IDHAYA COLLEGE FOR WOMEN

KUMBAKONAM – 612 001

DEPARTMENT OF PHYSICS

SEMESTER	**:**	**II**
CLASS	**:**	**I MSc PHYSCIS**
SUBJECT- INCHARGE	**:**	**Mrs. T. KAVITHA**
SUBJECT NAME	**:**	**ELECTROMAGNETIC THEORY**
SUBJECT CODE	**:**	**P16PY21**
TOPIC	**:**	**UNIT I TO V**
		2 MARKS(Q&A)

ELECTRO MAGNETIC THEORY

TWO MARKS QUESTIONS.WITH ANSWERS

1**. Define image charges.**

Under favorable conditions it is possible to infer the geometry of the situation that the small number of charges of magnitude can conserved the boundary conditions. These charges are called image charges.

2. Write a Gaussian condition for a grounded conducting sphere.

When the boundary conditions of the charges particle is grounded in the conducting sphere, the gaussian surface be equal to q/£0 or zero.

3. Define cavity resonator.

The definition of cavity resonator is an electronic device consisting of a space usually enclosed by metallic walls within resonant electromagnetic fields may be excited and extracted for use in microwave systems.

4. Justify the electromagnetic waves are transverse in nature

The conditions of the electro magnetic waves in free space as

$$K.H = 0$$

The vector 'H' is perpendicular to the direction of propagation. So that the electromagnetic waves are transverse waves .

5. Define coercivity.

By applying the reverse magnetic field then material loss it's magnetic property comp!etely. This is known as coercivity. It is represented by hysteresis curve.

6. Define poynting vector

Poynting vector is defined as the directional energy flux of an electro magnetic field. $S = E \times H$, where E is the electric field vector and H is the magnetic field's vector.

7. Show that the divergence of magnetic vector potential is zero or scalar constant.

The divergence of magnetic vector potential 'A' is

B = Curl A ,since the divergence of curl is zero.

$\times B = \quad \times \quad \times A$

$(\quad \bullet A) = 0$

Therefore, grad div A=0.So the divergence of magnetic vector potential is zero.

8. Relation between magnetic susceptibility and relative permeability.

$B = \mu_0 H (I + H)$

$B = \mu_0 H (1 + I/H)$

or $B = \mu_0 (1 + \chi) H$

$\mu = \mu_0 [1 + \chi]$

and $\mu = \mu 0 \mu r$

so $\mu r = [1+X]$

9. Define Gauss law.

The law states that the total electric flux is enclosed in a closed surface is equal to1/£0 times the total charge enclosed in it.

10. Define polarizability.

The dipole moment (Pm) acquired by a molecule per unit electric field (Em). This is called as polarizability.this dipole moment.

$\alpha = Pm/Em$

11. Write poisson and Laplace equation .

Poisson and Laplace equation derived from Coulomb's law and ρGauss law. It is a second order differential equation used for solving problems.

Poisson equation= div grad V= ρ/ε_0

Laplace equation =div grad V= 0

12. What is electric polarisation? Give the relation between electric polarisation and electric susceptibility.

Electric polarization refers to the separation of center of positive charge and the center of negative charge in a material. The separation can be caused by a sufficiently high-electric field.

The electric susceptibility χe relates the polarization to the electric field as

$$P = \chi_e E .$$

13. Define Maxwell equations interms of electromagnetic .

Gauss' law in electric field : div D= •D = ρ

Gauss law in magnetic field : div B= •B= 0

Ampere's law in circuital form: curl H= ×H= J+ dD/dt

Faraday's law : curl E = ×E= -dB/dt

These four equations are called as Maxwell's equation .

14. Explain the properties of ferro magnetic material.

1. Spontaneous polarisation even in the absence of applied electric field.
2. High dielectric constant.
3. Strong variation with temperature . It's called as pyroelectricity.
4. High strain response (piezoelectricity).

15. Correspondences in electrostatics and magneto statics.

ELECTRO STATICS	MAGNETO STATICS
Field arise from a potential difference or voltage gradient.	Field arise from the movement of charge carriers,i.e flow of current.
Volts per meter (V/m)	Ampere's per meter (A/m)
It consist of Coulomb's law,Gauss law and electrical displacement.	It consist of Biot-savart law, Ampere's law and magnetic permeability.
Field exist anywhere as long as there was a potential difference.	Field exist as soon as current flow.

16. Define Claudius -mossoti relation.

According to lorentz equation,

$$Em = E + P/3\,\varepsilon_0$$

Then, $\varepsilon_r - 1 / \varepsilon_r + 2 = n \cdot \alpha / 3\,\varepsilon_0$

this is the Claudius -mossoti equation.

17. State Coulomb's law.

The law states that the force of attraction or repulsion between two point charges in a system is directly proportional to the product of the charges and inversely proportional to the square of the distance between them.

F =K q1•q2/r^2

18. Define point charge.

A point charge is a hypothetical charge located at a single point space. Any charge whether positive or negative whose electric field is to be found at a particular distance (point) is called point charge .

19. Define magnetic Intensity .

The electric field intensity is the measure of the strength of an electric field at any point.

$$H = F/M$$

20. Define magnetic dipole .

A magnetic dipole is the limit of either a closed loop of electric current or a pair of poles as the size of the source is reduced to zero while keeping the magnetic moment constant.

21. Solve Continuity equation.

Transport of a charge constitute a current,

$$I = -dq/dt$$

div J+ds/dt =0,this is the equation of continuity.

22. Define the meaning of wave guide.

A Hollow conducting metallic tube of uniform cross section usually filled with air, for transmitting electromagnetic waves by successive reflection from inner walls of the tube is called as Wave guide**.**

23. Difference between kinematic and dynamic properties.

KINEMATIC	DYNAMIC
The frequency of the remains unchanged of reflection and refraction.	The frequency of the wave changed by reflection and refraction.

The reflected and refracted waves are in same plane.	The reflected and refracted waves are in different plane.
Polarisation and phase does not change of the wave.	Polarisation and phase change of the wave

24. Define electrostatic energy.

The work done on assembling the charges from infinity to the given distribution is called Electrostatic energy . It is representated by a letter 'U'.

Ue =1/2 E^2•£0

25. Define Boundary conditions.

The solution of a boundary value problems should always satisfies this condition as to pertaining the electrostatic potential,Normal component of displacement and Tangential component of electric intensity are called as boundary conditions.