PHYSICS
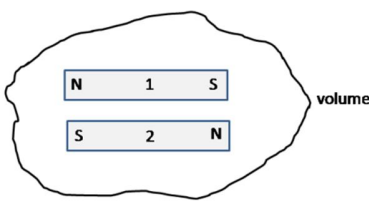
1. The electric field at a distance 8 cm from an infinite line charge is 9.0×10^5 N C^{-1}. The corresponding line charge density is

    A) 0.5 μC m^{-1} B) 1.0 μC m^{-1} C) 2.0 μC m^{-1} D) 4.0 μC m^{-1}

2. The quantity of charge flowing at any instant of time t through the cross-section of wire is given by $q(t) = 3t^2 - 9t + 6$. The value of the current in the wire at t = 4 s will be

    A) 10 A   B) 12 A   C) 15 A   D) 18 A

3. The substances for which the value of magnetic permeability is just more than unity are called

    A) diamagnetics   B) ferromagnetics   C) antiferromagnetics   D) paramagnetics

4. A thin convergent glass lens of refractive index 1.5 has a power of + 5 D. When this lens is immersed in a liquid of refractive index μ_ℓ, it acts as a divergent lens of focal length 100 cm. The value of μ_ℓ is

    A) 1.667   B) 1. 333   C) 1.556   D) 1. 444

5. The correct order in which frequency of the following electromagnetic radiations increases is

    A) Microwaves, Ultraviolet rays, X-rays
    B) Ultraviolet rays, Microwaves, X-rays
    C) Microwaves, X-rays, Ultraviolet rays
    D) X-rays, Ultraviolet rays, Microwaves

6. The ratio of mass defect of the nucleus to its mass number is maximum in the nuclei of

    A) N^{14} B) Cu^{64} C) Fe^{56} D) U^{238}

7. Consider the combination of gates as shown in figure below. The output Y of the combination will be
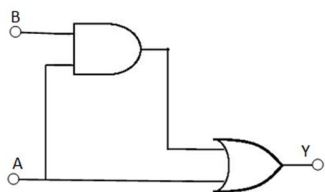
    A) $A \cdot A \cdot B$

    B) $A + A + B$

    C) $A \cdot A + B$

    D) $A + A \cdot B$

8. If I_1 and I_2 are intensities of two waves and α is the phase difference between two light waves of same frequency, then the resultant intensity I_r is given as

    A) $I_r = I_1 + I_2 + 2\sqrt{I_1 I_2}\cos\alpha$ B) $I_r = I_1 + I_2 + 2\sqrt{I_1 I_2}\sin\alpha$
    C) $I_r = I_1 + I_2 + \sqrt{2I_1 I_2}\cos\alpha$ D) $I_1 I_2 + 2\sqrt{I_1 + I_2}\sin\alpha$

9. The distance of closest approach of an alpha particle fired at a nucleus with a kinetic energy K is r_0. If the kinetic energy is doubled, the distance of closest approach becomes

    A) $r_0/2$ B) $2r_0$ C) $r_0/4$ D) $4r_0$

10. Two bar magnets with their north poles having strengths Q_{m1} = 20 A m and Q_{m2} = 10 A m (magnetic flux charges) are placed inside a volume as shown in the figure. The magnetic flux leaving the volume is

    A) 100 Wb

    B) 0 Wb

    C) 10 Wb

    D) -10 Wb

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