Kerala Board Class 10 Physics 2020 Question Paper with Solutions

Section-A

1. **The radius of curvature of a convex mirror is 24 cm. What is its focal length?**
   **(24 cm. 6 cm. 12 cm, 3 cm)**

   Answer: 12 cm

   If R = 24 cm then f = R /2 = 24/2 =12 cm

2. **The magnetic field around a current carrying conductor AB is given in the figure. Based on Maxwell's right-hand screw rule, find the direction of the current through the conductor.**

   Answer: The direction of the current through the conductor, will be from A to B

3. **Which of the following figures represents the critical angle?**
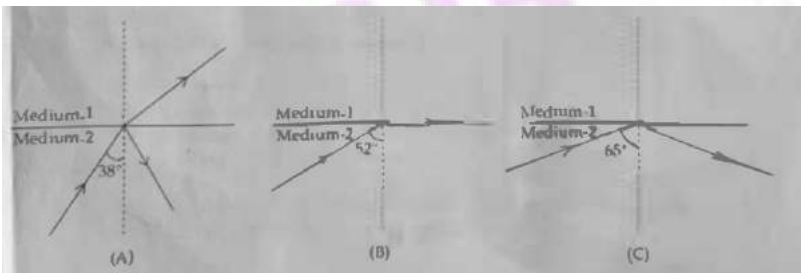
   Answer: figure (B)

4. **The order of various colours observed in the spectrum of sunlight is given below. Choose the correct order.**
   a.   Blue, Violet, Green, Red
   b.   Violet, Blue, Yellow, Red
   c.   Violet, Yellow, Blue, Green
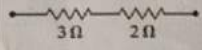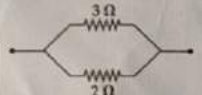   d.   Green, Yellow, Orange, Blue

   Answer: (b) Violet, Blue, Yellow, Red
   (according to the increasing order of wavelength)

5. Write any two products that are obtained when coal is distilled in the absence of air.
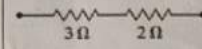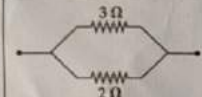
Answer: Some products that are obtained when coal is distilled in the absence of air, include coal gas, coal tar, coke, ammonia and so on.

Section-B

6. The following table is prepared for comparing the properties of resistances in different combinations. Re-arrange the contents in each column to match them correctly.

| Connection diagram of resistance	Effective resistance of the circuit	Voltage across each resistor	Current through each resistor
⎯ww⎯ww⎯ 3Ω 2Ω	decreases	same	same
3Ω ⎯www⎯ 2Ω ⎯www⎯	Increases	different	different

Answer:

Connection diagram of resistance	Effective resistance of the circuit	Voltage across each resistor	Current through each resistor
⎯ww⎯ww⎯ 3Ω 2Ω	INCREASES	DIFFERENT	same
3Ω ⎯www⎯ 2Ω ⎯www⎯	DECREASES	SAME	different

7. Write any two methods to provide first aid in the case of electric shock.

Answer: Given are some methods to provide first aid in the case of electric shock:
- Apply pressure on the chest
- Give artificial respiration
- Raise the body temperature via massaging

8. A conductor AB is placed in a magnetic field as shown in the figure.
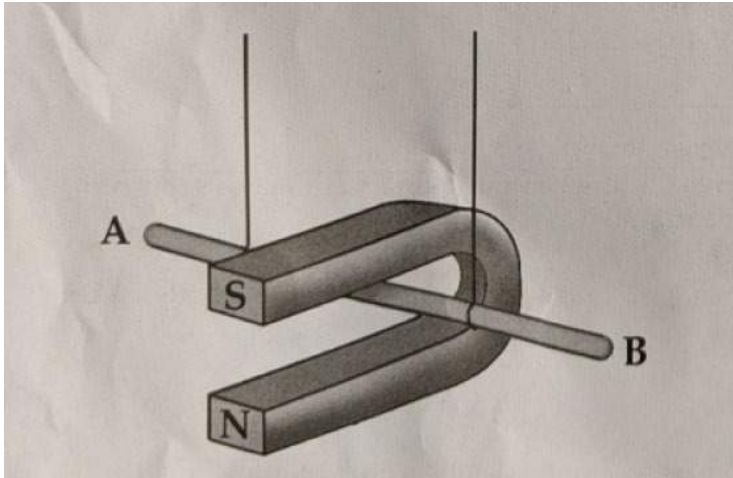
a. **If you are moving the conductor outwards, then what will be the direction of the current in the conductor?**

b. **If an electric current passes from A to B, then in which direction will the conductor move?**

[Inwards the magnet / Outwards the magnet]

Answer: (a) If you are moving the conductor outwards, then the direction of the current in the conductor will be from B to A.

(b) If an electric current passes from A to B, then the conductor will move outwards the magnet.

9. Observe the figure of a DC motor.
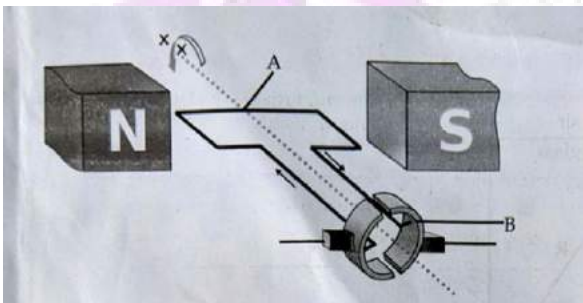
a. **Write the names of the parts labelled A and B.**

b. **What are the charges to be made to convert this device into an AC generator?**

Answer: (a) The part A is the Armature and part B is the Split ring

(b) To change the device to an AC generator, it will have to use Slip rings and the field magnets

10. Write the reason for the twinkling of stars in the Sky.

Answer: When a ray of light travels from one medium to another, it 'bends' and this phenomenon is referred to as refraction. If it travels from a rare medium to a dense medium, it

bends towards the normal and if it travels from a dense medium to a rarer medium, it bends away from the normal. The speed through which it travels changes depending on the medium, and therefore this bending occurs. This effect can be observed when light passes through a prism or a glass slab and even when light passes through water. The light ray travels from air to a medium of different density here. So how are refraction and twinkling connected? The atmosphere of the earth is made of different layers. It is affected by winds, varying temperatures, and different densities as well. When light from a distant source (a star) passes through our turbulent (moving air) atmosphere, it undergoes refraction many times. When we finally perceive this light from a star, it appears to be twinkling! This is because some light rays reach us directly and some bends away from and toward us. It happens so fast that it gives a twinkling effect.

Learn more about why do stars twinkle from here.

Section-C

11. **Specification of two electrical heaters are given below:**

Heater-A	Heater-B
Resistance- 690 Ω Working Voltage- 230 V	Resistance- 460 Ω Working Voltage- 230 V

a. **Which heater requires a fuse of higher amperage?**
b. **Which of the heaters generate more heat when they work for 5 minutes under the same voltage rating? Explain the reason.**

 Answer: (a) Heater B requires a fuse of higher amperage
(b) Heater B generates more heat when it operates for 5 minutes under the same voltage rating as the heater A because when the resistance decreases, the current increases, and so does the heat.
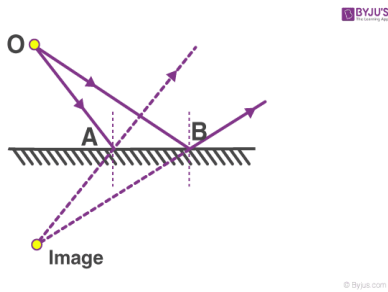
12. **Two rays of light OA and OB coming from an object "O", are falling obliquely on the surface of a plane mirror as shown.**
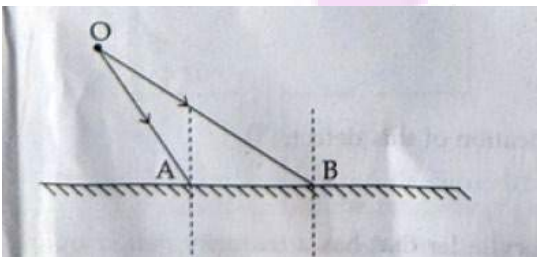
a. **Draw a ray diagram indicating the image formation**
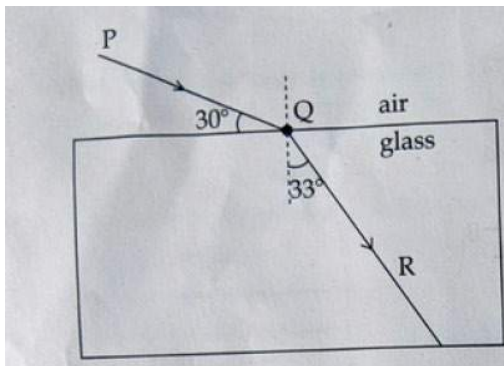b. **Write any two properties of the image formed in this case.**

 Answer:

(a)

Image

(b) The image formed is virtual, erect and same size as the object

13. **A ray of light falling obliquely from air to a glass slab is shown in the figure.**

a.   **Find out the angle of incidence.**
b.   **Why is the angle of refraction less than that of the angle of incidence in this case?**
c.   **How can you calculate the refractive index of the material of this slab? (calculation not required)**

Answer: (a) The angle of incidence is 60° = (90°- 30°).
(b) Here the refractive index and the optical density of glass is more than that of air. Also, the ray of light bends towards the normal, when light travels to denser medium. So, the angle of refraction is less than that of the angle of incidence in this case.
(c) n = sin i / sin r = sin 60° / sin 33°.

14. **The picture represents a method of rectification of the defect of an eye using a lens of suitable focal length.**
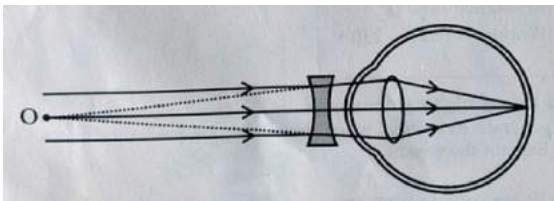
(a) Name the disorder of this eye.

(b) Give two reasons for this defect.
(c) Explain the role of the concave lens in the rectification of this defect.

Answer: (a) Myopia or short-sightedness is the disorder of this eye
(b) Main two reasons for the defect are given below:
- Increase in power of the lens
- Increase in size of the eyeball

(c) A concave lens is used to diverge the light rays before they reach the lens of the eye so that the image is formed in the retina. This helps to rectify myopia.

15. (a) What will be the marking on a cooking gas cylinder that has a maturity period up to March-2020?
**(b) Write any two precautions to be taken to avoid accidents due to "LPG' leakage.**

Answer: (a) The marking found on a cooking gas cylinder that has a maturity period of March-2020 is A 2020
(b) Two precautionary measures to take to avoid accidents due to "LPG" leakage is given below:
- Examine the rubber tube and the knob at regular intervals to confirm that there is no leakage or other issue
- Turn on the knob of the stove only after turning on the regulator

Section-D

16. Two stages of an experiment conducted with a solenoid and a magnet is given below:
(Magnets shown in fig-A and fig-B are stationary magnet and a moving magnet respectively)

Fig. A   Fig. B
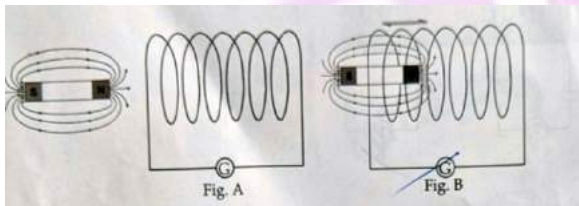
a.   In which stage does the galvanometer deflect?
b.   Explain the reason for this deflection in the galvanometer with the help of the scientific principle that you have learned.
c.   Write any two devices that work on this principle.

Answer: (a) In figure B, the galvanometer deflects
(b) Electromagnetic induction is the scientific principle that explains the reason for this deflection in the galvanometer
(c) The other two devices that work on this principle are moving coil microphone and the generator.

17. Explain the scientific reason behind the phenomena given below.
**(a) The path of sunlight is visible on a misty morning.**
(b) Newton's colour disc appears white when rotated fast,

(c) The rising and setting sun appears red.
(d) A person can see the distant object and near object clearly.

> **Answer:** (a) The scientific reason for the path of sunlight being visible on a misty morning is the Tyndall effect.
> (b) Persistence of vision is the scientific reason for Newton's colour disc to appear white when rotated fast
> (c) The rising and setting sun appears red due to scattering of light
> (d) A person can see the distant object and near object clearly due to the power of accommodation

18. Analyse the circuits A and B
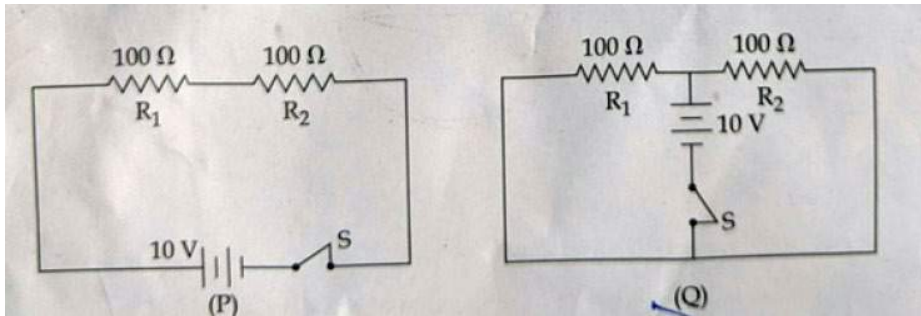
a.   In which circuit, the resistors get the same voltage?
b.   Calculate the voltage across the resistor K2 in the circuit (P).
c.   If current due to the applied emf is flowing through these two circuits for a time of 5 minutes, which circuit will produce more heat energy? Explain.

> **Answer:** (a) P - 10 V and Q- 5 V
> (b) 5V is the voltage across the resistor K2 in the circuit (P), as the voltage will be shared across the resistors that are connected in series
> (c) Q will produce more heat
> Effective resistance of P = 100 + 100= 200 Ω
> Effective resistance of Q = 100 /2 = 50 Ω
> Now, H = v² t / R, so if the resistance decreases, the heat will increase.

19. Observe the figure and answer the following questions. B1 and B2 are identical bulbs.
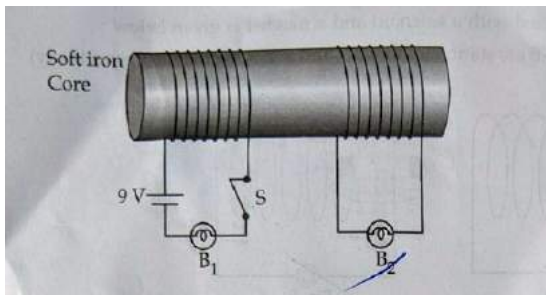
(a) Which bulb will glow in the circuits?

(b) If the battery in the circuit is replaced by an AC source of the same voltage, what change can be observed in the working of the bulbs? Explain the reasons for the change.

Answer: (a) Bulb B_1 will glow in the circuits

(b) The two bulbs [B_1 and B_2] glow due to mutual induction. While B_2 glows continuously, the intensity of bulb B_1 was reduced due to self-induction.

20. **Define the following terms of a lens.**
    (a) Optic centre.
    (b) Centre of curvature.
    (c) Principal focus of the convex lens.
    (d) Focal length of a concave lens.

Answer: (a) The centre point of a lens is called the optic centre of a lens.

(b)Centre of curvature: the centre of the sphere formed by the reflecting part of a spherical mirror is called the centre of curvature.

(c) Principal focus of a convex lens is a point on its principal axis to which light rays parallel to the principal axis converge after refraction by the lens.

(d) The difference between the optical centre of the lens and the principal focus is the Focal length of a concave lens.