PHYSICS

1. An L-C resonant circuit contains a 400 pF capacitor and a 100 μH inductor. It is set into oscillation coupled to an antenna. The wavelength of the radiated electromagnetic waves is
(1) 377 mm (2) 377 m
(3) 377 cm (4) 3.77 cm

2. The electric field strength in an electromagnetic wave is 10^4 V m^{-1}. The magnitude of magnetic field strength (in tesla) will be
(1) 10^4 (2) 3×10^{12}
(3) 3.3×10^{-4} (4) 3.3×10^{-5}

3. In electromagnetic wave the phase difference between electric and magnetic field vectors $\vec{E}$ and $\vec{B}$ is
(1) Zero (2) $\frac{\pi}{2}$
(3) π (4) $\frac{\pi}{4}$

4. Electromagnetic wave is produced by
(1) Charges at rest only
(2) Charges in uniform motion only
(3) Accelerated or decelerated charges only
(4) all of the above

5. An electromagnetic wave travels along z-axis. Which of the following pairs of space and time varying fields would generate such a wave?
(1) E_x, B_y (2) E_y, B_x
(3) E_z, B_x (4) E_y, B_z

6. A lamp radiates power P_0 uniformly in all directions; the magnitude of electric field strength E_0 at a distance r from it is
(1) $E_0 = \frac{P_0}{2\pi\varepsilon_0 cr^2}$ (2) $E_0 = \sqrt{\frac{P_0}{2\pi\varepsilon_0 cr^2}}$
(3) $E_0 = \sqrt{\frac{p_0}{4\pi\varepsilon_0 cr^2}}$ (4) $E_0 = \sqrt{\frac{p_0}{8\pi\varepsilon_0 cr}}$

7. In a plane electromagnetic wave, the electric field oscillates sinusoidally at a frequency of 2.0×10^{10} Hz and amplitude 48 V m^{-1}. The wavelength of the wave is
(1) 1.5 m (2) 1.5×10^{-1} m
(3) 1.5×10^{-2} m (4) 1.5×10^{-3} m

8. A radiation of energy E falls normally on a perfectly reflecting surface. The momentum transferred to the surface is
(1) $\frac{E}{c}$ (2) $\frac{2E}{c}$
(3) Ec (4) $\frac{E}{c^2}$

9. The pressure exerted by an electromagnetic wave of intensity I (watt m^{-2}) on a non-reflecting surface is [c is the velocity of light]
(1) Ic (2) Ic^2
(3) $\frac{I}{c}$ (4) $\frac{I}{c^2}$

10. If electric field in a non-magnetic medium for EM wave is given by $\vec{E} = 100\sin(10^8 t + 2z)\,\hat{j}$, then $\vec{H}$ is
(1) $\frac{50}{\pi}\sin(10^8 t + 2z)\hat{i}$
(2) $\frac{5}{\pi}\sin(10^8 t + 2z)\hat{i}$
(3) $20\sin(10^8 t + 2z)\hat{j}$
(4) $\frac{25}{\pi}\sin(10^8 t + 2z)\hat{j}$