## Assignment 7

Due on 2021-11-14, 13:30:01

### Question 1
1. For a magnetic material, if \( B \) is 2 \( 10^3 \) T more than the saturation value with \( H = 0 \), then specify the resultant type.

- Soft magnetic material
- Hard magnetic material
- Intermediate type

### Question 2
2. The magnetic moment in a paramagnetic material is given by

\[ \mu = \chi M_0 \mathbf{H} \]

Where \( \chi \) is the susceptibility, \( M_0 \) is the magnetic moment, and \( \mathbf{H} \) is the magnetic field.

### Question 3
3. If the permeability is \( \mu_r \) = 50 and magnetic susceptibility \( \chi = 1 \times 10^{-6} \), then a paramagnetic substance can be described as:

- Ferrimagnetic
- Ferrimagnetic
- Rare-earth magnetic

### Question 4
4. If the permeability of a ferromagnetic material is \( \mu_r = 1 \), then the magnetic field \( H \) is:

- Directly proportional to the magnetic field \( B \)
- Inversely proportional to the magnetic field \( B \)
- Constantly equal to the magnetic field \( B \)

### Question 5
5. A magnetic dipole is oscillating in a uniform magnetic field with a frequency \( f \). The magnetic field is in the \( z \) direction and the dipole is oscillating along the \( x \) direction. The magnetic field \( B \) is given by

\[ B(t) = B_0 \cos(\omega t) \]

Where \( B_0 \) is the amplitude of the magnetic field and \( \omega = 2\pi f \) is the angular frequency.

### Question 6
6. A permanent magnet is oriented along the \( x \) axis. A magnetic field \( B \) is applied along the \( y \) axis. The magnetic field at any point in the \( y-z \) plane is:

\[ B_y(x, z) = B_0 \cos(\frac{\pi x}{L}) \cos(\frac{\pi z}{L}) \]

Where \( B_0 \) is the amplitude of the magnetic field, \( L \) is the length of the magnet, and \( x, z \) are the coordinates.

### Question 7
7. In a uniform magnetic field, a charged particle moves in a circular path of radius \( r \). The magnetic field is given by

\[ B(x, y, z) = B_0 \mathbf{e}_z \]

Where \( B_0 \) is the amplitude of the magnetic field and \( \mathbf{e}_z \) is the unit vector in the \( z \) direction.

### Question 8
8. A ring is placed in a uniform magnetic field. The induced current in the ring is:

\[ I(t) = I_0 \sin(\omega t) \]

Where \( I_0 \) is the amplitude of the induced current and \( \omega \) is the angular frequency of the magnetic field.

### Question 9
9. In a magnetic field, a charged particle moves in a circular path of radius \( r \). The magnetic field is given by

\[ B(x, y, z) = B_0 \mathbf{e}_z \]

Where \( B_0 \) is the amplitude of the magnetic field and \( \mathbf{e}_z \) is the unit vector in the \( z \) direction.

### Question 10
10. A charged particle moves in a uniform magnetic field. The particle moves in a circular path of radius \( r \). The magnetic field is given by

\[ B(x, y, z) = B_0 \mathbf{e}_z \]

Where \( B_0 \) is the amplitude of the magnetic field and \( \mathbf{e}_z \) is the unit vector in the \( z \) direction.

### Question 11
11. A charged particle moves in a uniform magnetic field. The particle moves in a circular path of radius \( r \). The magnetic field is given by

\[ B(x, y, z) = B_0 \mathbf{e}_z \]

Where \( B_0 \) is the amplitude of the magnetic field and \( \mathbf{e}_z \) is the unit vector in the \( z \) direction.

### Question 12
12. A charged particle moves in a uniform magnetic field. The particle moves in a circular path of radius \( r \). The magnetic field is given by

\[ B(x, y, z) = B_0 \mathbf{e}_z \]

Where \( B_0 \) is the amplitude of the magnetic field and \( \mathbf{e}_z \) is the unit vector in the \( z \) direction.

### Question 13
13. A charged particle moves in a uniform magnetic field. The particle moves in a circular path of radius \( r \). The magnetic field is given by

\[ B(x, y, z) = B_0 \mathbf{e}_z \]

Where \( B_0 \) is the amplitude of the magnetic field and \( \mathbf{e}_z \) is the unit vector in the \( z \) direction.

### Question 14
14. A charged particle moves in a uniform magnetic field. The particle moves in a circular path of radius \( r \). The magnetic field is given by

\[ B(x, y, z) = B_0 \mathbf{e}_z \]

Where \( B_0 \) is the amplitude of the magnetic field and \( \mathbf{e}_z \) is the unit vector in the \( z \) direction.

### Question 15
15. A charged particle moves in a uniform magnetic field. The particle moves in a circular path of radius \( r \). The magnetic field is given by

\[ B(x, y, z) = B_0 \mathbf{e}_z \]

Where \( B_0 \) is the amplitude of the magnetic field and \( \mathbf{e}_z \) is the unit vector in the \( z \) direction.