# Magnetism And Matter

Q.No.1:
Two short bar magnets of length 1 cm each have magnetic moments 1.20 A m^2 and 1.00 A m^2 respectively. They are placed on a horizontal table parallel to each other with their N poles pointing towards the South. They have a common magnetic equator and are separated by distance of 20.0 cm. The value of the resultant horizontal magnetic induction at the mid-point O of the line joining their centres is close to (Horizontal component of earth's magnetic induction is 3.6×10^{-5} Wb/m^2)

JEE 2013

   A. 3.6×10^{-5} Wb/m^2
   B. 2.56×10^{-4} Wb/m^2
   C. 3.50×10^{-4} Wb/m^2
   D. 5.80×10^{-4} Wb/m^2

Q.No.2: A rectangular loop of sides 10 cm and 5 cm carrying a current I of 12 A is placed in different orientations as shown in the figures below:
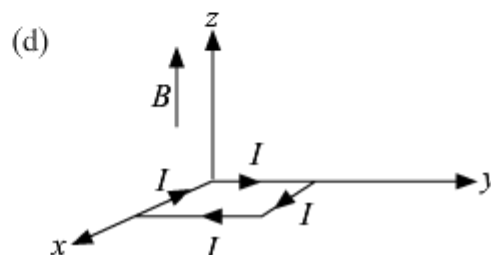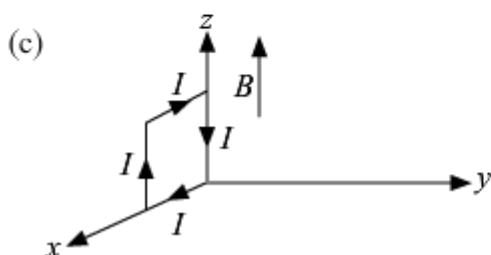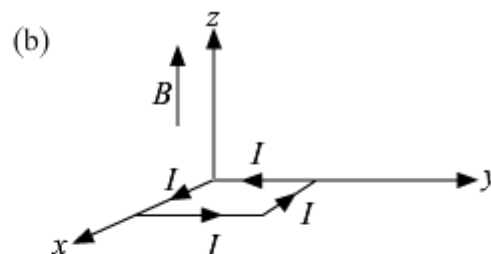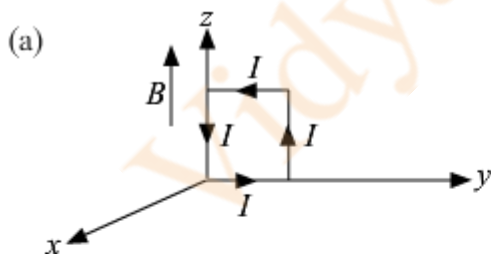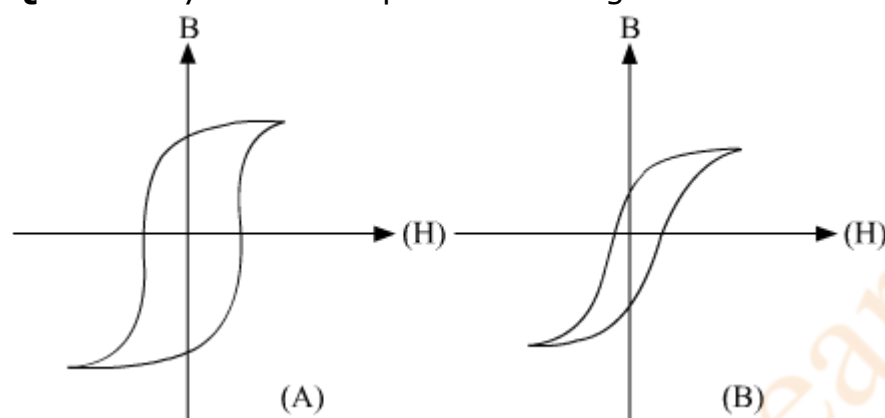

If there is a uniform magnetic filed of 0.3 T in the positive z direction, in which

orientations the loop would be in (i) stable equilibrium and (ii) unstable equilibrium? **JEE 2015**

  A. (a) and (b), respectively
  B. (a) and (c), respectively
  C. (b) and (d), respectively
  D. (b) and (c), respectively

Q.No.3: Hysteresis loops for two magnetic materials A and B are given below:

These materials are used to make magnets for electric generators, transformer core and electromagnet core. Then it is proper to use: **JEE 2016**

  A. A for electromagnets and B for electric generators.
  B. A for transformers and B for electric generators.
  C. B for electromagnets and transformers.
  D. A for electric generators and transformers.

Q.No.4: At some location on earth the horizontal component of earth's magnetic field is 18×10^{-6} T. At this location, magnetic needle of length 0.12 m and pole strength 1.8 Am is suspended from its mid-point using a thread, it makes 45° angle with horizontal in equilibrium. To keep this needle horizontal, the vertical force that should be applied at one of its ends is: **JEE 2019**

  A. 3.6×10^{-5} N
  B. 1.8×10^{-5} N
  C. 1.3×10^{-5} N
  D. 6.5×10^{-5} N

Q.No.5: A para-magnetic substance in the form of a cube with sides 1 cm has a magnetic dipole moment of 20×10^{-6} J/T when a magnetic intensity of 60×10^3 A/m is applied. Its magnetic susceptibility is : **JEE 2019**

A. 3.3×10^{-2}

B. 4.3×10^{-2}

C. 2.3×10^{-2}

D. 3.3×10^{-4}

Q.No.6: A soft ferromagnetic material is placed in an external magnetic field. The magnetic domains: **JEE 2021**
   A. decrease in size and changes orientation.
   B. may increase or decrease in size and change its orientation.
   C. increase in size but no change in orientation.
   D. have no relation with external magnetic field

Q.No.7: A bar magnet of length 14 cm is placed in the magnetic meridian with its north pole pointing towards the geographic north pole. A neutral point is obtained at a distance of 18 cm from the center of the magnet. If B_H = 0.4 G, the magnetic moment of the magnet is ($1 G = 10^{-4}$ T) **JEE 2021**
   A. 2.880×102 J T^{-1}
   B. 2.880 J T^{-1}
   C. 2.880×10^3 J T^{-1}
   D. 28.80 J T^{-1}

Q.No.8: In a uniform magnetic field, the magnetic needle has a magnetic moment 9.85×10^{-2} A/m^2 and moment of inertia 5×10^{-6} kg m^2. If it performs 10 complete oscillations in 5 seconds then the magnitude of the magnetic field is _____ mT. [Take π^2 as 9.85] **JEE 2021**

Q.No.9: Choose the correct option. **JEE 2021**
   A. True dip is always equal to apparent dip.
   B. True dip is not mathematically related to apparent dip.
   C. True dip is less than the apparent dip.
   D. True dip is always greater than the apparent dip.

Q.No.10: A long solenoid with 1000 turns/m has a core material with relative permeability 500 and volume 10^3 cm^3 . If the core material is replaced by

another material having relative permeability of 750 with same volume maintaining same current of 0.75 A in the solenoid, the fractional change in the magnetic moment of the core would be approximately $\left(\frac{x}{499}\right)$.

Find the value of x.   **JEE 2021**