

SSLC Examination, March 2025 - Physics PRELIMINARY Answer Key

**For Questions 1-17
other questions will be updated soon**

SECTION A

Answer any four questions. Each question carries 1 score.

1. **The midpoint of a lens is called _____.**
Answer: Optic centre.
 2. **If three images are formed when an object is placed between the reflecting surfaces of two plane mirrors, the angle between the mirrors will be _____.**
Answer: 60° .
 3. **Which of the following statements correctly describes the working of a loudspeaker?**
Answer: (b) Electrical energy is converted into sound energy based on the motor principle.
 4. **Find the relation in the first pair and complete the second pair.**
Answer: Plane mirror.
 5. **In Right Hand Thumb Rule, the thumb indicates the direction of _____.**
Answer: Current.
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SECTION B

Answer any four questions. Each question carries 2 scores.

6. **(a) How is electrical energy converted into light energy in discharge lamps?**
Answer: In discharge lamps, electrical energy ionizes the gas inside the tube, causing it to emit ultraviolet (UV) light. The UV light then strikes the phosphor coating on the tube, which converts it into visible light.
- (b) What are the advantages of LED lamps over discharge lamps?**
Answer:
 - LED lamps are more energy-efficient.
 - They have a longer lifespan.
 - They are environmentally friendly as they do not contain harmful gases like mercury.
 - LEDs produce less heat compared to discharge lamps.

7. **What is transmission loss in an electrical power distribution system? What measures have been taken to minimise it?**

Answer: Transmission loss refers to the loss of electrical energy as heat due to the resistance of the transmission lines. Measures to minimise it include:

- Using high-voltage transmission to reduce current.
- Using thicker conductors to reduce resistance.
- Using superconducting materials where possible.

8. **(a) A ray of light entering from water to air at an angle of incidence 52° does not undergo refraction. Why?**

Answer: This is because the angle of incidence (52°) is greater than the critical angle for water-air interface (approximately 48.6°), causing total internal reflection.

(b) Write a method that makes refraction possible here.

Answer: Reduce the angle of incidence to less than the critical angle (48.6°).

9. **Power of lens is $-0.5D$.**

(a) What is the relation between the power of a lens and its focal length?

Answer: Power (P) = $1 /$ Focal length (f), where focal length is in meters.

(b) Calculate the focal length of this lens.

Answer:

$$f = \frac{1}{P} = \frac{1}{-0.5} = -2 \text{ m}$$

10. **The government is promoting the installation of solar panels by giving incentives to boost electricity generation. Explain its significance in the context of the energy crisis.**

Answer:

- Solar panels harness renewable energy from the sun, reducing dependence on fossil fuels.
- They help in mitigating the energy crisis by providing a sustainable and clean source of energy.
- Incentives encourage more people to adopt solar energy, leading to reduced greenhouse gas emissions and environmental conservation.

SECTION C

Answer any four questions. Each question carries 3 scores.

11. An electric heater has a resistance of 690Ω and is designed to operate at 230V.

(a) What are the characteristics of a good heating coil?

Answer:

- High resistivity to produce more heat.
- High melting point to withstand high temperatures.
- Low temperature coefficient of resistance to maintain consistent performance.

(b) Calculate the heat energy produced by this heater when it works for 30 minutes.

Answer:

$$\text{Heat energy} = \frac{V^2}{R} \times t = \frac{230^2}{690} \times 1800 \text{ seconds} = 138000 \text{ J}$$

12. (a) Why does the bulb glow?

Answer: The bulb glows due to electromagnetic induction. When AC flows through the coil, it creates a changing magnetic field, which induces a current in the nearby coil, causing the bulb to glow.

(b) When a soft iron core is placed inside the inductor, what change will be observed in the intensity of brightness of the bulb? Justify your answer.

Answer: The brightness of the bulb will increase. The soft iron core increases the magnetic field strength, leading to a higher induced current and thus brighter light.

13. (a) Copy the figure and mark the direction of current flow through the coil.

Answer: (Diagram to be drawn with current direction marked.)

(b) Identify and mark the north pole of this solenoid. Justify your answer.

Answer: The north pole can be identified using the Right Hand Thumb Rule. The thumb points in the direction of the magnetic field (north pole) when the fingers curl in the direction of the current.

14. (a) Identify the diagram that shows long-sightedness (hypermetropia). Justify your answer.

Answer: Fig-2 shows hypermetropia. In hypermetropia, the image is formed behind the retina due to the eyeball being too short or the lens being too weak.

(b) How can this defect be corrected?

Answer: Hypermetropia can be corrected using convex lenses, which converge the light rays to form the image on the retina.

15. (a) What are the drawbacks of partial combustion?

Answer:

- It releases harmful gases like carbon monoxide.
- It produces less heat energy compared to complete combustion.
- It leads to the wastage of fuel.

(b) Write the conditions favourable for the complete combustion of different fuels.

Answer:

- Sufficient supply of oxygen.
- High temperature to ignite the fuel.
- Proper mixing of fuel and oxygen.

SECTION D

Answer any four questions. Each question carries 4 scores.

16. (a) "Voltage across the $65\ \Omega$ resistor in the circuit is $230\ \text{V}$ ". Do you agree with this statement? Explain.

Answer: Since R_1 is not the only resistor in the circuit, the voltage across it is not necessarily $230\ \text{V}$. Instead, it will share the voltage with the parallel combination of R_2 and R_3 .

Thus, the statement is incorrect because part of the $230\ \text{V}$ is also dropped across the parallel combination of R_2 and R_3 .

(b) Calculate the effective resistance of the circuit.

Answer:

The effective resistance of the circuit is $115\ \Omega$.

(c) If the $100\ \Omega$ resistor (R_3) in the circuit is removed, will the effective resistance decrease? Why?

Answer:

If R_3 is removed, only $R_2 = 100 \Omega$ will remain in series with $R_1 = 65 \Omega$. In this case:

- The new total resistance ($R_{\text{new total}}$) becomes:

$$R_{\text{new total}} = R_1 + R_2 = 65 + 100 = 165 \Omega$$

Comparing this with the original total resistance ($R_{\text{total}} = 115 \Omega$):

- $R_{\text{new total}} > R_{\text{total}}$.

Therefore, **the effective resistance increases** when R_3 is removed because removing a parallel resistor reduces the overall conductance of the circuit.

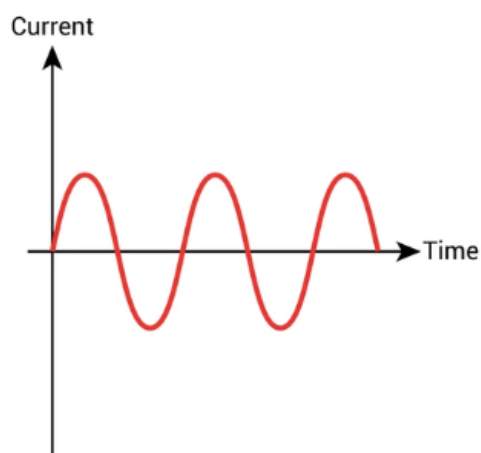
17. a) Name the parts labelled as 'X' and 'Y'.

X: Slip Rings Y: Brushes

(b) Which type of current is produced as output here? Draw the graph of output voltage.

Type of Current: Alternating Current (AC)

Graph:



(c) State the law that helps to find the direction of current in the armature coil.

Law: Fleming's Right-Hand Rule (This rule is used for generators.)

Rest of the answers will be uploaded soon