

# PHYSICS

## BOOKS - UNITED BOOK HOUSE

### MODEL PAPER SET-08

#### Exercise

1. The total flux  $\phi$  comes out of a sphere of radius  $r$ . Keeping the amount of charge constant, if the radius of the sphere is made

$2r$ , how much flux will come out of the sphere  
now?—

A.  $2\phi$

B.  $4\phi$

C.  $\frac{\phi}{2}$

D.  $\phi$

**Answer:**



**Watch Video Solution**

2. A parallel plate air capacitor has a capacitance  $C$  and the distance between the plates is  $d$ . A metallic plate of thickness  $\frac{d}{3}$  is introduced between the plates of the capacitor. The new capacitance will be—

A.  $\frac{3}{2}C$

B.  $\frac{2}{3}C$

C.  $C$

D.  $3C$

**Answer:**



Watch Video Solution

3. The electric field intensity  $E$ , current density  $J$  and conductivity  $\delta$  are related as—

A.  $\delta = \frac{E}{J}$

B.  $\delta = \frac{J}{E}$

C.  $\delta = JE$

D.  $\delta = \frac{1}{J}E$

**Answer:**



4. A proton enters a magnetic field  $\vec{B}$  with velocity  $\vec{V}$  in a direction opposite to  $\vec{B}$ . The net magnetic force is—

A.  $Bev$

B.  $-Bev$

C.  $Bv$

D. zero

**Answer:**



5. At a certain place the horizontal component of earth's magnetic field is  $\sqrt{3}$  times the vertical component. The angle of dip at that place is—

A.  $30^\circ$

B.  $60^\circ$

C.  $45^\circ$

D.  $75^\circ$

**Answer:**



**Watch Video Solution**

6. The magnetic flux linked with a coil is  $\phi = (3t^2 - 2t + 2)$  mwb. What emf is induced in the coil at  $t = 1$  sec?—

A.  $4V$

B.  $4 \times 10^{-3}V$

C.  $6V$

D.  $6 \times 10^{-3}V$

**Answer:**



**Watch Video Solution**

7. In an ac circuit voltage  $V = 100 \sin(100t) \text{ V}$  and current  $I = 100 \sin(100t) \text{ mA}$ . The power dissipated in the circuit over a full cycle is—

A.  $10^4 \text{ watt}$

B.  $10 \text{ watt}$

C.  $2.5 \text{ watt}$



D. 5watt

**Answer:**



**Watch Video Solution**

**8. Dimension of  $\mu_0$   $\epsilon_0$  are—**

A.  $[LT^{-1}]$

B.  $[L^{-2}T^{-2}]$

C.  $[L^2T^{-2}]$

D.  $[L^{-1}T]$

**Answer:**



**Watch Video Solution**

9. The refractive index of the material of a double equiconvex lens is 1.5. If the radius of curvature of the lens is  $R$ , then its focal length is

A.  $3R$

B.  $2R$

C.  $4R$

D.  $R$

**Answer:**



**Watch Video Solution**

**10.** The refractive angle of prism is  $A$ . A ray is incident normally on one of the refracting faces of a prism and emerges out. If  $D$  be the deviation of the ray then refractive index of the material of the prism is—

A.  $\frac{\sin\left(\frac{A+D}{2}\right)}{\sin\left(\frac{A}{2}\right)}$

B.  $\sin\left(\frac{A+D}{\sin\left(\frac{A}{2}\right)}\right)$

C.  $\sin\left(\frac{\frac{A}{2}+D}{\sin\left(\frac{A}{2}\right)}\right)$

D.  $\frac{\sin(A-D)}{\sin A}$

**Answer:**



**Watch Video Solution**

11. The amount of energy released in the fission of  ${}_{92}\text{U}^{235}$  is—

A.  $200\text{ev}$

B.  $20\text{ev}$

C.  $200\text{kev}$

D.  $200\text{Mev}$

**Answer:**



**Watch Video Solution**

12. The magnitude of saturated photoelectric current depends upon —

- A. Frequency of radiation
- B. intensity of radiation
- C. work function
- D. stopping potential

**Answer:**



**Watch Video Solution**

13. For a transistor used in common emitter configuration,  $\alpha = 0.9$ . What is the change in collector current when the base current changes by  $2\mu A$ ?

A.  $1\mu A$

B.  $0.9\mu A$

C.  $30\mu A$

D.  $18\mu A$

**Answer:**



Watch Video Solution

**14.** As radio waves of low frequencies cannot be transmitted to long distances, a high frequency carrier signal is superposed on it. This process is called—

- A. Amplification
- B. Rectification
- C. Modulation
- D. Oscillation



**Answer:**



**Watch Video Solution**

**15.** An electron is moving along X axis and a magnetic field is directed along Y axis. What will be the direction of magnetic force acting on the electron?



**Watch Video Solution**

**16.** Two infinitely long conductors are placed at a separation  $r$  and each carrying a current  $i$ . What is the magnetic field at a point midway between the conductors when the currents are in opposite directions?



**Watch Video Solution**

**17.** When an aeroplane flies horizontally, a potential difference is developed across the two ends of its wings. Why?





[Watch Video Solution](#)

**18.** Which one of blue and red light will be deviated more by a prism and why?



[Watch Video Solution](#)

**19.** What is polarisation of light?



[Watch Video Solution](#)

20. Write down the symbol and truth table OR gate.



[Watch Video Solution](#)

21. What is forbidden energy gap?



[Watch Video Solution](#)

22. When a shunt  $S$  is connected across galvanometer of resistance  $G$ ,  $\frac{1}{n}$  of the main

current passes through the galvanometer.

What is the relation between  $S$  and  $G$ ?



[Watch Video Solution](#)

**23.** Why is potentiometer preferred to voltmeter for the measurement of emf of a cell? Explain.



[Watch Video Solution](#)

**24.** How does the magnetic moment of a circular coil vary with its radius?



**Watch Video Solution**

**25.** How can you find the direction of the magnetic moment?



**Watch Video Solution**

26. A long wire carries a current of 90 A in the east to west direction. What is the magnitude and direction of magnetic field due to the current 1.5m below the line?



[Watch Video Solution](#)

27. In a piece of ancient wood C -14 and C - 12 are present. the ratio of C -14 and C - 12 in this wood at present is  $\frac{1}{8}$ th part of their ratio in

the ancient wood. Half life of  $C^{14}$  is 5570Y.

What is the age of the wood?



[Watch Video Solution](#)

**28.** What are electromagnetic waves? Write down the relation connecting electric vector, magnetic vector and the direction of propagation of an electromagnetic wave.



[Watch Video Solution](#)



**29.** A plane electromagnetic wave is moving along X-direction in free space. At a certain location in a moment the electric field vector  $\vec{E} = E_0 \sin(\omega t - kx) \hat{j}$ , where  $E_0 = 3 \text{ V/m}$ .

Write down the expression for the magnetic field vector  $\vec{B}$  in that location.



**Watch Video Solution**

**30.** On the X-Y plane two point charges  $+q$  and  $-q$  are placed at positions  $(0, L)$  and  $(0, -L)$

respectively. Find an expression for the intensity of the electric field at a point  $(0, y)$  where  $y \gg L$ . Express the electric field in terms of the dipole moment so formed.



[Watch Video Solution](#)

**31.** What is potential gradient? The electric potential is found to depend on  $X$  only and is given by  $V(x) = ax - bx^2$ , where  $a$  and  $b$  are constants. Find the positions on the  $X$  - axis where electric field intensity is zero.



[Watch Video Solution](#)

32. The parallel plate capacitors of capacitances  $C$  and  $2C$  are connected in parallel and charged to a potential difference  $V$  by a battery. The battery is then disconnected and the space between the plates of capacitance  $C$  is filled with a dielectric of dielectric constant  $K$ . Find the potential difference across the combination now.



[Watch Video Solution](#)

**33.** Write down the Biot - Savart law in the vector form. Hence find the magnetic field intensity in magnitude and direction at the centre of a circular coil carrying a current.



**Watch Video Solution**

**34.** What is the time taken by light to travel through a glass slab of thickness 'd' and refractive index  $\mu$  ?



**Watch Video Solution**

**35.** Write down the condition for minimum deviation in prism.



**Watch Video Solution**

**36.** Calculate the refracting angle of a prism ( $\mu = \sqrt{2}$ ) if a ray of light incident normally on one of the face emerges from the other face just grazing it.



**Watch Video Solution**

**37.** In double slit experiment, the distance between two slits is 0.6 mm and they are illuminated by blue cadmium light ( $\lambda = 4800\text{\AA}$ ). How far from the plane of the slit should a screen be placed so that the fringe width on the screen would be 0.16mm?



**Watch Video Solution**

**38.** A short sighted person can see objects at 20cm from his eyes. What type of lens is to be

used to see clearly objects at 100cm away?



[Watch Video Solution](#)

**39.** What is threshold frequency in connecting with photoelectric effect?



[Watch Video Solution](#)

**40.** Will photoelectrons be emitted by copper plate of work function  $4.4\text{eV}$  when illuminated by visible light?



[Watch Video Solution](#)

**41.** Show that for an electron accelerated by a potential difference of  $V$ - volts, the de - Broglie wavelength will be  $\frac{12.27}{\sqrt{v}} \text{ \AA}$ .



[Watch Video Solution](#)

**42.** Show that kinetic energy of an electron in the first Bohr orbit is numerically half of its potential energy.





[Watch Video Solution](#)

**43.** What is a p-n junction diode? Draw the circuit diagram of a full wave rectifier using p-n junction diodes. Show the input and output voltage waveforms by a schematic graph.



[Watch Video Solution](#)

**44.** What is a photodiode? Draw the I-V characteristic curve of a photodiode. Mention one use of photodiode.



[Watch Video Solution](#)

**45.** Prove that current density of a metallic conductor is directly proportional to the drift speed of electrons.



[Watch Video Solution](#)

**46.** Define mobility of free electrons.



[Watch Video Solution](#)

**47.** The potential difference between the terminals of a cell, in an open circuit was 2.5 volt and when it was connected through a resistance of 5 ohm, the potential difference fell to 1.5v. Find the internal resistance of the cell.



**Watch Video Solution**

**48.** State and explain Kirchhoff's laws for electrical circuits.



**Watch Video Solution**

49. What is the principle of potentiometer?



Watch Video Solution

50. A potentiometer wire has a length 10m and a resistance of 4 ohm. A cell of emf 2V and a resistance box are connected in series with it. Calculate the resistance to be introduced in the box, so as to get a potential gradient of  $0.1Vm^{-1}$ .



[Watch Video Solution](#)

51. Define SI unit of magnetic flux.



[Watch Video Solution](#)

52. Show that  $\frac{d\phi}{dt}$  and  $V$  have the same dimension.



[Watch Video Solution](#)

**53.** A conducting wire of length  $l$  is rotating with angular velocity  $\omega$  in a magnetic field  $B$  perpendicular to it. Prove that the induced e.m.f. at the two ends of the conducting wire is

$$e = \frac{1}{2}B\omega l^2.$$



**Watch Video Solution**

**54.** The electric mains in the house are marked '220v, 50Hz'. Write down the equation for instantaneous voltage.





[Watch Video Solution](#)

**55.** How can an LCR circuit be made purely resistance?



[Watch Video Solution](#)

**56.** A resistance of  $400\Omega$  and a capacitance of reactance  $200\Omega$  are connected in series to a 220V, 50Hz a.c source. If the current in the circuit is 0.49A. Find voltage across resistor and capacitor



[Watch Video Solution](#)

**57.** A resistance of  $400\Omega$  and a capacitance of reactance  $200\Omega$  are connected in series to a 220V, 50Hz a.c source. If the current in the circuits is 0.49A. Find value of the inductance required so that voltage and current are in phase.



[Watch Video Solution](#)



**58.** Derive an expression for the equivalent focal length for two thin convex lenses in contact.



**Watch Video Solution**

**59.** The distance between an object and a screen is 2m. Can an image of an object be obtained on the screen with the help of a convex lens whose power is 1.25D?



**Watch Video Solution**

