Kerala Board Class 10 Physics 2021

General Instructions to Candidates:

- There is 'cool-off time' of 15 minutes in addition to the writing time. Use this time to get familiar with questions and to plan your answers.
- Questions with different scores are given as distinct parts.
- Read the instructions carefully before answering the questions.
- Keep in mind the score and time while answering the questions.
- The maximum score for questions from 1 to 34 will be 40.

Each question from 1 to 8 carries 1 score.

Q1. Choose the least scattered colour in sunlight from the following.
[Violet, Green, Blue, Red]
Solution: Red

Q2. The non-rotating part in a de motor is: [Armature, split ring, Graphite Brush]
Solution: Graphite brush

Q3. Select the odd one from the group.
[Reflection, Dispersion, Refraction, Persistence of vision]
Solution: Persistence of Vision

Q4. If the object distance and image distance in a concave mirror is 40 cm, what is its focal length?
Solution:
Given: Image distance (v) $= -40$ cm,
Object distance (u) $= -40$ cm
To find: Focal length (f)
According to the mirror formula: $\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$

Putting values: $\frac{-1}{40}+\frac{-1}{40}=\frac{1}{f}$ OR $\frac{-2}{40}=\frac{1}{f}$

Thus $f=-20$ cm

Q5. Observe the relations between terms in the first pair and complete the second pair.

CNG: Compressed Natural Gas

LNG: _____

Solution: Liquefied Natural Gas

Q6. Pick out the one which is not a source of Green Energy.

[Solar cell, Wind mill, Biogas, LPG]

Solution: LPG

Q7. Which phenomenon of light is utilised in optical fiber technology?

[Refraction, Total internal reflection, Dispersion, Scattering]

Solution: Total Internal Reflection

Q8. The image formed by a convex lens is inverted and diminished. Then the object must be placed:

[At 2F, Beyond 2F, Between F and 2F, AT F]

Solution: Beyond 2F

Each question from 9 to 20 carries 2 scores.

Q9. Write the energy change taking place in the given devices.

a. Incandescent Lamp

b. Electric Mixer

Solution:

a. Incandescent Lamp - Electrical energy to Light energy

b. Electric Mixer - Electrical energy to Mechanical energy

Q10. a. Name the part of a heating equipment in which the electric energy is converted into heat Energy.

b. Name the substance used to make this part.

Solution:

a. heating coil

b. Nichrome

Q11. Explain the difference between short circuit and overloading.

Solution:

Short Circuit: A short circuit is simply a low-resistance connection between the two conductors supplying electrical power to any circuit, which results in excessive current flow.

An electric circuit overload occurs when current flows in a circuit and is greater than the capacity of the components to resist the current. When too much current passes through electric wires, an electric overload occurs.

Q12. Write any two methods to increase the magnetic strength of a current-carrying solenoid.

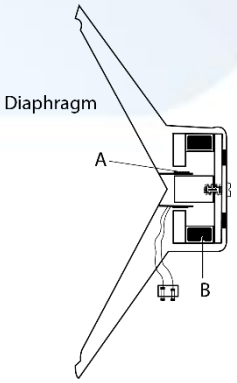
Solution:

Two methods to increase the magnetic strength of a current-carrying solenoid are:

a. Increase the intensity of the electric current.

b. Increase the no. of turns in the solenoid.

Q13. Observe the figure of a moving coil loudspeaker.



a. Name the parts labeled as A and B.

b. Write the function of diaphragm in this device.

Solution:

a. A- Voice Coil B-Field Magnet

b. A diaphragm is the thin, semi-rigid membrane attached to the voice coil, which moves in a magnetic gap, vibrating the diaphragm and producing sound.

Q14. Write any two relevant first aids to be given in the case of electric shock.

Solution:

Two relevant first aids to be given in the case of electric shock are:

a. Raise the temperature of the body by massaging.

b. Give artificial respiration if needed.

Q15. Explain the following.

a. Electromagnetic Induction

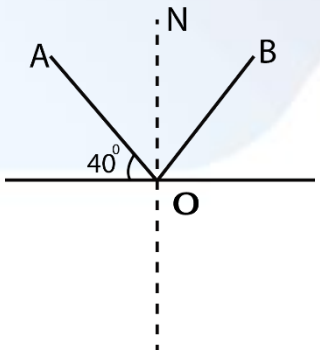
b. Induced emf

Solution:

a. Whenever there is a change in the magnetic flux linked with a coil, an emf is induced in the coil. This phenomenon is electromagnetic induction.

b. It can be defined as the generation of a potential difference in a coil due to the changes in the magnetic flux through it.

Q16. Observe the figure



a. Write the angle of incidence

b. Write the relation between angle of incidence and angle of reflection.

Solution:

a. Angle of incidence, $i = 90° - 40° = 50°$

b. Angle of incidence and angle of reflection are equal i.e. $i = r$

Q17. When an object is placed at a distance of 30 cm in front of the mirror, an image is obtained at 15 cm on the same side.

a. Write the values of u and v according to the new cartesian sign convention.

b. Calculate the focal length of the given mirror.

Solution:

a. Distance of object, u $= -30$ cm

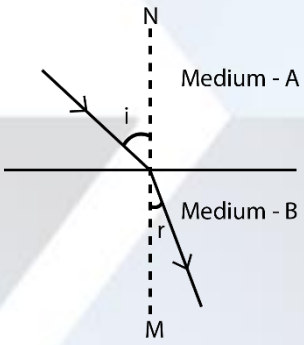
Distance of image, v $= -15$ cm

b. Focal length of the mirror $f = \frac{uv}{u+v}$

$$= \frac{450}{-45} = -10 \text{ cm}$$

Q18. Light falls obliquely from one medium to another is shown in the figure.

[MN is the normal at the point of incident]



Which of the given mediums is the fastest medium for light? Justify your answer.

Solution: Medium A.

The angle of incidence is greater than that of the angle of refraction, so medium A has low optical density. As optical density decreases, the speed of light through the medium increases.

Q19. DC current is flowing through a solenoid AB. The direction of current at the end A is anticlockwise.

a. Write the polarity at the end A.

b. The solenoid is replaced by a current carrying conductor. Give the name of the law that helps to determine the direction of the magnetic field produced.

Solution:

a. North pole

b. Maxwell's right hand thumb rule

Q20. Green energy is the energy of the future.

Explain the above statement based on the energy crisis.

Solution:

Green energy is any type of energy generated from natural resources, such as sunlight, wind, or water. It often comes from renewable energy sources, although there are some differences between renewable and green energy, which we will explore below.

The key with these energy resources are that they don't harm the environment through factors such as releasing greenhouse gasses into the atmosphere.

Each question from 21 to 28 carries 3 scores.

Q21. 2 A current flows through an electric heating device connected to 230 V supply

a. The quantity of charge that flow through the circuit in 5 minutes is:

(i) 10 C

(ii) 60 C

(iii) 600 C

(iv) 6 C

b. What is the resistance of the device?

c. Calculate the power of the heating device.

Solution:

Given: Current = 2 A, Voltage = 230 V, Time (t) = 5 min = 300 secs

a. $Q = It = 2 \times 300 = 600C$

b. $R = V/I = 230/2 = 115\Omega$

c. Power $P = VI = 2 \times 230 = 460$ W

Q22. Three resistances of 4 Ω, 6 Ω and 12 Ω are given to you.

a. What is the highest resistance that you can get using all of them?

b. What is the lowest resistance that can be obtained by using the 6Ω and 12Ω resistances?

Solution:

a. For highest resistance, the resistors are connected in series, Effective

$$R = 4 + 6 + 12 = 22\Omega$$

b. Lowest resistance can be obtained by connecting the resistances in parallel.

$$R_e = \frac{R_1 R_2}{R_1 + R_2} = \frac{6 \times 12}{6 + 12} = \frac{72}{18} = 4\ \Omega$$

Q23. The voltage of electric power generated is increased from 11 kV to 220 kV in power transmission. But the household supply is provided at 230 V.

a. Write the type of transformer used at the first phase of power transmission.

b. Write the type of transformer used at the distribution line.

c. Write any two structural differences between step-up and step-down transformers.

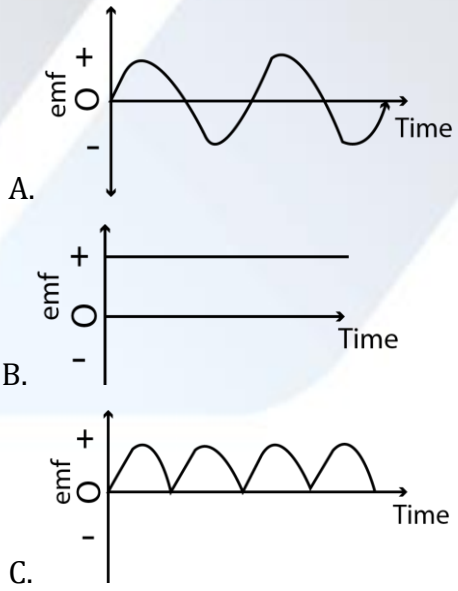
Solution:

a. Step-up transformer (POWER TRANSFORMER)

b. Step-down transformer (DISTRIBUTION TRANSFORMER)

c. The number of turns in the primary coil is less than that of the secondary in the step-up transformer. Also, the thickness of the primary coil is greater than that of the secondary.

Q24. The graphical representation of emf obtained from three electrical sources are given below.



a. Identify any two sources.

b. Write any two peculiarities of each of the emf shown in the graph (A) and (B).

Solution:

a. A — AC generator, B - battery, C — DC generator

b. 1. emf in the circuit is varying because the direction changes continuously,

2. The direction is the same, and the emf is constant.

Q25. a. How fossil fuels are formed?

b. What are the products obtained by fractional distillation of coal?

Solution:

a. Fossil fuels are formed by transforming plants and animals that went under the earth's crust millions of years ago. The transformation took place in the absence of air under high pressure and high temperature.

Q26. Rainbow is formed due to dispersion of sunlight.

a. What is dispersion?

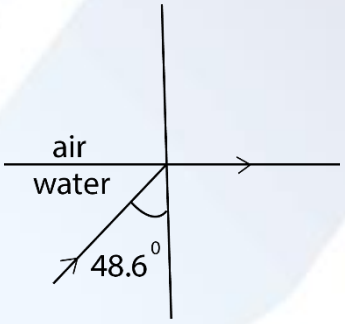
b. Write down the changes in the sunlight in the water droplet as the rainbow forms explain.

Solution:

a. Dispersion is the phenomenon of splitting up of a composite light into its constituent colours.

b. Sunlight passes through water droplets in the atmosphere. In a water droplet, light undergoes one dispersion, one total internal reflection, and one refraction.

Q27. Critical angle of water with air is shown in the figure



a. Define critical angle.

b. What change in the path of light will be observed if the angle of incidence is increased from critical angle?

Solution:

a. When a ray of light passes from a medium of greater optical density to that of lower optical density, the angle of incidence at which the angle of refraction becomes 90° is the critical angle.

b. When a ray of light passes from a medium of higher optical density to a medium

of lower optical density at an angle of incidence greater than the critical angle, the ray is reflected back to the same medium without undergoing refraction. This phenomenon is known as total internal reflection.

Q28. The magnification of an image formed in a mirror is -1.

a. What does the negative sign indicate with the value of magnification?

b. What is magnification?

c. Identify the mirror used.

Solution:

a. If magnification is negative, it means image formed by the mirror is real and inverted

b. Magnification is defined as the ratio of the height of image to height of object

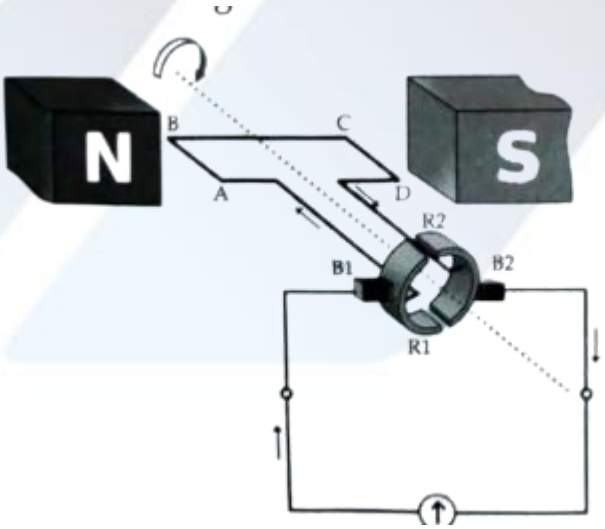
Magnification,

$$\text{m} = \text{height of image/height of object} = \frac{h_i}{h_o} = -\frac{v}{u}$$

c. Concave mirror

Each question from 29 to 34 carries 4 scores.

Q29. Observe the figure.



a. Identify the Generator.

b. Write the working principle of this generator.

c. Which type of emf is induced in the armature?

d. Write the function of split ring commutator used in this generator.

Solution:

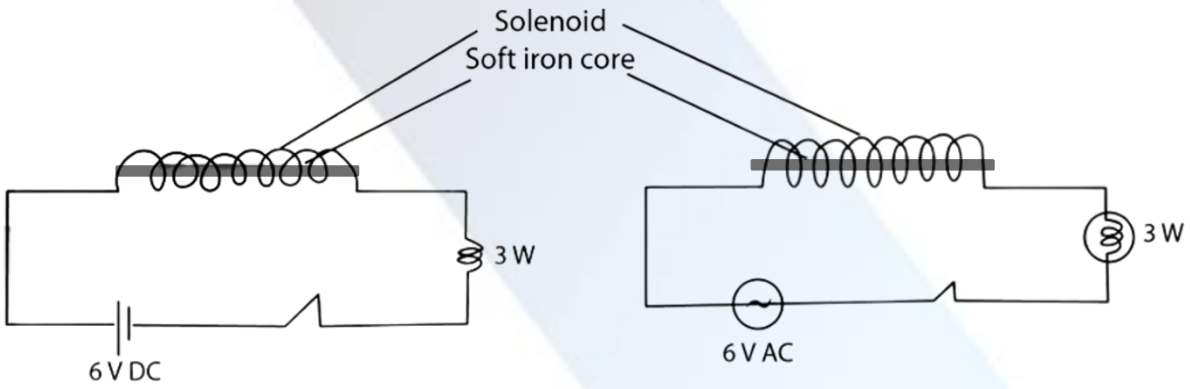
a. DC Generator

b. Electromagnetic induction

c. AC

d. Split rings are used to keep the direction of current be same in the external circuit.

Q30. Analyse the figure to answer the questions.



a. In which circuit is a varying magnetic field developed around the solenoid?

b. Which bulb in the circuit glows when the switch is kept on?

c. Explain whether there is a difference in the intensity of the light of the bulb.

Solution:

a. Figure *B*

b. The bulbs in both the circuits will glow

c. Since circuit B is AC, a back emf is induced in it due to self-induction, the the resultant voltage across the bulb decreases, and the brightness of the bulb decreases.

Q31. a. If an image formed from a convex lens is erect and enlarged:

i) Image is formed at: [Same side of the object/Opposite side of the object]

ii) Write any one application of this type of image formation.

b. Write any two characteristics of the image formed by a convex lens when the object is placed at the following positions.

i) At infinity

ii) Between F and 2F

Solution:

a. i) Same Side of the object

ii) Application: Magnifying glass

b. i) Position of object at infinity --- Image : inverted, real and diminished.

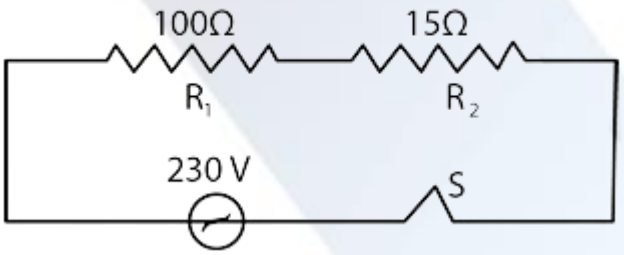
ii) Position of object between F and 2F --- Image : inverted, real and enlarged.

Q32. Observe the circuit diagram and answer the questions.

a. Find the effective resistance of the given circuit.

b. Calculate the current flowing through this circuit.

c. What is the heat produced in the 100 Ω resistance if the current flows for 10 minutes?



Solution:

a. Effective resistance $(R_E) = R_1 + R_2 = 100 + 15 = 115\Omega$

b. Current, $I = \frac{V}{R} = \frac{230}{115} = 2\ A$

c. Heat, $H = I^2Rt = 4 \times 100 \times 10 \times 60 = 240000\ J$

Q33. a. Write the function of a safety fuse in an electric circuit.

b. Write any two characteristics of fuse wire.

c. Write any two precautions to be taken while including fuse wire in a circuit.

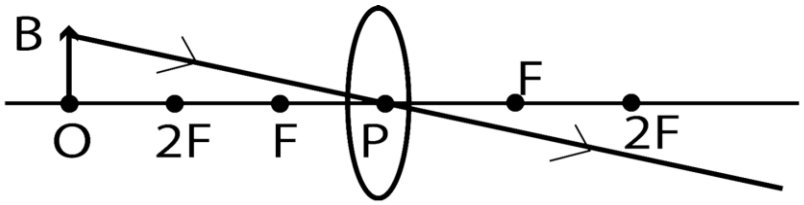
Solution:

a. A safety fuse protects a circuit by melting and breaking the connection when excessive current flows, preventing damage to the wiring and appliances.

b. Fuse wire is an alloy of tin and lead and it has a low melting point.

c. The ends of the fuse wire must be connected with the screws in the plug. The fuse wire should not project out of the carrier base.

Q34. Observe the ray diagram given below.

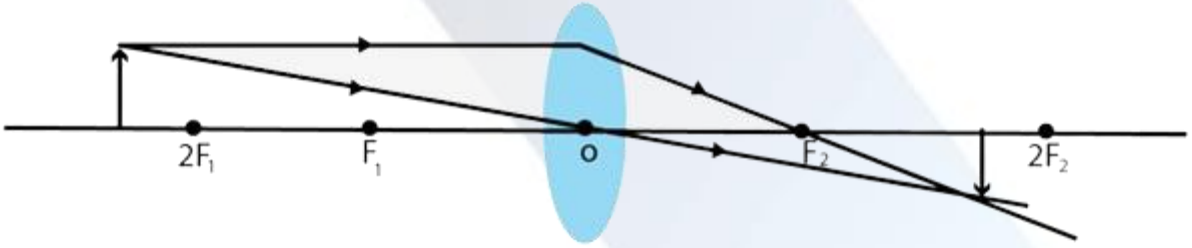


a. Redraw the diagram and complete it to get the image.

b. Write any two characteristics of the image obtained.

Solution:

a.



b. Image is inverted, real and diminished