Model Question Paper 1

Magnetism 1

11th Standard

Physics

Reg.No. : | | | | | | |

Answer all the Questions

Time : 00:45:00 Hrs

Total Marks : 40

Part A

6 x 1 = 6

1) Two magnetic poles kept separated by a distance d in vacuum experience a force of 10N. The force they would experience when kept inside a medium of relative permeability 2, separated by the same distance is

   (a) 20 N (b) 10 N (c) 5 N (d) 40 N

2) The magnetic moment of a magnet is 5 A m^2 . If the pole strength is 25 A m, what is the length of the magnet?

   (a) 10 cm (b) 20 cm (c) 25 cm (d) 1.25 cm

3) A long magnetic needle of length 2 *l*, magnetic moment M and pole strength m is broken into two at the middle. The magnetic moment and pole strength of each piece will be

   (a) M, m (b) $\frac{M}{2}, \frac{m}{2}$ (c) $m, \frac{m}{2}$ (d) $\frac{m}{2}, m$

4) Two short magnets have equal pole strength but one is twice as long as the other. The shorter magnet is placed 20 cm in tan A position from the compass needle. The longer magnet must be placed on the other side of the magnetometer for zero deflection at a distance

   (a) 20 cm (b) $20(2)^{\frac{1}{3}} \quad cm$ (c) $20(2)^{\frac{2}{3}} \quad cm$ (d) 20(2) cm

5) The direction of a magnet in tan B position of a deflection magnetometer is

   (a) North-South (b) East-West (c) North-West (d) South-West

6) The relative permeability of a specimen is 10001 and magnetising field strength is 2500 Am^{-1} . The intensity of magnetisation is

   (a) $0.5 \times 10^{-7} \quad A \quad m^{-1}$ (b) $2.5 \times 10^{-7} \quad A \quad m^{-1}$ (c) $2.5 \times 10^{-7} \quad A \quad m^{-1}$ (d) $2.5 \times 10^{-1} \quad A \quad m^{-1}$

Part B

6 x 2 = 12

7) State Coulomb's inverse square law.

8) Find the torque experienced by a magnetic needle in a uniform magnetic field

9) State and prove tangent law

10) What is tan A position?How will you set up the deflection magnetometer in tan A position?

11) What is tan B position?How will you set up the deflection magnetometer in tan B position?

12) Define the term (i)magnetic permeability,(ii)intensity of magnetisation and (iii) magnetic susceptibility.

Part C

4 x 3 = 12

13) Two like poles of unequal pole strength are placed 1 m apart. if a pole of strength 4A m is in equilibrium at a distance 0.2 m from one of the poles, calculate the ratio of the pole strengths of the two poles.

14) A magnet of pole strength $24.6 \times 10^{-2} Am$and the length 10 cm is placed at 30^0 with a magnetic field of 0.01 T. Find the torque acting on the magnet.

    Given data.

    Pole strength of the magnet (m)=$24.6 \times 10^{-2} Am$

    Length of the magnet (2l)=10 cm=$10 \times 10^{-2} m$

    Angle made by the magnet with the magnetic field(θ)=30^0

    Magnetic induction B=0.01 T

15) The magnetic moment of a bar magnet of length 10 cm is $9.8 \times 10^{-1} Am^2$.Calculate the magnetic field at a point on its axis at a distance of 20 cm from its midpoint.

16) Two mutually perpendicular line are drawn on a table. Two small magnets of magnetic moments 0.108 and $0.192 Am^2$respectively are placed on these lines.If the distance of the point of intersection of these lines is 30 cm and 40 cm respectively from these magnets, find the resultant magnetic field at the point of intersection.

Part D

2 x 5 = 10

17) The force acting on each pole of a magnet placed in a uniform magnetic induction of $5 \times 10^{-4} \quad T$ is $6 \times 10^{-3} \quad N$. if the length of the magnet is 8 cm, calculate the magnetic moment of the magnet.

18) Two magnetic poles, one of which is twice stronger than the other, repel one another with a force of $2 \times 10^{-5} N$, when kept separated at a distance of 20 cm in air. calculate the strength of each pole.

    Given data.

    Pole strength of one pole is twice stronger than the other

    Let the pole strength of one pole =$m_1 = m$

    Let the pole strength of another pole $m_2 = 2m.$

    Force of repulsion between two pole $F \quad = 2 \times 10^{-5} N$

    Distance of separation between two poles(d) = 20 cm $= 20 \times 10^{-2} m$

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