



Q1. Using the concept of force between two infinitely long parallel current carrying conductors, define one ampere of current.

Answer: We know that

$$F = \frac{\mu_0}{4\pi} \cdot \frac{2I_1 I_2}{r}$$

If $I_1 = I_2 = 1 \text{ A}$, $r = 1 \text{ m}$ then

$$F = \frac{4\pi \times 10^{-7} \times 2 \times 1 \times 1}{4\pi \times 1} [\because \mu_0 = 4\pi \times 10^{-7}]$$

$$F = 2 \times 10^{-7} \text{ Nm}^{-1}$$

Thus, one ampere can be defined as the amount of current which when flows through each of the two parallel uniform long linear conductors placed in free space at a distance of one metre from each other will attract or repel each other with a force of $2 \times 10^{-7} \text{ N}$ per metre of their length.

Q2. To which part of the electromagnetic spectrum does a wave of frequency $5 \times 10^{19} \text{ Hz}$ belong?

Answer: in electromagnetic spectrum (γ ray | x ray | visible | Infra red ray | micro waves | radio waves), frequency $5 \times 10^{19} \text{ Hz}$ falls in γ – region.

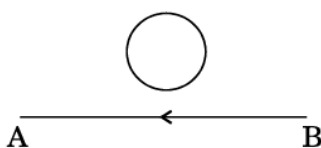
Q3. Two equal balls having equal positive charge ‘q’ coulombs are suspended by two insulating strings of equal length. What would be the effect on the force when a plastic sheet is inserted between the two?

Answer: The electric lines of force will not able to pass through the insulating plastic sheet as a result force between the charged balls will decrease.

Q4. Define intensity of radiation on the basis of photon picture of light. Write its S.I. unit.

Answer: Intensity of radiation depends on the number of photons incident per unit area per unit time. It is number of quanta of radiation per unit area per unit time.

Q5. The electric current flowing in a wire in the direction from B to A is decreasing. Find out the direction of the induced current in the metallic loop kept above the wire as shown.





Answer:

	<p>When we grasp the conductor AB along the direction of current curl of finger tips giving direction of magnetic field produced which is perpendicular to the plane of the paper away from the observer. Hence induced current will be clock wise as shown.</p>
--	--

Q6. Why is it found experimentally difficult to detect neutrinos in nuclear β -decay?

Answer: Neutrinos are uncharged particles also their mass is insignificant, they rarely interact with matter and can penetrate through matter hence experimentally it is difficult to detect neutrino.

Q7. Why is the use of a.c. voltage preferred over d.c. voltage? Give two reasons.

Answer:

- (1) AC can be transmitted to long distance with less energy loss.
- (2) We can change low voltage AC to high voltage using Step up transformer and high voltage AC to Low voltage using Step down transformer. Thus using transformer we can regulate voltage easily compared to DC.

Q8. A biconvex lens made of a transparent material of refractive index 1.25 is immersed in water of refractive index 1.33. Will the lens behave as a converging or a diverging lens? Give reason.

Answer:

	<p>Here $\mu_1 = \mu_3 = 1.33$ (immersed in water) $\mu_2 = 1.25$</p> <p>Hence light rays coming from denser to rarer medium will converge.</p> <p>We know that the converging or diverging nature of lens depends on refractive index of surrounding medium. Normally if we keep this lens of RI 1.25 in air (air has RI = 1) it will act as diverging lens, however when kept in water now RI of water 1.33 which is greater than lens material RI 1.25, therefore this lens will behave like Converging lens.</p>
--	---