

Electromagnetic waves

- A laser beam can be focussed on an area equal to the square of its wavelength. A He-Ne laser radiates energy at the rate of 1 mW and its wavelength is 632.8 nm . The intensity of focussed beam will be
 (a) $1.5 \times 10^{13}\text{ W/m}^2$ (b) $2.5 \times 10^9\text{ W/m}^2$ (c) $3.5 \times 10^{17}\text{ W/m}^2$ (d) None of these
- An electric field of 300 V/m is confined to a circular area 10 cm in diameter. If the field is increasing at the rate of 20 V/m-s , the magnitude of magnetic field at a point 15 cm from the centre of the circle will be
 (a) $1.85 \times 10^{-15}\text{ T}$ (b) $1.85 \times 10^{-16}\text{ T}$ (c) $1.85 \times 10^{-17}\text{ T}$ (d) $1.85 \times 10^{-18}\text{ T}$
- A lamp emits monochromatic green light uniformly in all directions. The lamp is 3% efficient in converting electrical power to electromagnetic waves and consumes 100 W of power. The amplitude of the electric field associated with the electromagnetic radiation at a distance of 10 m from the lamp will be
 (a) 1.34 V/m (b) 2.68 V/m (c) 5.36 V/m (d) 9.37 V/m
- A point source of electromagnetic radiation has an average power output of 800 W . The maximum value of electric field at a distance 4.0 m from the source is
 (a) 64.7 V/m (b) 57.8 V/m (c) 56.72 V/m (d) 54.77 V/m
- In short wave communication, waves of which of the following frequencies will be reflected back by the ionospheric layer having electron density 10^{11} per m^3
 (a) 2.8 MHz (b) 10 MHz (c) 12 MHz (d) 18 MHz
- Which of the following are not electromagnetic waves
 (a) Cosmic rays (b) Gamma rays (c) β -rays (d) X-rays
- Ozone is found in
 (a) Stratosphere (b) Ionosphere (c) Mesosphere (d) Troposphere
- If a source is transmitting electromagnetic wave of frequency $8.2 \times 10^6\text{ Hz}$, then wavelength of the electromagnetic waves transmitted from the source will be
 (a) 36.6 m (b) 40.5 m (c) 42.3 m (d) 50.9 m
- In an apparatus, the electric field was found to oscillate with an amplitude of 18 V/m . The magnitude of the oscillating magnetic field will be
 (a) $4 \times 10^{-6}\text{ T}$ (b) $6 \times 10^{-8}\text{ T}$ (c) $9 \times 10^{-9}\text{ T}$ (d) $11 \times 10^{-11}\text{ T}$
- According to Maxwell's hypothesis, a changing electric field gives rise to
 (a) An e.m.f. (b) Electric current (c) Magnetic field (d) Pressure gradient
- Which of the following rays has the maximum frequency
 (a) Gamma rays (b) Blue light (c) Infrared rays (d) Ultraviolet rays
- Radio waves of constant amplitude can be generated with
 (a) FET (b) Filter (c) Rectifier (d) Oscillator
- A signal emitted by an antenna from a certain point can be received at another point of the surface in the form of
 (a) Sky wave (b) Ground wave (c) Sea wave (d) Both (a) and (b)
- Speed c of E.M. waves through vacuum is given by
 (a) $c = \sqrt{\mu_0 \epsilon_0}$ (b) $c = \frac{1}{\sqrt{\mu_0 \epsilon_0}}$ (c) $c = \sqrt{\frac{\mu_0}{\epsilon_0}}$ (d) $c = \sqrt{\frac{\epsilon_0}{\mu_0}}$
- A TV tower has a height of 100 m . The average population density around the tower is 1000 per km^2 . The radius of the earth is $6.4 \times 10^6\text{ m}$. The population covered by the tower is
 (a) 2×10^6 (b) 3×10^6 (c) 4×10^6 (d) 6×10^6