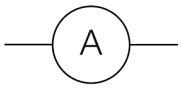
ELECTRICITY

One Mark Each

1. Identify the symbol. 

2. Identify the symbol. 

3. Relation between current and voltage. Write the mathematical form.

4. 1 μA =_____

5. What is the unit of electric current?

6. SI unit of potential difference.

7. Name a device that helps to maintain a potential difference across a conductor.

8. SI unit of resistivity.

9. On what factors the resistance of a conductor depends?

10. SI unit of electric power.

11. Commercial unit of Electric Power.

12. 1 kWh =

13. How is voltmeter is connected in a circuit to measure the potential difference between two ends?

14. In which configuration, a fuse is placed in a device?

15. On what factors the resistivity of a conductor depends?

16. Name any two appliances which are based on the application of heating effect of electric current.

17. What happens to resistance of a conductor when its area of cross-section is increased?

18. A given length of a wire is doubled on itself and this process is repeated once again. By what factor does the resistance of the wire change?

19. Two resistors of 10 Ω and 15 Ω are connected in series to a battery of 6 V. How can the values of current passing through them be compared?

20. Define the term 'volt'

Two Marks Each

1. Draw a schematic diagram for the three resistors connected in series along with a key, ammeter and a battery.

2. A) How much current will an electric bulb draw from a 220 V source, if the resistance of the bulb filament is 1200 Ω?

   B) How much current will an electric heater coil draw from a 220 V source, if the resistance of the coil is 100 Ω?

3. Resistance of a metal wire of length 1m is 26 Ω. If the diameter of the wire is 0.2 mm, what will be the resistivity of the metal?

4. Why are coils of the electric toasters and electric iron are made of alloy rather than a pure metal?

Four Marks Each

1. In resistance for a system of the resistor, there are two methods of joining the resistors together as shown below: -

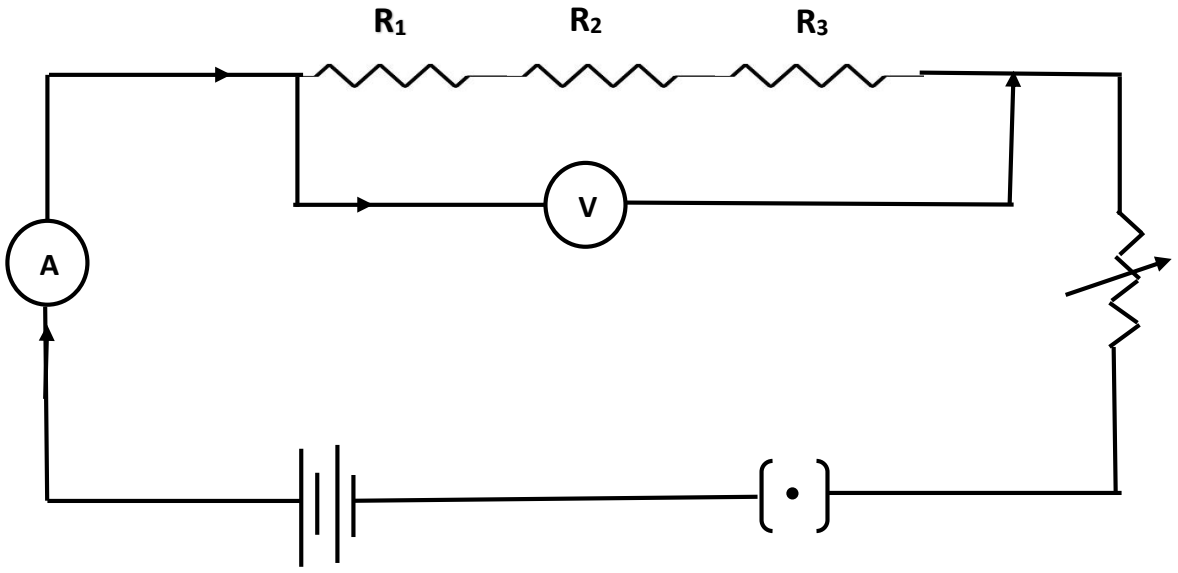


Figure 1.

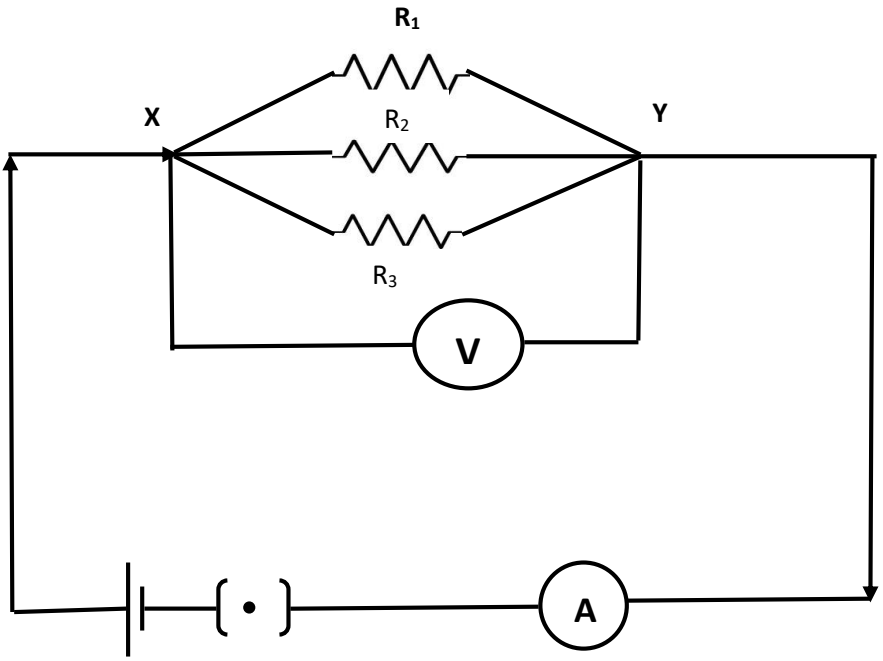


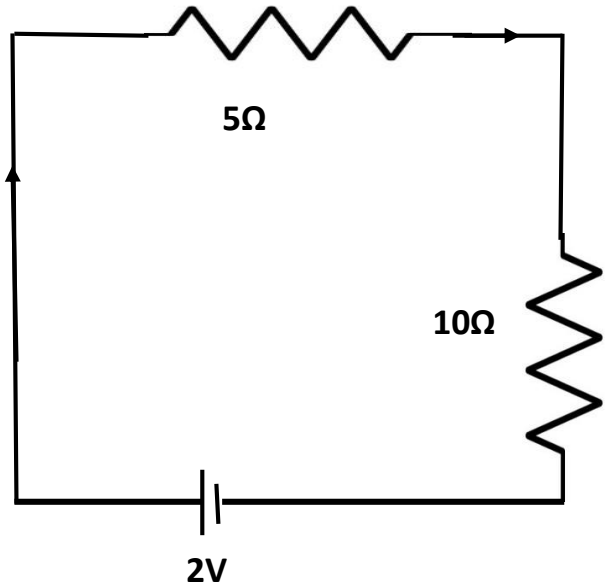
Figure 2.

It showed an electric current in which three resistors having R_1, R_2, and R_3 respectively are join end to end i.e. series while the combination of resistors in which three resistors are connected together at point X and Y are said to be parallel.

1. What is the total potential across a combination of a resistor in series?
2. What is the value of current in series combination of resistor at every point?
3. If 6 resistors, each of 1.2Ω are connected in series, what will be the resultant resistance?
4. If 3 resistors, each of 1Ω are connected in parallel, what will be the resultant resistance?

2. Calculate

I. Effective resistance
II. Current
III. Potential difference across 10 Ω resistor
IV. Potential difference across 5 Ω resistor as shown in figure.



3. The value of current I flowing in a resistor for the corresponding values of potential difference V across the resistor is given below:

I (ampere)	1A	2A	3A	4A
V (volt)	2V	4V	6V	8V

i) Plot the graph between V and I

ii) What is the shape of graph obtained by you?

iii) Is it in accordance with Ohm's law?

iv) Calculate the resistance of resistor.

4. Explain with the help of a labelled circuit diagram, how will you find the resistance of a combination of three resistors, of resistance R_1, R_2 and R_3 joined in parallel. Also mention how will you connect the ammeter and the voltmeter in the circuit while measuring the current in the circuit and the potential difference across one of the three resistors of the combination.

5. Name the physical quantity which is (i) same (ii) different in all the bulbs **,** when three bulbs of:

(a) same wattage are connected in series.

(b) same wattage are connected in parallel.

(c) different wattage are connected in series.

(d) different wattage are connected in parallel.

6. (a) Calculate the resistance of 1 km long copper wire of radius 1 mm. Resistivity of the copper is 1.72×10^{-8} Ω m.

(b) Draw a schematic diagram of a circuit consisting of a battery of 4 cells of 2V each connected to a key, an ammeter and two resistors of 2 Ω and 3 Ω respectively in series and a voltmeter to measure potential difference across 3 Ω.

SOURCES OF ENERGY

One Mark Each

1. Burning of candle is an example of conversion of chemical energy into _____ energy and _____ energy
2. Which form of energy is used by thermal power plant to convert it into electrical energy?
3. Which form of energy is converted by hydro power plants into electrical energy?
4. Define slurry.
5. What percentage of methane is present in a Bio-gas?
6. What should be the wind speed that is required to maintain speed of turbine in wind-mill?
7. What is a good fuel?
8. Name the part of a bio gas plant where reaction takes place in the absence of oxygen.
9. Name any two elements that are used in fabricating solar cells.
10. Why a solar cooker painted black from outside?
11. Name the reaction responsible for large energy production in sun.
12. What is geothermal energy?
13. Define tidal energy.
14. Mention the purpose of blackening the interior of a solar cooker.
15. List two non-conventional sources of energy.

Two Marks Each

1. Distinguish between renewable and non-renewable sources of energy. Also, give an example of each of these sources.

2. Out of two elements A and B with mass number 2 and 235 respectively, which one is suitable for making a) Nuclear Reactor b) Hydrogen Bomb
   Name the nuclear reaction in each case.

3. List two practical uses of biogas in rural areas.

4. Biogas is considered to be a boon for farmers. Give reasons.

5. Out of two solar cookers one was covered with a glass slab and the other was left open. Which of the two solar cookers will be more efficient and why?

6. What is Geo thermal energy? How it is produced?

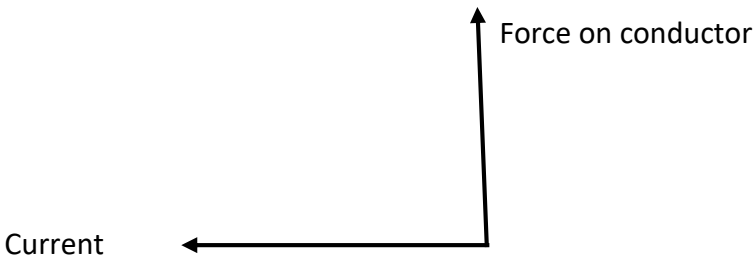
7. State any three advantages of charcoal over wood.

8. State any three reasons to justify that LPG is considered as an ideal fuel.

MAGNETIC EFFECTS OF CURRENT

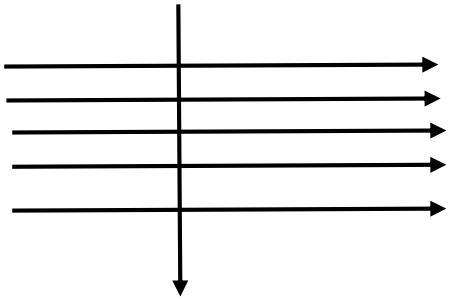
One Mark Each

1. What is the pattern of the magnetic field lines around a straight conductor carrying current?
2. How can we say that the magnetic field is uniform inside the solenoid?
3. If the number of turns of a circular current carrying coil are doubled, the how will the magnetic field produced by it changes?
4. The magnetic field lines in a given region is uniform. Draw a diagram to represent it.
5. Why do not two magnetic field lines intersect each other?
6. What is the role of slip rings in an electric motor?
7. Name two safety measures commonly used in electric circuits and appliances.
8. Name the type of current: a) used in household supply b) given by a cell
9. How is an electromagnet being different from permanent magnet?
10. State the direction of magnetic field in the following case:



11. State Fleming's left hand rule.
12. What is the principle of electric motor?
13. When is the force experienced by a current-carrying conductor placed in a magnetic field largest?

14. A charged particle enters at right angle into a uniform magnetic field as shown. What should be the nature of charge on the particle if it begins to move in a direction pointing vertically out of the page due to its interaction with the magnetic field?



15. Two circular coils A and B are placed close to each other. If the current in the coil A is changed, will some current be induced in the coil B? Give reason.

16. Identify the poles of the magnet in the given figure (1) and (2).

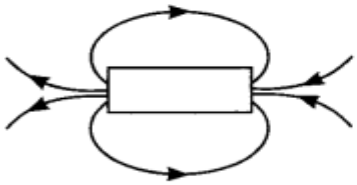


Figure (1)

Figure (2)

Two Marks Each

1. Explain the role of fuse in series with any electrical appliance in an electric circuit.

2. Why should a fuse with defined rating for an electric circuit not be replaced by one with a larger rating?

3. Draw a schematic labelled diagram of a domestic circuit which has a provision of a main fuse, meter, one light bulb and a socket.

4. Explain the term overloading of an electric circuit.

5. Name the physical quantities which are indicated by the direction of thumb and forefinger in the Fleming's right hand rule?

6. Explain any two situations that can cause electrical hazards in domestic circuits.

7. Cable of an electric iron has three wires inside it which have insulation of different colours black, green and red. Mention the significance of the three colours.

8. State the rule to find the direction of magnetic field associated with a current carrying conductor.

9. How is the strength of magnetic field near a straight current-conductor

(i) related to the strength of current in the conductor?

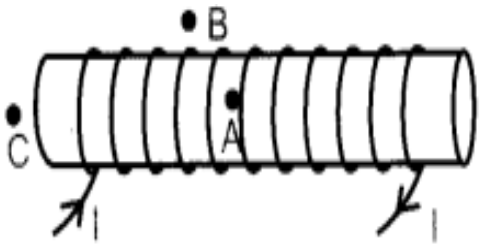
(ii) is affected by changing the direction of flow of current in the conductor?

10. Why and when does a current carrying conductor kept in a magnetic field experience force? List the factors on which direction of this force depends?

11. What are magnetic field lines? Justify the following statement

(a) Two magnetic field lines never intersect each other.

12. For the current carrying solenoid as shown below, draw magnetic field lines and giving reason explain that out of the three points A, B and C at which point the field strength is maximum and at which point it is minimum.



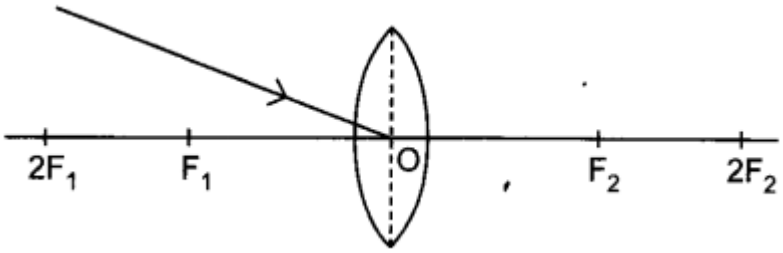
13. What is meant by solenoid? How does a current carrying solenoid behave?

14. List three factors which may lead to the short circuit.

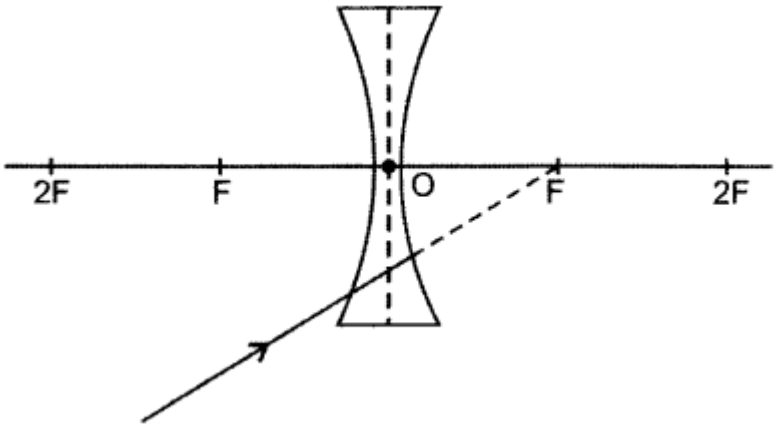
LIGHT- REFLECTION AND REFRACTION

One Mark Each

1. "The refractive index of glass is 1.42". What is the meaning of this statement in relation to speed of light?
2. Redraw the given diagram and show the path of the refracted ray:



3. Which kind of mirrors are used in the headlights of a motor-car?
4. Why does a ray of light bend when it travels from one medium into another?
5. Redraw the diagram given below in your answer book and show the direction of the light ray after refraction from the lens.



6. Define refractive index.
7. Why a ray of light passing through the centre of curvature of a concave mirror, gets reflected along the same path?
8. What is the nature of the image formed by a concave mirror if the magnification produced by the mirror is +3?
9. Between which two points of a concave mirror should an object be placed to obtain a magnification of -3?

10. Between which two points related to a concave mirror should an object be placed to obtain on a screen an image twice the size of the object?

11. What is S.I. unit of power of a lens?

12. What is meant by 'power of a lens'?

13. If the image formed by a lens is diminished in size and erect, for all positions of the object, what type of lens is it?

14. Name the point on the lens through which a ray of light passes undeviated.

15. What is the units of refractive index?

TWO MARKS EACH

1. Explain with the help of a diagram, why a pencil partly immersed in water appears to be bent at the water surface.

2. Draw ray diagrams to represent the nature, position and relative size of the image formed by a convex lens for the object placed:
   (a) at $2F_1$
   (b) between F_1 and the optical centre O of lens.

3. A ray of light, incident obliquely on a face of a rectangular glass slab placed in air, emerges from the opposite face parallel to the incident ray. State two factors on which the lateral displacement of the emergent ray depends.

4. What is the minimum number of rays required for locating the image formed by a concave mirror for an object? Draw a ray diagram to show the formation of a virtual image by a concave mirror.

5. The refractive index of water is 1.33 and the speed of light in air is 3×10^8 ms^{-1}. Calculate the speed of light in water.

6. The refractive index of glass is 1.50 and the speed of light in air is 3×10^8 ms^{-1}. Calculate the speed of light in glass.

7. In an experiment with a rectangular glass slab, a student observed that a ray of light incident at an angle of 55° with the normal on one face of the slab, after refraction strikes the opposite face of the slab before emerging out into air making an angle of 40° with the normal. Draw a labelled diagram to show the path of this ray. What value would you assign to the angle of refraction and angle of emergence?

8. State the two laws of reflection of light.

9. Define and show on a diagram, the following terms relating to a concave mirror:
   (i) Aperture
   (ii) Radius of curvature

10. Distinguish between a real and a virtual image of an object. What type of image is formed (i) by a plane mirror, (ii) on a cinema screen?

11. Define the focus of a concave mirror. If the radius of curvature of a convex mirror is 30 cm, what would be its focal length?

12. What is understood by lateral displacement of light? Illustrate it with the help of a diagram.

13. List four properties of the image formed by a plane mirror.

14. List four properties of the image formed by a convex mirror.

15. List the sign conventions for reflection of light by spherical mirrors.

FOUR MARKS EACH

1. A concave lens has focal length of 10 cm. At what distance from the lens a 5 cm tall object be placed so that it forms an image at 15 cm from the lens? Also calculate the size of the image formed.

2. An object 2 cm in size is placed 20 cm in front of a concave mirror of focal length 15 cm. At what distance from the mirror should a screen be placed in order to obtain a sharp image? What will be the nature and the size of the image formed? Draw a ray diagram to show the formation of the image in this case.

3. An object 2 cm high is placed at a distance of 64 cm from a white screen. On placing a convex lens at a distance of 32 cm from the object it is found that a distinct image of the object is formed on the screen. What is the focal length of the convex lens and size of the image formed on the screen? Draw a ray diagram to show the formation of the image in this position of the object with respect to the lens.

4. For which position of the object does a convex lens form a virtual and erect image? Explain with the help of a ray diagram.

5. At what distance should an object be placed from a convex lens of focal length 18 cm to obtain an image at 24 cm from it on the other side. What will be the magnification produced in this case?

6. How far should an object be placed from a convex lens of focal length 20 cm to obtain its image at a distance of 30 cm from the lens? What will be the height of the image if the object is 6 cm tall?

7. Draw a ray diagram and also state the position, the relative size and the nature of image formed by a concave mirror when the object is placed at the centre of curvature of the mirror.

8. Define ‘refractive index of a transparent medium.’ What is its unit? Which has a higher refractive index, glass or water?

9. A ray of light travelling in air enters obliquely into water. Does the light ray bend towards or away from the normal? Why? Draw a ray diagram to show the refraction of light in this situation.

10. List four properties of the image formed by a concave mirror, when object is placed between focus and pole of the mirror.

11. State the type of mirror preferred as (i) rear view mirror in vehicles, (ii shaving mirror. Give reason in each case.

12. Name the type of mirror used in the following situations:
    (i) Headlights of a car (ii) Rear-view mirror of vehicles (iii) Solar furnace

13. A 6 cm tall object is placed perpendicular to the principal axis of a convex lens of focal length 15 cm. The distance of the object from the lens is 10 cm. Find the position, size and nature of the image formed, using the lens formula.

SIX MARKS EACH

1. Draw the ray diagram in each case to show the position and nature of the image formed when the object is placed:

   (i) at the centre of curvature of a concave mirror
   (ii) between the pole P and focus F of a concave mirror
   (iii) in front of a convex mirror
   (iv) at 2F of a convex lens
   (v) in front of a concave lens

2. Obtain an erect image of an object, using a concave mirror of focal length 20 cm.

   (i) What should be the range of distance of the object from the mirror?
   (ii) Will the image be bigger or smaller than the object?
   (iii) Draw a ray diagram to show the image formation in this case.

3. (a) If the image formed by a lens is diminished in size and erect, for all positions of the object, what type of lens is it?
   (b) Name the point on the lens through which a ray of light passes undeviated.
   (c) An object is placed perpendicular to the principal axis of a convex lens of focal length 20 cm. The distance of the object from the lens is 30 cm. Find (i) the position (ii) the magnification and (iii) the nature of the image formed.

4. (a) What is meant by 'power of a lens'?
   (b) State and define the S.I. unit of power of a lens.
   (c) A convex lens of focal length 25 cm and a concave lens of focal length 10 cm are placed in close contact with each other. Calculate the lens power of this combination.

5. (a) Draw a ray diagram to show the formation of image of an object placed between infinity and the optical centre of a concave lens.
   (b) A concave lens of focal length 15 cm forms an image 10 cm from the lens. Calculate
   (i) the distance of the object from the lens.
   (ii) the magnification for the image formed.
   (iii) the nature of the image formed.

6. List the sign conventions for reflection of light by spherical mirrors. Draw a diagram and apply these conventions in the determination of focal length of a spherical mirror which forms a three times magnified real image of an object placed 16 cm in front of it.

7. State the law of refraction of light that defines the refractive index of a medium with respect to the other. Express it mathematically. How is refractive index of any medium 'A' with respect to a medium 'B' related to the speed of propagation of light in two media A and B? State the name of this constant when one medium is vacuum or air.
   The refractive indices of glass and water with respect to vacuum are 3/2 and 4/3 respectively. If the speed of light in glass is 2 x 108 m/s, find the speed of light in (i) vacuum, (ii) water.

8. List the sign conventions that are followed in case of refraction of light through spherical lenses. Draw a diagram and apply these conventions in determining the nature and focal length of a spherical lens which forms three times magnified real image of an object placed 16 cm from the lens.

THE HUMAN EYE AND THE COLOURFUL WORLD

ONE MARK EACH

1. Why is red colour selected for danger signal lights?

2. What is meant by spectrum of white light?

3. Name the part of our eyes that helps us to focus near and distant objects in quick succession.

4. A person is advised to wear spectacles with concave lenses. What type of defect of vision is he suffering from?

5. A person is advised to wear spectacles with convex lenses. What type of defect of vision is he suffering from?

6. Why do different components of white light deviate through different angles when passing through a triangular glass prism?

7. What will be the colour of the sky, when it is observed from a place in the absence of any atmosphere? Why?

8. A person can comfortably read a book but finds it difficult to read the number on a bus parked 5 m away from him. Name the type of defect of vision he is suffering from. Which type of lens should he use in his spectacles to correct his vision?

9. The sky appears dark instead of blue to an astronaut. State its reason.

10. What is Tyndall effect?

11. Give an example of optical phenomena which occurs in nature due to atmospheric refraction.

12. Give an example of a phenomenon where Tyndall effect can be observed.

13. Name the type of particles which acts as a prism in the formation of rainbow in the sky.

14. What is the cause of dispersion of white light on passing through a prism?

15. Name the atmospheric phenomenon due to which the sun can be seen above the horizon about two minutes before actual sunrise.

16. State one function of iris in human eye.

17. State one function of the crystalline lens in the human eye.

18. State one function of pupil in human eye.

19. State one function of cornea in human eye.

20. State two properties of the image formed by the eye lens on the retina.

21. Why does the sun appear reddish at sunrise?

TWO MARKS EACH

1. Student sitting at the back bench in a class is not able to see what is written on the blackboard. He however, sees it clearly when sitting on the front seat at an approximate distance of 1.5 m from the blackboard. Draw ray diagrams to illustrate the image formation of the blackboard when he is seated at the (i) back seat (ii) front seat.

2. What is meant by spectrum of white light? How can we recombine the components of white light after a prism has separated them? Draw a diagram to illustrate it.

3. Explain why do the planets not twinkle but the stars twinkle.

4. What is myopia (near-sightedness)? Draw a ray diagram to show how it can be corrected using a lens.

5. What is hypermetropia (far-sighted-ness)? Draw a ray diagram to show how this defect can be corrected using a lens.

6. Define the term dispersion of white light. State the colour which bends (i) the least and (ii) the most while passing through a glass prism.

7. Give reasons:
   (i) The extent of deviation of a ray of light on passing through a glass prism depends on its colour.
   (ii) Lights of red colour are used for danger signals.

8. A star appears slightly higher (above) than its actual position in the sky. Illustrate it with the help of a labelled diagram.

9. Draw a ray diagram to show the refraction of light through a glass prism. Mark on it (a) the incident ray. (b) the emergent ray and (c) the angle of deviation.

10. What is a spectrum? Why do different coloured rays deviate differently on passing through a glass prism?

11. What is the colour of the clear sky during day time? Give reason for it.

FOUR MARKS EACH

1. (a) A student cannot see clearly a chart hanging on a wall placed at a distance 3 m from his eye. Name the defect of vision he is suffering from. Draw a ray diagram to illustrate this defect. List its two possible causes.

   (b) Draw a ray diagram to show how this defect may be corrected using a lens of appropriate focal length.

   (c) An eye donation camp is being organised by social workers in your locality. How and why would you help in this cause?

2. What is meant by the term 'power of accommodation' of human eye? How does it help a person to see nearby as well as distant objects clearly?

3. (a) What is meant by the power of accommodation of an eye?

   (b) A person with a myopic eye cannot see objects beyond 1.2 m directly. What should be the type of the corrective lens used? What would be its power?

4. What is dispersion of white light? What is the cause of such dispersion? Draw a diagram to show the dispersion of white light by a glass prism.

5. (a) Explain the following terms used in relation to defects in vision and correction provided by them:
   (i) Myopia (ii) Far-sightedness iii) Presbyopia

   (b) Why is the normal eye unable to focus on an object placed within 10 cm from the eye?

6. A 11-year old student is not able to see clearly the questions written on the blackboard placed at a distance of 5 m from him.

   (a) Name the defect of vision he is suffering from.
   (b) With the help of labelled ray diagrams show how this defect can be corrected.
   (c) Name the type of lens used to correct this defect**.**