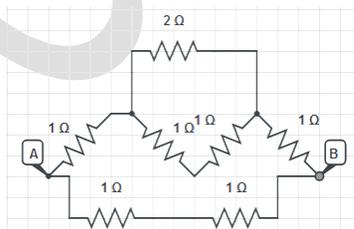


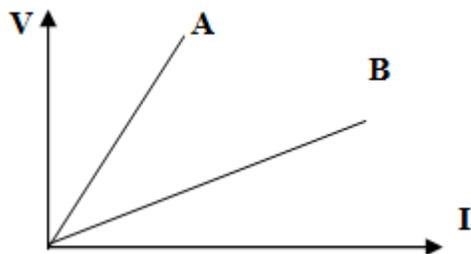
## Chapter 12: ELECTRICITY

1. B1, B2 and B3 are three identical bulbs connected in parallel across 4.5 V supply. If current I given by the supply is 3A such that all the bulbs glow. Answer the following questions:
  - a. If B1 gets fused, what happens to the intensity of other two bulbs?
  - b. What is the value of I1, I2 and I3 when B2 is fused?
  - c. How much power is dissipated in the circuit when all the three bulbs glow together?
2. An electrical toaster rated 20W, 10 V is connected to a 10 V supply for 2 hrs daily. If the billing rate is Rs 10 per unit, what is the bill at the end of 30 days?
3. What does an electric circuit mean?
4. Define the unit of current.
5. Calculate the number of electrons constituting one coulomb of charge.
6. Name a device that helps to maintain a potential difference across a conductor.
7. What is meant by saying that the potential difference between two points is 1 V?
8. On what factors does the resistance of a conductor depend?
9. Will current flow more easily through a thick wire or a thin wire of the same material, when connected to the same source? Why?
10. Why are coils of electric toasters and electric irons made of an alloy rather than a pure metal?
11. Two bulbs each of rating 40W,220V and 60W,220V are available. Which bulb has a thicker filament?
12. Find equivalent R between A and B



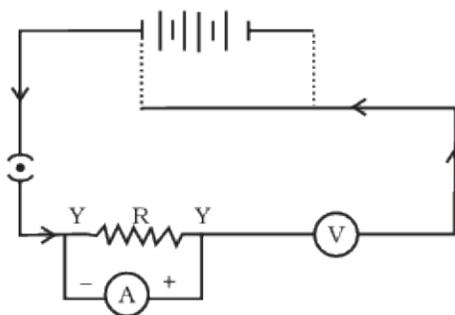
13. Two bulbs each rated 20W, 10V and 30W, 15V are connected to a 10V supply in parallel. What is the power delivered by each bulb? What is the current through each bulb? What happens if a bulb rated 5W,5V is also connected in parallel?
14. You are given several identical resistors each having resistance of 10 ohms and a maximum current of 1A is allowed to pass through each resistor. It is required to make a suitable combination of these resistances of 5 ohms which can carry a current of 4A. Find the number of such resistances that will be required.
15. What are the advantages of connecting electrical devices in parallel with the battery instead of connecting them in series?
16. How can three resistors of resistances 2  $\Omega$ , 3  $\Omega$ , and 6  $\Omega$  be connected to give a total resistance of (a) 4  $\Omega$ , (b) 1  $\Omega$ ?

17. Two identical wires A and B are operated at different temperatures. Their V-I graph is shown below:



Which wire is at higher temperature?

18. A 2 ohm resistance wire of length  $L$  is bent to form a circle such that its circumference is same as that of the length of the wire. What is the equivalent resistance across the diametric ends of the circle formed?
19. Why does the cord of an electric heater not glow while the heating element does?
20. The values of current  $I$  flowing in a given resistor for the corresponding values of potential difference  $V$  across the resistor are given below –
- |               |     |     |     |      |      |
|---------------|-----|-----|-----|------|------|
| $I$ (amperes) | 0.5 | 1.0 | 2.0 | 3.0  | 4.0  |
| $V$ (volts)   | 1.6 | 3.4 | 6.7 | 10.2 | 13.2 |
- Plot a graph between  $V$  and  $I$  and calculate the resistance of that resistor.
21. How many  $176 \Omega$  resistors (in parallel) are required to carry 5 A on a 220 V line?
22. Several electric bulbs designed to be used on a 220 V electric supply line, are rated 10 W. How many lamps can be connected in parallel with each other across the two wires of 220 V line if the maximum allowable current is 5 A?
23. Which uses more energy, a 250 W TV set in 1 hr, or a 1200 W toaster in 10 minutes?
24. Why is the tungsten used almost exclusively for filament of electric lamps?
25. Why are copper and aluminium wires usually employed for electricity transmission?
26. Draw a schematic diagram of a circuit consisting of a battery of three cells of 2 V each, a  $5 \Omega$  resistor, an  $8 \Omega$  resistor, and a  $12 \Omega$  resistor, and a plug key, all connected in series.
27. A child has drawn the electric circuit to study Ohm's law as shown in figure below. His teacher told that the circuit diagram needs correction. Study the circuit diagram and redraw it after making all corrections.



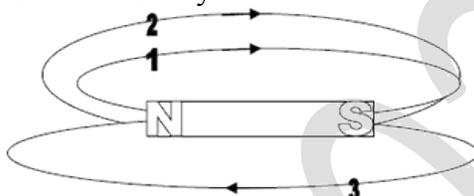
28. What is electrical resistivity? In a series electrical circuit comprising a resistor made up of a metallic wire, the ammeter reads 5 A. The reading of the ammeter decreases to half when the length of the wire is doubled. Why?
29. State Ohm's law? How can it be verified experimentally? Does it hold good under all conditions? Comment.
30. What is electrical resistivity of a material? What is its unit?
31. Describe an experiment to study the factors on which the resistance of conducting wire depends.
32. How many electrons per second pass through a given point of wire carrying 2A current?
33. What is dangerous: "High Voltage" or "High Current"? Justify.
34. Why an ammeter could burn out, if connected in parallel to a branch in a circuit?
35. A wire of length 1 m has a resistance of 1  $\Omega$ . If the same wire is stretched upto a length of 2 m, what will be the new resistance?
36. How much work is done in moving a charge of 2 coulombs from a point at 118 volts to a point at 128 volts?
37. A copper wire has a diameter of 0.5 mm and resistivity of  $1.6 \times 10^{-1}$  m. What will be the length of this wire to make its resistance 100 ohm? How much does the resistance change if the diameter is doubled?
38. (a) Why do copper or aluminium wires generally used for electrical transmission and distribution purposes ?  
(b) Two wires, one of copper and other of manganin, have equal lengths and equal resistances. Which wire is thicker ? Given that resistivity of copper is lower than that of manganin.
39. What is a rheostat? What is the function of rheostat?
40. Enlist two disadvantages of Ohm's Law.
41. An LED is connected directly to a 9 V cell and it was observed that the LED got damaged. What must be the reason? What can be done to avoid the damage?

### **Chapter 13: Magnetic Effects of Electric Current**

#### **VSA ( 1 mark each):**

42. If the frequency of A.C. is 50 Hz, then how many times current changes its direction in 1s?
43. Which property of proton will change while it freely move in the magnetic field?
44. Name one source each of AC and DC.
45. Name two safety measures commonly used in electric circuits and appliances.
46. In which position the force on the current conductor is maximum when it is placed in uniform magnetic field?
47. Name some devices in which electric motors are used.
48. Two circular coils A and B are placed closed to each other. If the current in the coil A is changed, will some current be induced in the coil B? Give reason.
49. Why do magnetic field lines at the centre of current carrying circular coil appears straight?
50. Draw magnetic field lines of a bar magnet.

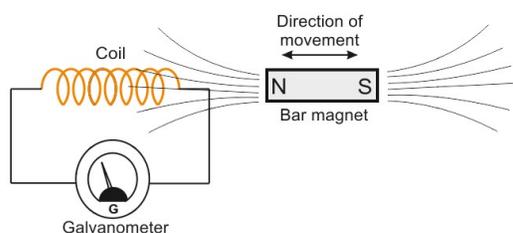
51. List the properties of magnetic lines of force.
52. Why do magnetic field lines not intersect?
53. What is the role of split ring?
54. When does an electric short circuit occur?
55. How can you convert an AC generator into DC generator?
56. A student draws three magnetic field lines 1,2 and 3 of a bar magnet:
  - a. Is this configuration of field line possible?
  - b. If not what is wrong in the field and why?



57. A current through a horizontal power line flows in north to south direction. What is the direction of magnetic field:
  - a. At a point directly below it
  - b. At a point directly above it
58. What is the difference between direct current and alternate current? Write one advantage of alternate current.
59. A wire carrying current is passing through a hole at the middle of a cardboard. Plot the magnetic field lines.
60. What is the function of an earth wire? Why is it necessary to earth metallic appliances?

**SA-II ( 3 marks each):**

61. Which phenomenon is shown in the figure next page?



Which physical quantity is set up in the coil when there is a relative motion between coil and magnet?

What may be the cause of production of that physical quantity?

62. Draw the magnetic field lines due to a bar magnet. Mention any two properties of the magnetic field lines.
63. Explain different ways to induce current in the coil.
64. State the rule to determine the direction of a (i) magnetic field produced around a straight conductor-carrying current, (ii) force experienced by a current-carrying straight conductor placed in a magnetic field which is perpendicular to it, and (iii) current induced in a coil due to its rotation in a magnetic field.
65. Draw the pattern of lines of force due to magnetic field associated with a current carrying straight conductor. State how the magnetic field produces changes:

- a. With an increase in current in the conductor
  - b. The distance from the conductor
66. Explain what is short circuiting and overloading in an electric supply.  
What is the usual capacity of the fuse wire in the line to feed lights and appliances of 2kW or more power?

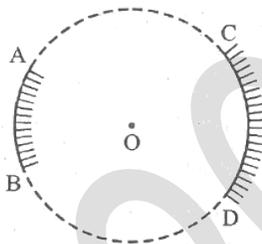
**LA ( 5 marks each):**

67. Draw the line of forces of the magnetic field through and around:
- a. A single loop wire carrying current
  - b. A solenoid carrying current
68. Draw a schematic diagram of a domestic electric circuit which includes a main fuse, a power meter, a light point, a fan and a power plug. Why is it necessary to earth electric metal appliances.
69. What is electromagnetic induction? Name two methods of inducing electric current in a coil. Explain each method with the help of diagram.
70. State the principle on which electromagnet works. Describe an activity to make an electromagnet. Give two uses of electromagnet.
71. Explain the electric motor and state Fleming's Left Hand Rule.
72. Explain the A.C. generator and state Fleming's Right Hand Rule.

**Chapter 10: Light Reflection and Refraction****VSA ( 1 mark each):**

73. Why do we prefer convex mirror as rear view mirror in vehicles?
74. Identify the mirror whose magnification factor is 0.5.
75. Define 1 D.
76. Write any two applications of concave mirrors.
77. Define absolute refractive index.
78. State Snell's Law of refraction.
79. The magnification produced by a plane mirror is +1. What does this mean?
80. Why absolute refractive index cannot be less than 1?
81. A doctor has prescribed a corrective lens of power +1.5 D. Find the focal length of the lens. Is the prescribed lens diverging or converging?
82. The refractive index of diamond is 2.42. What is the meaning of this statement?
83. List four characteristics of the image formed by plane mirrors.
84. List four characteristics of the image formed by convex mirrors.
85. One-half of a convex lens is covered with a black paper. Will this lens produce a complete image of the object? Verify your answer experimentally. Explain your observations.
86. Write two applications each for: convex lens and concave lens.
87. State two positions in which a concave mirror produces a magnified image of an object. List two differences between the two images.

88. The linear magnification produced by a spherical mirror is +3. Analyse this value and state the:
- Type of mirror
  - Position of the object with respect to the pole of the mirror
- Draw the ray diagram to show the formation of image in this case.
89. AB and CD, two spherical mirrors, form parts of a hollow spherical ball with its centre O as shown in figure below. If arc AB = 0.5 arc CD, what is the ratio of their focal lengths? State which of the two mirrors will always form virtual image of an object placed in front of it?



90. The linear magnification produced by a spherical mirror is  $1/3$ . Analysing this value, state the:
- Type of mirror
  - Position of object with respect to pole of the mirror. Draw ray diagram to justify your answer.
91. The linear magnification produced by a spherical mirror is  $-1/5$ . Analysing this value, state the:
- Type of mirror
  - Position of object with respect to pole of the mirror. Draw ray diagram to justify your answer.
92. Under what condition of arrangement of two plane mirrors, incident and reflected light rays will always be parallel to each other, whatever may be the angle of incidence. Show the same with the help of ray diagram.

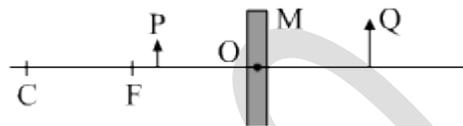
**SA-II ( 3 marks each):**

93. Name the type of mirror used in the following with justification:
- Headlights
  - Rear view mirror
  - Solar furnace
94. Refractive index of glass is  $n_g$  and refractive index of water is  $n_w$ . What will be the refractive index of glass with respect to water?

**LA ( 5 marks each):**

95. Define the following terms in the context of spherical mirrors:
- Pole
  - Centre of Curvature
  - Principal axis
  - Principal focus
- Draw a ray diagram to show principal focus of concave and convex mirror.

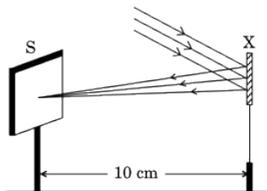
- ii. Consider the following diagram shown below in which M is a mirror and P is an object and Q is its magnified image formed by the mirror. State the type of mirror M and one characteristic property of the image Q.



96. A student has focussed the image of a candle flame on a white screen using a concave mirror. The situation is as given below:  
 Length of flame = 1.5 cm  
 Focal length of the mirror = 12 cm  
 Distance of flame from the mirror = 18 cm  
 If flame is perpendicular to the principal axis of the mirror, then calculate the following:  
 a. Distance of the image from the mirror  
 b. Length of the image  
 If the distance between the mirror and the flame is reduced to 10 cm, then what would be observed on the screen? Draw a ray diagram to justify your answer for this situation.

### Numerical Section

97. An object is placed at a distance of 30 cm from a convex mirror, the magnification produced is  $\frac{1}{2}$ . Where should the object be placed to get the magnification of  $\frac{1}{3}$ ? (Ans: -60 cm) (2 marks)
98. An object is kept in front of a concave mirror of focal length 20 cm. The image is three times the size of the object. Calculate two possible distances of the object from the mirror. (Ans:  $-\frac{80}{3}$  cm,  $-\frac{40}{3}$  cm) (2 marks)
99. The image of an object formed by a mirror is real, inverted and is of magnification -1. If the image is at a distance of 40 cm from the mirror, where is the object placed? Where would the image be if the object is moved 20 cm towards the mirror? State the reason and also draw ray diagram for the new position of the object to justify your answer. (Ans: -40 cm, infinity) (3 marks)
100. The size of image of an object by a mirror having a focal length of 20 cm is observed to be reduced to  $\frac{1}{3}$ <sup>rd</sup> of its size. At what distance the object has been placed from the mirror? What is the nature of the image and the mirror? (Ans: -80 cm, -40 cm) (3 marks)
101. Student obtained a sharp image of a candle flame placed at a distant end of the laboratory table on a screen using a concave mirror to determine its focal length. The teacher suggested him to focus a distant building 1 km far from the laboratory, for getting more correct value of the focal length. How must the student adjust the screen and the mirror in order to focus the distant building on the same screen sharply?
102. A student determines the focal length of a device X by focusing the image of distant object on a screen placed 20 cm from the device on the same side as the object. Identify the device and its focal length.
103. A student used a device "X" to obtain the image of a well illuminated distant building on a screen "S" as shown in the diagram. Identify the device and its focal length.



104. A student obtained a sharp inverted image of a distant tree on a screen placed in front of concave mirror. He then removed the screen and tried to look into the mirror. What would be the nature of the image of tree that he would observe now?

### Chapter 11: Human Eye and Colourful World

105. State the cause of dispersion of white light passing through a glass prism. How did Newton show that white light of sun contains seven colours using two identical glass prisms. Draw a ray diagram to show the path of light when two identical glass prisms are arranged together in inverted position with respect to each other and a narrow beam of white light is allowed to fall obliquely on one of the focus of the first prism.
106. (a) Write the function of each of the following parts of the human eye: Cornea; iris; crystalline lens; ciliary muscles  
(b) Millions of people in the developing countries of the world are suffering from corneal blindness. These persons can be cured by replacing the defective cornea with the cornea of a donated eye. A charitable society of your city has organised a campaign in your neighbourhood in order to create awareness about this fact. If you are asked to participate in this mission, how would you contribute in this noble cause?  
(i) State the objective of organising such campaigns.  
(ii) List two arguments which you would give to motivate the people to donate their eyes after death.  
(iii) List two values which are developed in the persons who actively participate and contribute in such programmes.
107. Why does the sun appear reddish early in the morning? Will this phenomenon be observed by an observer on the moon? Justify your answer with a reason.
108. Describe an activity to show that the colours of white light splitted by a glass prism can be recombined to get white light by another identical glass prism. Also, draw a ray diagram to show the recombination of the spectrum of white light.
109. What is atmospheric refraction? Use this phenomenon to explain the following natural events:  
(a) Twinkling of stars  
(b) Advanced sunrise and delayed sunset  
Draw diagrams to illustrate your answer.

- 110.** A student is unable to see clearly the words written on the black board at a distance of approximately 4 m from him. Name the defect of vision of the boy. Explain the method of correcting and draw the ray diagrams.
- 111.** Write the importance of ciliary muscles in the human eye. Name the defect of vision that arises due to gradual weakening of the ciliary muscles in old age. What type of lenses are required by the persons suffering from this defect to see the objects clearly? Akshay, sitting in the last row in his class, could not see clearly the words written on the blackboard. When the teacher noticed it, he announced if any student sitting in the front row could volunteer to exchange his seat with Akshay. Salman immediately agreed to exchange his seat with Akshay. He could now see the words written on the blackboard clearly. The teacher thought it fit to send the message to Akshay's parents advising them to get his eyesight checked. In the context of the above event, answer the following questions :
- (a)** Which defect of vision is Akshay suffering from? Which type of lens is used to correct this defect?
- (b)** State the values displayed by the teacher and Salman.
- (c)** In your opinion, in what way can Akshay express his gratitude towards the teacher and Salman?
- 112.** Why planets do not twinkle but stars do?
- 113.** Why moon do not twinkle?
- 114.** Why red light is used as danger signal?
- 115.** Why do light disperse after refraction?
- 116.** What is persistence of vision?
- 117.** What is power of accommodation?
- 118.** The far point of myopic eye is 500 cm. Find the power of lens for correction. State its nature.
- 119.** The near point of hypermetropic eye is 60 cm. Find the power of lens for correction. State its nature.
- 120.** State the phenomenon involved in rainbow formation.