SURE SHORT QUESTIONS FOR CLASSXII (PHYSICS)

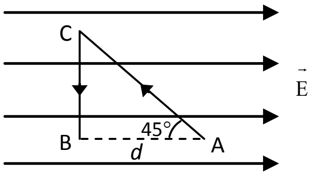
1 MARKS QUESTIONS

1 which orientation a dipole placed in a uniform electric field is in a) Stable, b) Unstable Equilibrium?

Ans. a) For stable equilibrium the angle between p and E must be 0^0

b) For unstable equilibrium the angle between p and E must be 180^0

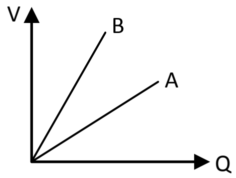
2 A test charge q_0 is moved without acceleration from point A to B along the path A $\rightarrow$ C $\rightarrow$ B as shown in figure. Calculate the potential difference between A and B.



Ans $\quad E = \dfrac{-dv}{dr} = -\dfrac{(V_b - V_a)}{d} = \dfrac{V_a - V_b}{d}$

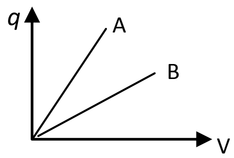
$V_a - V_b = Ed$

3 The graph shows the variation of voltage V across the plates of two capacitors. A and B versus increase of charge Q stored on them. Which of the capacitors has higher capacitance? Give reason for your answer.



Ans. Slope $= \dfrac{1}{C}$; $C_A > C_B$

4 The given graph shows the variation of charge q versus potential difference V for two capacitors C_1 and C_2. The two capacitors have same plate separation but the plate area of C_2 is double than that of C_1. Which of the lines in the graph correspond to C_1 and C_2 and why?



Ans. Use $C \propto A$, A for C_2 , B for C_1

5 A force F is acting between two charges placed some distance apart in vacuum. If a brass rod is placed between these two charges, how does the force change?

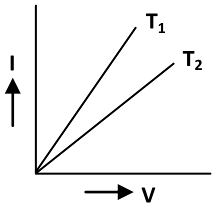
Ans.) K of brass $= \infty$ therefore $F_{brass} = 0$

6 Which physical quantity has its S.I unit (1) Cm (2) N/C

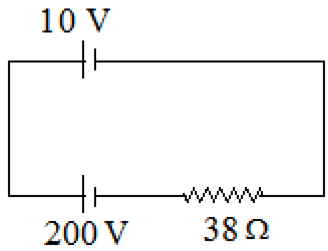
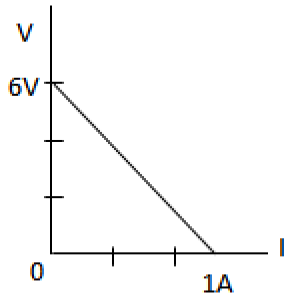
Ans. (1) Electric dipole moment

(2)Electric field Intensity

7 V – I graph for a metallic wire at two different temperatures T_1 and T_2 is as shown in figure. Which of the two temperatures T_1 and T_2 is higher and why?



Ans. $\quad T_2 > T_1$, because R_2 is higher

8	A 10 V battery of negligible internal resistance is connected across a 200 V battery and a resistance of 38 Ω. Find the value of the current in circuit.  Ans: $I = \frac{E}{r + R} = \frac{200 - 10}{0 + 38} = 5\,A$
9	The plot of the variation of potential difference across a combination of three identical cells in series, versus current is as shown below. What is the emf of each cell?  Ans: Let E be emf of each cell and r be the total internal resistance of circuit. The equation of terminal potential difference $V = 3E - Ir$ ....(1) At V = 6V, I = 0. Therefore from eq (1), $6 = 3E - 0 \Rightarrow E = 2V$
10	A conductor of length L is connected to a dc source of emf V. If this conductor is replaced by another conductor of same material and same area of cross-section but of length 3L, how will the drift velocity change? Ans: $v_d = \frac{eV\tau}{mL} \propto \frac{1}{L}$ When the length is made 3L, the drift velocity becomes one third.
11	Uniform electric and magnetic fields are produced pointing to the same direction. An electron is projected in the direction of the fields. What will be the effect on the kinetic energy of the electron due to the two fields? Ans. N o effect of B on electrons, whereas electric field retarded.
12	If a magnet is broken into pieces, which one of the following remains unchanged in each part – mass, moment of inertia, magnetization? Ans. Magnetisation.
13	A cyclotron is not suitable to accelerate electron. Why? Ans. A cyclotron is not suitable to accelerate electron because its mass is less due to which they gain speed and step out of the dee immediately.
14	How will the magnetic field intensity at the centre of a circular our carrying current change, if the current though the will is doubled and radius of the coil is halved? Ans.

Since $B = \frac{\mu_o}{4\pi}\frac{2\pi I}{r}$

$$B' = \frac{\mu_o}{4\pi}\frac{2\pi(2I)}{r/2}$$

$$B' = 4\left(\frac{\mu_o}{4\pi}\frac{2\pi I}{r}\right) \qquad \boxed{B' = 4B}$$

15 Which physical quantity has the unit wb/m^2? Is it a scalar or a vector quantity?
Ans. Magnetic field. It is a vector quantity.

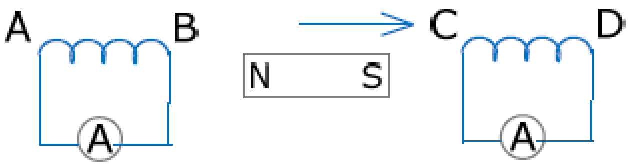
16 What type of magnetic material is used in making permanent magnets?
Ans. Material having high coercivity is used in making permanent magnets.

17 Why the oscillations of a copper disc in a magnetic field are lightly damped?
Ans. Copper disc oscillates because of the production of eddy currents which opposes its oscillating motion and as a result the motion gets damped.

18 Two identical loops, one of copper and another of aluminum are rotated with the same speed in the same magnetic field. In which case, the induced
(a) emf. (b) current will be more and why?
Ans. the induced emf will be same in both the loops but induced current will be more in copper loop because its resistance is less.

19 Power factor of an a.c. circuit is 0.5. What will be the phase difference between voltage and current in the circuit?
Ans. $\cos\phi = 0.5$
$\phi = \cos^{-1}(0.5)$
$\phi = 60^o$

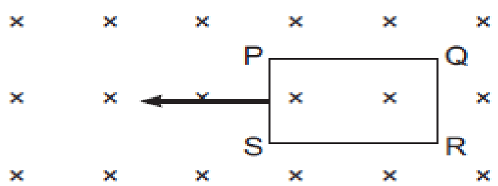
20 A magnet is moved in the direction indicated by an arrow between two coil AB and CD as shown in the figure. Suggest the direction of current in each coil.



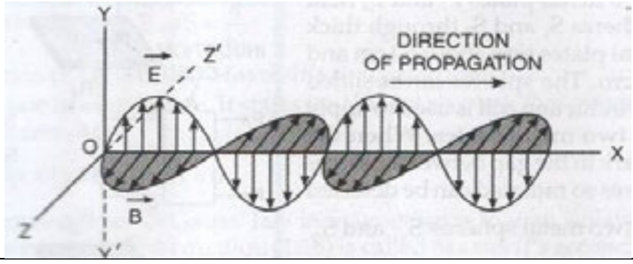
For coil AB since N – pole is moving away from the coil so end B should behave as S – pole according to Lenz's law therefore from the end A the current appear to be anti clockwise. For coil CD the end C should be South Pole thus from end D direction in coil CD will be anti clockwise..

21 What is the power dissipated in an a.c. circuit in which voltage and current are given by $V=230 \sin(\omega t+\pi/3)$ and $I = 10 \sin \omega t$?
Ans. $\langle P\rangle = E_{rms}I_{rms} \cos\phi$ = 230 x 10 x ½ x ½ = 575 W

22 A closed loop PQRS of wire is moved into a uniform magnetic field at right angles to the plane of the paper as shown in the figure. Predict the direction of induced current in the loop.



Ans. Anticlockwise

23	Electromagnetic waves with wavelength (i) λ_1 are used to treat muscular strain. (ii) λ_2 are used by a FM radio station for broadcasting (iii) λ_3 are used to detect fracture in bones (iv) λ_4 are absorbed by the ozone layer of the atmosphere. Identify and name the part of electromagnetic spectrum to which these radiations belong. Arrange these wavelengths in decreasing order of magnitude. Ans. γ rays, radio waves, X-rays, UV rays
24	The amplitude of oscillating electric field in an electromagnetic wave is 50 vm^{-1}. What is the amplitude of the oscillating magnetic field? **Ans.** $B_0 = 1.6 \times 10^{-7}$ T
25	How does a charge q oscillating at certain frequency produce electromagnetic waves? Sketch a schematic diagram depicting electric and magnetic fields for electromagnetic wave propagation along the z-direction. Ans. 
26	Name them waves which are used in telecommunication. **Ans.** Micro waves
27	An air bubble in a jar of water shines brightly. Why? Ans. Light entering water is totally reflected from the air bubble. For the observer, this light appears to come from the bubble. So it shines.
28	How does the focal length of a convex lens change if monochromatic red light is used instead of violet light? Ans. Focal length, $F \propto \frac{1}{(\mu - 1)}$. As $\mu_R < \mu_V$, so the focal length of a convex lens will increase when red light is used.
29	A chicken wakes up early in the morning and goes to sleep by sunset. Why? OR Why is a chicken not able to see in the dim light? Ans. In a chicken's eye, the retina has a large number of cones but only few rods. The rods are sensitive to bright light only. That is why a chicken is not able to see in dim light. It needs bright light to see, so it wakes up early in the morning with the sunrise and goes sleep by sunset.
30	Explain with reason, how the resolving power of a compound microscope will change when (i) frequency of the incident light on the objective lens is increased. Ans. R.P.of a compound microscope = $\frac{2d \sin\theta}{\lambda} = (2d \sin\theta).\frac{v}{c}$ (i) When the frequency v of the incident light increases, the resolving power increases (R.P. $\propto$ v).
31	In a single-slit diffraction experiment, the width of the slit is made double the original width. How does this affect the size and intensity of the central diffraction band? **Ans**: In single slit diffraction experiment fringe width is, $\beta = 2D\lambda / d$ If *d* is doubled, the width of central maxima is halved. Thus size of central maxima is reduced to half. Intensity of diffraction pattern varies square of slit width. So, when the slit gets double, it makes the intensity four times.

32	What is the shape of the wavefront when light is diverging from a point source? Ans. Spherical
33	A light wave enters from air to glass. How will the following be affected: [1] (i) Energy of the wave (ii) Frequency of the wave: Ans. (1) A part of light is reflected back into the air. Thus energy of the wave will be lower in the glass. (2) Frequency of the wave remains unchanged.
34	The stopping potential in an experiment on photoelectric effect is 2 V. What is the maximum kinetic energy of the photoelectrons emitted? Ans: $KE_{max} = eV_0 = e(2V) = 2$ eV
35	The de-Broglie wavelength associated with an electron accelerated through a potential difference V is λ. What will be its wavelength when the accelerating potential is increased to 4 V? Ans: $\lambda = \frac{12.27}{\sqrt{V}}\dot{A}$ for V = 4 V $\lambda = \frac{12.27}{\sqrt{4}}\dot{A} = 6.135\dot{A}$
36	Calculate the threshold frequency of photon for photoelectric emission from a metal of work function 0.1eV? Ans. $\phi_o = hv_o$ $v_o = \frac{\phi_o}{h} = \frac{0.1eV}{6.6\times10^{-34}Js}$ $v_o = \frac{0.1\times1.6\times10^{-19}J}{6.6\times10^{-34}Js}$ $\boxed{v_o = 2.4\times10^{-13}\Delta^{-1}}$
37	Electron and proton are moving with same speed, which will have more wavelength? Ans. Since $\lambda \alpha \frac{1}{\sqrt{m}}$ so electron being lighter will have more wavelengths
38	Write any two characteristics properties of nuclear force. Ans. . i) These are short range force. ii) These are strong force of attractive nature.
39	Two nuclei have mass numbers in the ratio 8:125.What is the ratio of their nuclear radii? Ans. Nuclear radius, $R=R_oA^{1/3}$ Where, R_o=constant , A= mass no. ∴ $R_1/R_2 = (A_1/A_2)^{1/3} = (8/125)^{1/3} = 2/5$ R1 : R2 = 2 : 5
40	State Bohr's postulate of quantization of angular momentum of the orbiting electron in hydrogen atom. Ans. For Bohr's postulate of quantization of angular momentum of the orbiting electron in hydrogen atom is electrons are permitted to revolve in only those orbits in which the angular momentum of electron is integral multiple of h/2π i.e. mvr = nh/2π, where, n=1,2,3…….

41	Write the empirical relation for paschen series lines of hydrogen atom? Ans. $\frac{1}{\lambda} = R\left(\frac{1}{3^2} - \frac{1}{ni^2}\right)$ where n = 4, 5, 6, 7 --------------------
42	What type of impurity is added to obtain n-type semiconductor? Ans. Pentavalent atoms like Arsenic (As)
43	How does the energy gap of an intrinsic semiconductor vary, when doped with a trivalent impurity? Ans. When a trivalent impurity is added to an intrinsic semiconductor, an acceptor energy level is created in the forbidden energy gap which lies above the valence band. Due to this electrons easily transformed to the acceptor energy level.
44	How does width of depletion layer of p.n junction diode change with decrease in reverse bias? Ans. Decrease in reverse bias will decrease in width of the depletion layer.
45	Define current amplification factor in a common – emitter mode of transistor? Ans. Ratio of small change in collection current to the small change in base current at constant collector emitter junction voltage is called current amplification factor.
46	What is the purpose of modulating a signal in transmission? Ans. Modulation is done because low frequency signal cannot be transmitted to a longer distance so in order to increase the range of transmission modulation is done.
47	Why ground wave propagation is not suitable for high frequencies? Ans. Ground waves are not suitable for propagation high frequencies because signals having frequency more than 1500 KHz are greatly absorbed by the surface of the earth and cannot be transmitted.
48	What does the term LOS communication mean ? Ans. A space wave travels in a straight line from transmitting to receiving antenna it is called LOS communication. TV frequencies of the range 100-200 MHz & microwave links used this mode.
49	A carrier wave of peak voltage 20 volt is used to transmit a message signal. What should be the peak voltage of the modulating signal in order to have modulation index 80%? Ans. $\mu = \frac{Am}{Ai}$, $Am = \frac{80}{100}\ x\ 20 = 16V.$
50	In half-wave rectification, what is the output frequency if the input frequency is 50 Hz ? What is the output frequency of a full- wave rectifier for the same input frequency ? Ans. Output frequency of a half wave rectifier = Input frequency = 50 Hz Output frequency of a full wave rectifier = 2x input frequency = 2 x 50 = 100 Hz