and in the extracting of dust from dirty carpets and from the chimneys of industrial machinery. First both the bodies are charged with opposite charges. One of the body is sprayed, sucked or thrown respectively to each of the other body. Due to the opposite charges the bodies are attracted to each other. The opposite charges also help the bodies to stay attached to each other for a long time.

Question 11b

Describe any FIVE safety measures that should be taken in connection with the household circuit.

Better responses correctly described the safety measures that should be taken in connection with the household circuit in five points. Some of the safety measures described by the candidates in their answers are given below:

- Replace or repair damaged electrical appliances that may have damaged cords, cracked housing, or broken plugs.
- Turn off power points and appliances after using them, or if going outside from the home. Make sure appliances have adequate space so they don't overheat.
- Be careful when using electrical appliances or extension cords near wet areas like sinks, bathrooms and swimming pools.
- Stay safe around power lines by keeping ladders and poles clear of overhead wires. Also keep plants and trees trimmed and away from power lines.
- Installed fuses in the circuits to protect the equipments when excess current flows. If a large, unsafe current passes through the circuit, the fuses melt and break the circuit before the wires become very hot and cause fire.
- Earthing further protects the user from electric shock by connecting the metal casing of the appliance to earth. The earth wire provides a safe route for the current to flow through, if the live wire touches the casing.
- Make sure switchboard is located. Keep access to it clear and label the switches, circuit breakers and fuses.
- Homes should have smoke and fire alarms installed in the important places.

Example:

Following are some safety measures that should be taken in connection with the household circuit:

- ① A fuse must be installed in the live wire as it prevents excess current from flowing. It is a thin metal wire that melts when excess current passes through the live wire.
- ② Cables must be used i.e the wires in use must be insulated properly and in some cases, they should have a double insulation layer.
- ③ A circuit breaker must be installed in the live wire to break the circuit when excess current flows.
- ④ Make sure that the earth wire is not in contact with the live wire and is plated.
- ⑤ Switches and the circuits must be kept dry. Also, electrical devices should not be handled with wet hands.

Weaker responses were unable to describe all five safety measures that should be taken in connection with the household circuit. Some candidates wrote security measures of the houses and factories and explained working of gadgets used for security purposes. Some of the responses were totally focused on the household wiring and material of wires used for electricity. Candidates should be guided to read the questions carefully and answer according to the demands of the question.

Example:

- Use transformer
- Alarm should be placed with circuit.
- Use copper wires.
- Galvanic wire is used.
- Circuit is completely made up of copper.