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Worksheet

1. A bar magnet placed in a uniform magnetic field of strength 0.3 T with its axis at 30° to the field experiences a torque of 0.06 Nm. What is the magnetic moment of the bar magnet?

2. A bar magnet having a magnetic moment of 10^4 J/T is free to rotate in a horizontal plane. A horizontal magnetic field $B = 5 \times 10^{-4}$ T exists in space. Calculate the work done to rotate the magnet by 60° from the direction of the magnetic field.

3. A short bar magnet experience a torque of magnitude 0.064 J when it is placed in a uniform magnetic field of 0.32 T, making an angle of 30° with the direction of the field. Calculate the magnetic moment of the magnet.

4. A bar magnet of magnetic moment $3 J T^{-1}$ lies aligned with a uniform magnetic field of 0.22 T.
(a) Calculate the work done to turn the magnet so as to align its magnetic moment.
(i) normal to the field direction
(ii) opposite to the field direction.

(b) Calculate the torque on the magnet in each case.

5. A magnetic dipole is under the influence of two magnetic fields. The angle between the field directions is 60° and one of the fields has a magnitude of 1.2×10^{-2} T. If the dipole comes to equilibrium at an angle of 15° with this field, what is magnitude of the other field?

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