

Physics Numerical _ LIGHT

1. An object 5.0 cm in length is placed at a distance of 10cm from a convex mirror of radius of curvature 150cm. Find the position, nature and size of the image.
2. Find the position, nature and size of image of an object 4cm high placed at a distance of 10 cm from a concave mirror of focal length 20 cm.
3. An object is placed at a distance of 25 cm from the pole of a spherical mirror which forms a real, inverted image on the same side of object at 37.5 cm from the pole. Calculate the focal length of mirror and find nature of the mirror.
4. An object 2.0 cm in size is placed 20.0 cm in front of a concave mirror of focal length 10.0 cm. Find the distance from the mirror at which a screen should be placed in order to obtain a sharp image. What will be the size and nature of the image formed?
5. Find the position of an object which when placed in front of a concave mirror of focal length 20 cm produces a virtual image, which is twice the size of the object.
6. A concave lens has a focal length of 15cm. At what distance should an object 10 cm long be placed so that it forms an image of 10 cm from the lens? Find the nature and size of the image formed.
7. A convex lens has a focal length of 30 cm. Calculate at what distance should the object be placed from the lens so that it forms an image at 60 cm on the other side of the lens. Find the magnification produced by the lens in this case.
8. A concave lens has focal length 20cm. 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.
9. A Calculate the focal length of convex lens which produces a virtual image at a distance of 25 cm of an object placed 10cm in front of it.
10. A concave lens of focal length 15 cm forms an image of 10 cm from the lens. How far is object from the lens? What are its characteristics?
11. Light enters from air into glass plate which has a refractive index of 1.5. Calculate the speed of light in glass. (Given, speed of light in vacuum is $3 \times 10^8 \text{ms}^{-1}$)
12. A person cannot see distinctly any object placed beyond 40 cm from his eye. Calculate the power of the lens which will help him to see distant object clearly.
13. The near point of a hypermetropic person is 75 cm from the eye. What is the power of lens required to enable him to read clearly a book held at 25 cm from the eye?
14. A person with a myopic eye is not able to see beyond 3 m distinctly. Determine the nature, focal length and power of the lens required.
15. The near point of a hypermetropic person is 1m. What is the power of lens required to correct this defect? Assume that near point of the normal eye is 25 cm.

Physics Numerical _ Electricity and Magnetism

16. There are two electric bulbs (i) marked 60 W, 220V and (ii) marked 100 W, 220V. Which one of the two has a higher resistance?
17. A cylinder of a material is 10 cm long and has a cross-section of 2 cm^2 . If its resistance along the length be 20Ω , what will its resistivity value be in number and units?
18. Two bulbs are marked 60 W, 220V and 100 W, 220V. These are connected in parallel to 220V mains. Which one of the two will glow brighter?
19. Two wires A and B are of the same metal. Have the same area of cross-section and have their lengths in the ratio of 2:1. What will be the ratio of currents flowing through them respectively when the same potential difference is applied across length of each of them?
20. A torch bulb is rated at 2.5 V, 500 mA. Find its (i) Power and (ii) Resistance.

21. Geyser draws a current of 15 A from the main line for half an hour to heat water. Calculate the amount of charge that flows through the filament.
22. When a 12V battery is connected across an unknown resistor, there is a current of 2.5 mA in the circuit. Find the value of the resistance of the resistor.
23. An electric lamp is marked 25 W, 220 V. It is used for 10 hrs daily. Calculate (i) its resistance while glowing. (ii) Energy consumed in kWh per day.
24. A heater coil is rated 100 W, 220V. It is cut into two identical parts. Both parts are connected together in parallel to the same source of 200V. Calculate the energy liberated per second in the new combination.
25. An electric heater is used everyday for 120 minutes. The electricity bill for 30 days is 60 units. Calculate the power of the electric heater.
26. A piece of wire having resistance R is cut into four equal parts. (i) What will be the resistance of each part, compare it with the original one. (ii) If the four parts are placed in parallel, what will be the equivalent resistance, compare it with the original.
27. You are given an 8Ω resistor. What will be the number of resistors that you put in parallel to make a resistance of 2Ω ?
28. A 100m long copper wire having a radius of 0.5 mm is used to connect two electrical appliances. Calculate the resistance offered by the wire to the flow of current.
29. Resistance of a metal wire of length 1 m is 26Ω at 20°C . If the diameter of the wire is 0.3 mm, what will be the resistivity of the metal at that temperature?
30. (i) Draw a schematic diagram of a circuit consisting of a battery of five 2 V cells, a 5Ω resistor, a 10Ω resistor and a 15Ω resistor, and a plug key, all are connected in series.
(ii) Calculate the electric current passing through the above circuit when the key is closed.
31. In a household 5 tubelights of 40 W each are used for 5 hrs and an electric press of 5000W for 4 hrs everyday. Calculate the total electrical energy consumed by the appliances in the month of March.
32. Two identical resistors, each of resistance 2Ω are connected in turns
(i) In series and (ii) in parallel, to a battery of 12 V. Calculate the ratio of power consumed in two cases.
33. A 100W electrical bulb is lighted for 2hrs everyday and five 40W tubes are lighted for 4hrs everyday. Find (i) the energy consumed for 60 days and (ii) cost of electricity consumed at the rate of Rs.1.50/ kWh.
34. A magnanin wire of resistivity $4.4 \times 10^{-5} \Omega \text{ m}$ has a diameter of 0.4 mm. What will be the length of this wire to make a resistance of 4Ω ? How will the resistance change, if the diameter is halved?
35. An electric draws energy of 480 kJ in 1 minute. If the resistance of heating device is 20Ω , calculate the current flowing through the device.
36. Calculate the electric energy flowing into the filament of an electric bulb in 20s, when its resistance is 40Ω and potential difference across its terminal is 12 V.
37. 100 kJ of energy flows in 21 minute and 40 seconds in an electric device of resistance 40Ω . Calculate the potential difference at the ends of the device.
38. An electric device operates at 24 V and has a resistance of 8Ω . Calculate the power consumed by the device and the current flowing through it.
39. An electric heater is used on 220V supply and takes a current of 3.4A. Calculate (i) its power and (ii) its resistance when it is in use.
40. A charge of 8860 C flows through a conductor in 2 min and 40 sec. Calculate the magnitude of current.