

Model Questions in Electromagnetic Theory according to CBCS pattern

Answer all questions.(1 Marks)

1. What happens to the potential difference between the plates of a capacitor upon introducing a dielectric material between them.
(a) Increases (b) Decreases (c) Remains same (d) Becomes zero
2. The relative permittivity of a metal is given by
(a) less than zero (b) zero (c) one (d) infinite
3. The magnetic field intensity will be zero inside a conductor.
(a) True (b) False
4. The conductivity in free space medium is
(a) Infinity (b) Zero (c) Unity (d) Negative
5. A material which is slightly repelled by a magnetic field is known as
(a) ferromagnetic material (b) diamagnetic material
(c) paramagnetic material (d) conducting material
6. Lenz's law is a consequence of the law of conservation of
(a) induced current (b) charge (c) energy (d) induced emf
7. which Gauge treats both scalar and vector potential on equal footing.
(a) Coulomb Gauge (b) Lorentz Gauge (c) Both Gauge (d) None of the two
8. Total power radiated by a dipole is proportional to its frequency ω as
(a) ω^{-4} (b) ω^{-2} (c) ω^2 (d) ω^4
9. Which of the following is Coulomb Gauge.
(a) $\nabla \cdot \vec{A} = -\mu_0 \epsilon_0 \frac{\partial V}{\partial t}$ (b) $\nabla \cdot \vec{A} = \mu_0 \epsilon_0 \frac{\partial V}{\partial t}$ (c) $\nabla \cdot \vec{A} = 0$ (d) $\nabla \times \vec{A} = 0$
10. Coulomb's law can be used to find electric field of point charge moving at constant velocity.
(a) True (b) false

Answer all questions.(1 Marks)

11. Write the expression for refractive index in terms of permittivity and permeability of medium.
12. Write the mathematical expression for Gauss's Divergence theorem.
13. What is the expression for Cyclotron frequency?
14. How do you know that the solution you get by method of image charge is the only possible solution?
15. What happens to a ferromagnetic substance when you increase the temperature?
16. What happens to electromagnetic wave when it falls upon a perfect conductor surface?
17. What happens to a dipole in a non-uniform electric field.
18. What is the dimension of electric susceptibility?
19. Write the expression for energy density in electrostatic field.
20. What happens to intensity of radiation when you double the distance from the point source?

Answer all questions.(2 Marks)

21. Which component of electric field \vec{E} and magnetic field \vec{B} do not change at boundary.
- (a) normal component of both \vec{E} and \vec{B}
 - (b) parallel component of both \vec{E} and \vec{B}
 - (c) normal component of \vec{E} and parallel component of \vec{B}
 - (d) parallel component of \vec{E} and normal component of \vec{B}
22. Consider the magnitude of electric field at axial line and equatorial plane with equal distance from the center of a perfect dipole.
- (a) They are equal at both location
 - (b) It is larger at axial line
 - (c) It is larger at equatorial plane
 - (d) It is zero at equatorial plane
23. The non-existence of magnetic monopole is content of which Maxwell's equation
- (a) $\nabla \cdot \vec{E} = \rho/\epsilon_0$
 - (b) $\nabla \cdot \vec{B} = 0$
 - (c) $\nabla \times \vec{E} = -\partial\vec{B}/\partial t$
 - (d) $\nabla \times \vec{B} = \mu_0\vec{J} + \mu_0\epsilon_0\partial\vec{E}/\partial t$
24. For the wave equation $\vec{E} = 10 \sin(\omega t - 5z)\hat{e}_x$, the wave propagation will be in the direction of
- (a) Y direction
 - (b) Z direction
 - (c) X direction
 - (d) XY direction
25. Two long parallel conductors carry 100 A. If the conductors are separated by 20 mm, the force per meter of length of each conductor will be
- (a) 100N
 - (b) 10N
 - (c) 1N
 - (d) 0.1N

26. In the context of special relativity, consider a infinite wire and a observer moving relative to it. The line charge density of a infinite wire
- (a) depends upon relative velocity of wire
 - (b) independent of the relative velocity of wire
27. The electromagnetic field tensor is
- (a) Anti-symmetric 4th rank tensor
 - (b) Symmetric 4th rank tensor
 - (c) Anti-symmetric 2nd rank tensor
 - (d) Symmetric 2nd rank tensor
28. Which of the following statements is true?
- (a) \vec{E} is the cross product of \vec{v} and \vec{B} .
 - (b) \vec{B} is the cross product of \vec{v} and \vec{E} .
 - (c) \vec{E} is the dot product of \vec{v} and \vec{B} .
 - (d) \vec{B} is the dot product of \vec{v} and \vec{E} .
29. A charged spherical conducting material is placed in a region of uniform electric field and we consider the potential at two diametrically opposite points on it. The two potential are
- (a) equal if the points lie on the diameter parallel to electric field direction
 - (b) equal if the points lie on the diameter perpendicular to electric field direction
 - (c) equal irrespective of diameter orientation with respect to electric field
 - (d) can not be equal
30. Pointing Vector is given by
- (a) $\epsilon_0(\vec{B} \times \vec{E})$
 - (b) $\epsilon_0(\vec{E} \times \vec{B})$
 - (c) $\frac{1}{\mu_0}(\vec{B} \times \vec{E})$
 - (d) $\frac{1}{\mu_0}(\vec{E} \times \vec{B})$