PHYSICS

BOOKS - SAI PHYSICS (TELUGU ENGLISH)

MAGNETISM

Problems

1. A circular loop and a square loop are formed from two wires of same length and cross

section. Same current is passed through them.

Then the ratio of their dipole moments is

A. 4

B. $\frac{2}{\pi}$

C. 2

D. $\frac{4}{\pi}$

Answer: D

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2. At a certain place a magnet makes 30 oscillations per minute. At another place where the magnetic field is doubled, its time period will be

A. $\sqrt{2}\,\text{sec}$

B. $2\,\text{sec}$

C. $4\,\text{sec}$

D. $\frac{1}{2}\text{sec}$

Answer: A

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3. Suppose that the electric flux inside a parallel plate capacitor changes at a rate of 7×10^{14} units/sec, then the magnetic induction field density at any points inside the capacitor is,

[Area of the plate of the capacitor=$1m^2$

Permittivity of free space = $8.8 \times 10^{-12} Nm^2 c^{-2}$

Permeability of free space =$4\pi \times 10^{-7}$ Teslam/Amp]

A. $7.79 \times 10^{-3} T$

B. $0.779 \times 10^{-5} T$

C. $8.85 \times 10^{-4} T$

D. $88.5 \times 10^{-12} T$

Answer:

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4. If the dielectric constant of a substance is $K = \frac{4}{3}$, then the electric susceptibility ψ_e is

A. $\in \frac{0}{3}$

B. $3 \in_0$

C. $\frac{4}{3} \in_0$

D. $\frac{3}{4} \in_0$

Answer: A

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5. Two long straight parallel conductors 10 cm apart, carry equal currents of magnitude 3A in

the same direction. Then the magnetic induction at a point midway between then is

A. $2 \times 10^{-5} T$

B. $3 \times 10^{-5} T$

C. Zero

D. $4 \times 10^{-5} T$

Answer: C

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6. In a crossed field, the magnetic field induction is 2.OT and electric field intensity is $20 \times 10^3 \frac{v}{m}$. At which velocity the electron will travel In a straight line without the effect of electric and magnetic fields ?

A. $\frac{20}{1.6} \times 10^3 ms^{-1}$

B. $10 \times 10^3 ms^{-1}$

C. $20 \times 10^3 ms^{-1}$

D. $40 \times 10^3 ms^{-1}$

Answer: B

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7. A material of $0.25cm^2$ cross sectional area is placed in a magnetic field of strength (H) $1000Am^{-1}$. Then the magnetic flux produced is (Susceptibility of material is 313) (Permeability of free space, $\mu = 4\pi \times 10^{-7}Hm^{-1}$

A. $8.33 \times 10^{-8}Weber$

B. $1.84 \times 10^{6}Weber$

C. $9.87 \times 10^{-6}Weber$

D. $8.33 \times 10^{-8} Weber$

Answer: C

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8. A steady current flows in a long wire. It is bent into a circular lopp of one turn and the magnetic field at the centre of the coil is B. If the same wire is bent into a circular loop of n turns, the magnetic field at the centre of the coil is

A. $\frac{B}{n}$

B. nB

C. Nb^2

D. n^2B

Answer: D

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9. An electrically charged particle enters into a uniform magnetic induction field in a direction

perpendicular to the field with a velocity v. Then, it travels

A. In a straight line without acceletaion

B. With force in the direction of the field

C. In a circular path with a radius directly proportional to v^2

D. In a circular path with radius directly proportional to its velocity

Answer: D

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10. At a certain place, the angle of dip is 60° and the horizontal component of the earth's magnetic field (B_H) is 0.8×10^{-4} T. The earth's overall magnetic field is

A. $1.5 \times 10^{-4} T$

B. $1.6 \times 10^{-3} T$

C. $1.5 \times 10^{-3} T$

D. $1.6 \times 10^{-4} T$

Answer: D

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11. A short bar magnet having magnetic moment 4 Am^2, placed in a vibrating magnetometer, vibrates with a time period of 8 s. Another short bar magnet having a magnetic moment $8Am^2$ vibrates with a time period of 6 s. If the moment of intertia of the second magnet is $9 \times 10^{-2} kg - m^2$, the moment of intertia of the first magnet is (assume that both magnets are kept in the same uniform magnetic induction field.)

A. $9 \times 10^{-2} kg - m^2$

B. $8 \times 10^{-2} kg - m^2$

C. $5.33 \times 10^{-2} kg - m^2$

D. $12.2 \times 10^{-2} kg - m^2$

Answer: B

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12. A deflection magnetometer is adjusted and a magnet of magnetic moment M is placed on it in the usual manner and the observed

deflection is theta. The period of oscillation of the needle before setting of the deflection is T. When the magnet is removed, the period of oscillation of the needle is T_0 before setting to 0°. If the eart's induced magnetic field is B_H, the relation between T and T_0 is

A. $T^2 = T_0^2 \cos\theta$

B. $T^2 = \dfrac{T_0^2}{\cos\theta}$

C. $T = T_0 \cos\theta$

D. $T = \dfrac{T_0^2}{\cos\theta}$

Answer: A

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13. A long curved conductor carries a current I(I is a vector). A small current element of length dl, on the wire induces a magnetic field at a point, away from the current element and the point is r, making an angle with current element then, the induced magnetic field density, dB(vector) at the point is (μ_0 =Permeability of free space)

A. $\frac{\mu_0 I dl \times r}{-4\pi r}$ (Perpendicular to the current element dl)

B. $\frac{\mu_0 I \times r \times dl}{4\pi r^2}$ (Perpendicular to the current element dl)

C. $\frac{\mu_0 I \times dl}{r}$ (Perpendicular to the plane containing the current element and position vector r)

D. $\frac{\mu_0 I \times dl}{4\pi r^2}$ (Perpendicular to the plane containing current element and position vector r)

Answer: B

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14. If a bar magnet of pole strength m and magnetic moment M is cut equally 5 times parallel to its axis and again 3 times perpendicular to its axis, then the pole strength and magnetic moment of each piece are respectively.

A. $\frac{m}{20}, \frac{M}{4}$

B. $\frac{m}{5}, \frac{M}{20}$

C. $\frac{m}{6}, \frac{M}{24}$

D. $\frac{m}{5}, \frac{M}{24}$

Answer: C

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15. The frequency of vibration in a vibration magnetometer of the combination of two bar magnets of magnetic moments M_1 and M_2 is 6 Hz when like poles are tied and it is 2 Hz

when the unlike poles are tied together, then the ratio $M_1 : M_2$ is

A. $4:5$

B. $5:4$

C. $1:3$

D. $3:1$

Answer: B

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16. A short magnetic needle is pivoted in a uniform magnetic field of induction IT. Now, simultaneously another magnetic field of induction sqrt3 T is applied at right angles to the first field , the needle defects through an angle theta whose value is

A. 30°

B. 45°

C. 90°

D. 60°

Answer: D

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17. In Thomson's experiment to determine e/m of an electron, it is found that an electron beam having kinetic energy of 45.5 eV remains undeflected, when subjected to crossed electric and magnetic fields. If $E = 1 \times 10^3 Vm^{-1}$, the value of B is (mass of the electron is $9.1 \times 10^{-31} kg$)

A. $2.5 \times 10^{-3} Wbm^{-2}$

B. $5.0 \times 10^{-4} Wbm^{-2}$

C. $2.5 \times 10^{-4} Wbm^{-2}$

D. $1.0 \times 10^{-4} Wbm^{-2}$

Answer: C

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18. Two bar magnets A and B are placed one over the other and are allowed to vibrate in a vibration manetometer. They of A and B are on

the same side, while opposite poles lie on the same side. If M_A and M_B are the magnetic moments of A and B and if $M_A > M_B$, the ratio of M_A and M_B is

A. $4:3$

B. $25:7$

C. $7:5$

D. $25:16$

Answer: B

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19. A bar magnet is 10 cm long is kept with its north (N) pole pointing north. A neutral point is formed at a distance of 15 cm from each pole. Given the horizontal component of earth's field is 0.4 Gauss, the pole strength of the magnet is

A. $9A - m$

B. $6.75A - m$

C. $27A - m$

D. $1.35A - m$

Answer: D

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20. A wires of length I is bent into a circular loop of radius R and loop is B. The same wire is now bent into a double loop of equal radii. If both loops carry the same current I and it is in the same direction, the magnetic field at the centre of the double loop will be

A. Zero

B. 2 B

C. 4 B

D. 8 B

Answer: C

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21. An infinitely long straight conductor is bent into the shape as shown below. It carries a current of I ampere and the radius of the circular loop is R meter. Then the magnitude

of magnetic induction at the centre of the circular loop is

A. $\frac{\mu_0 I}{2\pi R}$

B. $\frac{\mu_0 n I}{2R}$

C. $\frac{\mu I}{2\pi R}(\pi + 1)$

D. $\frac{\mu_0 I}{2\pi R}(\pi - 1)$

Answer: C

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22. Two concentric coils of 10 turns each are placed in the same plane. Their radii are 20 cm and 40 cm and carry 0.2 A and 0.3 A current respectively in opposite directions. The magnetic induction (in T) at the centre is

A. $\frac{3}{4}\mu_0$

B. $\frac{5}{4}\mu_0$

C. $\frac{7}{4}\mu_0$

D. $\frac{9}{4}\mu_0$

Answer: B

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23. With a standard rectangular bar magnet the time period of a vibration magnetometer is 4 s. The bar magnet is cut parallel to its length into four equal pieces. The time period of vibration magnetometer when one piece is used (in second) (bar magnet breadth is small) is

A. 16

B. 8

C. 4

D. 2

Answer: C

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24. The magnetised wire of moment M and length I is bent in the form os semicircle of radius r. Then, its magnetic moment is

A. $2\frac{m}{\pi}$

B. $2M$

C. $\frac{M}{\pi}$

D. $Zero$

Answer: A

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25. The wires A and B are of lengths 40 cm and 30 cm. A is bent into a circle of radius r and b into an are of radius r. A current i_1 is passed through A and i_2 through B. To have the same

magnetic inductions at the centre, the ratio of $i_1 : i_2$ is

A. $3:4$

B. $3:5$

C. $2:3$

D. $4:3$

Answer: A

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26. An electron beam travels with a velocity of $1.6 \times 10^{7} ms^{-1}$ perpendicular to magnetic field of intensity 0.1 T. The radius of the path of the electron beam $\left(m_e = 9 \times 10^{-31} kg\right)$

A. $9 \times 10^{-5} m$

B. $9 \times 10^{-2} m$

C. $9 \times 10^{-4} m$

D. $9 \times 10^{-3} m$

Answer: C

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27. A bar magnet of moment of inertia $49 \times 10^{-2} kg - m^2$ vibrates in a magnetic field of induction 0.5×10^{-4} T. The time period of vibration is 8.8s. The magnetic moment of the bar magnet is

A. $350 A - m^2$

B. $490 A - m^2$

C. $3300 A - m^2$

D. $5000 A - m^2$

Answer: D

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28. A bar magnet of magnetic moment M and moment of inertia I is freely suspended such that the magnetic axial line is in the direction of magnetic meridian. If the magnet is displaced by a very small angle (theta), the angular acceleration is (magnetic induction of earth's horizontal field= B_H)

A. $\frac{MB_H\theta}{I}$

B. $\frac{IB_H\theta}{M}$

C. $\frac{M\theta}{IB_H}$

D. $\frac{I\theta}{M}B_H$

Answer: A

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29. An electrically charged particle enters into a uniform magnetic induction field in a

direction perpendicular to the field with a velocity v. Then, it travels

A. (1) only

B. (1) or(2)

C. (1) or (3)

D. Any one of (1),(2) and (3)

Answer: D

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30. The effect due to uniform magnetic field on a freely suspended magnetic needle is as follows

A. Both torque and net force are present

B. Torque is present but no net force

C. Both torque and net force are absent

D. Net force is present. But no torque

Answer: B

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31. Two short magnets AB and CD are in the xy-plane and are parallel to X-axis and coordinates of their centres respectively are (0,2) and (2,0). Line joining the north-south poles of CD is opposite to that of AB and lies along the positive X-axis. The resultant field induction due to AB and CD at a point P(2,2) is 100×10^{-7} T. When the poles of the magnet CD are reversed, the resultant field induction is $50 \times 10^{-7} T$. The value of magnetic moments of AB and CD (in Am^2) are

A. 300,200

B. 600,400

C. 200,100

D. 300,150

Answer: A

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32. Two parallel rails of a railway track insulated from each other and with the ground are connected to a millivoltmeter. The

distance between the rails is 1 m. A train is travelling with a velocity of $72kmh^{-1}$ along the track. The reading of the millivoltmeter (in mV) is (Vertical component of the earth's magnetic induction is $2 \times 10^{-5}T$

A. 1.44

B. 0.72

C. 0.4

D. 0.2

Answer: C

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33. Magnetic field induction at the centre of a circular coil of radius 5 cm and carrying a current 0.9 A is (in SI units) ($\in_0$ = Absolute permitivity of air in SI units: velocity of light = $3 \times 10^8 ms^{-1}$)

A. $\frac{1}{\in_0 10^{16}}$

B. $\frac{10^{16}}{\in_0}$

C. $\frac{\in_0}{10^{16}}$

D. $10^{16} \in_0$

Answer: A

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34. With a standard rectangular bar magnet of length (l), breadth (b,bltlt) and magnetic moment M, the time period of the magnet in a vibration magnetometer is 4 s. If the magnet is cut normal to its length into four equal pieces, the time period (in second) with one of the piece is

A. 16

B. 2

C. 1

D. 4

Answer: C

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35. If two identical bar magnets, each of length I, pole strength m and magnetic moment M are placed perpendicular to each other with

their unlike poles in contact, the magnetic moment of the combination is

A. $\frac{M}{\sqrt{2}}$

B. $lm\left(\sqrt{2}\right)$

C. $2lm\left(\sqrt{2}\right)$

D. $2m$

Answer: B

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36. A wire of length l is bent into a circular coil of one turn of radius R_1. Another wire of the same material and same area of cross-section and same lengths is bent into a circular coil of two turns of radius R_2. When the same current flows, through the two coils, the ratio of magnetic induction at the centres of the two coils is

A. $1:2$

B. $1:1$

C. $1:4$

D. $3:1$

Answer: C

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37. The magnetic induction and the intensity of magnetic field inside an iron core of an electromagnet are $1Wb-m^{-2}$ and $150Am^{-1}$ respectively. The relative permeability of iron is $(\mu_0 = 4\pi \times 10^{-7} Hm^{-1})$

A. $\frac{10^6}{4\pi}$

B. $\frac{10^6}{6\pi}$

C. $\frac{10^5}{4\pi}$

D. $\frac{10^5}{6\pi}$

Answer: D

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38. The magnetic needle of a vibration magnetometer makes 12 oscillations per minute in the horizontal component of earth's

magnetic field. When an external short bar magnet is placed at some line, it makes 15 oscillations per minute, If the poles of the bar magnet are interchanged, the number of oscillations it makes per minute is

A. $\sqrt{61}$

B. $\sqrt{63}$

C. $\sqrt{65}$

D. $\sqrt{67}$

Answer: B

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39. Magnetic induction at the centre of a circular loop of area πm^2 is 0.1 T. The magnetic moment of the loop is ($\pi_0 =$ permeability of air)

A. $\frac{0.1\pi}{\mu_0}$

B. $\frac{0.2\pi}{\mu_0}$

C. $\frac{0.3\pi}{\mu_0}$

D. $\frac{0.4\pi}{\mu_0}$

Answer: B

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40. A long straight wire carrying a current of 30 A is placed in an external uniform magnetic field of induction 4×10^{-4} T. The magnetic field is acting parallel to the direction of current. The magnitude of the resultant magnetic induction in tesla at a point 2.0 cm away from the wire is $(\mu = 4\pi \times 10^{-7} Hm^{-1})$

A. 10^{-4}

B. 3×10^{-4}

C. 5×10^{-4}

D. 6×10^{-4}

Answer: C

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41. Two ions having masses in the ratio 1:1 and charges 1:2 are projected into uniform magnetic field perpendicular to the field with

speeds in the ratio 2:3. The ratio of the radii of circular paths along which the two particles move is

A. $4:3$

B. $2:3$

C. $3:1$

D. $1:4$

Answer: A

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42. A vibration magnetometer consists of two identical bar magnets placed one over the other such that they are perpendicular and bisect each other. The time period of oscillation in a horizontal magnetic field $2^{\frac{5}{4}}s$. One of the magnets is removed and if the other magnet oscillates in the time field, then the time period in second is

A. $2^{\frac{1}{4}}$

B. $2^{\frac{1}{2}}$

C. 2

D. $2^{\frac{5}{4}}$

Answer: C

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43. The magnetic susceptibility of the material of rod is 499. Permeability of the vacuum is $4\pi \times 10^{-7} Hm^{-1}$. Absolute permeability of the material of the rod in H/m is

A. $\pi \times 10^{-4}$

B. $2\pi \times 10^{-4}$

C. $3\pi \times 10^{-4}$

D. $4\pi \times 10^{-4}$

Answer: B

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44. An electron revolves in a circle of radius 0.4 A with a speed of $10^{6} ms^{-1}$ in a hydrogen atom. The magnetic field produced at the centre of the orbit due to the motion of the

electron (in tesla) is $\left[\mu_0 = 4\pi \times 10^{-7} Hm^{-1},\right.$ charge on the electron=$\left.1.6 \times 10^{-19} C\right]$

A. 0.1

B. 1

C. 10

D. 100

Answer: C

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45. A proton of velocity $\left(3\hat{i}+2\hat{j}\right)ms^{-1}$ enters a field of magnetic induction $\left(2\hat{j}+3\hat{k}\right)T$, the acceleration produced in the proton in ms^{-2} is (specific charge of proton = $0.96\times10^{8}C-kg^{-1}$)

A. $2.8\times10^{8}\left(2\hat{i}-3\hat{j}\right)$

B. $2.88\times10^{8}\left(2\hat{i}-3\hat{j}+2\hat{k}\right)$

C. $2.8\times10^{8}\left(2\hat{i}-3\hat{k}\right)$

D. $2.88\times10^{8}\left(\hat{i}-3\hat{j}+2\hat{k}\right)$

Answer: B

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46. A thin magnetic iron rod of length 30 cm is suspended in a uniform magnetic field. Its time period of oscillation is 4 s. It is broken into three equal parts, The time period in second of oscillation of one part when suspended in the same magnetic field is

A. $\frac{1}{\sqrt{3}}$

B. $\frac{2}{\sqrt{3}}$

C. $\sqrt{3}$

D. $\frac{4}{\sqrt{3}}$

Answer: D

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47. Consider the following two statements A and B and identify the correct choice in the given answers A. Paramagnetism is explained by domain theory. B. Susceptibility of a diamagnetic substance is independent of temperature.

A. Both A and B are correct

B. Both A and B are wrong

C. A is correct and B is wrong

D. A is wrong and B is correct

Answer: D

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48. A wire in the form of a square of side a carries a current I Then, the magnetic

induction at the centre of the square is (magnetic permeability of free space= μ_0)

A. $\frac{\mu_0 i}{2\pi a}$

B. $\frac{\mu_0 i\sqrt{2}}{\pi a}$

C. $\frac{2\sqrt{2}\mu_0 i}{\pi a}$

D. $\frac{\mu_0 i}{\sqrt{2}\pi a}$

Answer: C

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49. A particular of mass 0.6 g and having charge of 25 nC is moving horizontally with a uniform velocity $1.2 \times 10^4 ms^{-1}$ in a uniform magnetic induction is ($g = 10ms^{-2}$)

A. Zero

B. 10 T

C. 20 T

D. 200 T

Answer: C

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50. A magnet freely suspended in a vibration magnetometer makes 40 osillations per' minute at place A and 20 oscillations per minute at a place B. If the horizonatal component of earth's magnetic field at A is $36 \times 10^{-6} T,$ then its value at B is

A. $30 \times 10^{-6} T$

B. $9 \times 10^{-6} T$

C. $144 \times 10^{-6} T$

D. $288 \times 10^{-6} T$

Answer: B

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51. A magnetic of length 10 cm and magnetic moment 1 Am^2 is placed along side AB of an equilateral triangle ABC. If the length of the side AB is 10 cm. The magnetic induction at the point C is $\left(\mu_0 = 4\pi \times 10^{-7} Hm^{-1}\right)$

A. $10^{-9} T$

B. $10^{-7}T$

C. $10^{-5}T$

D. $10^{-4}T$

Answer: D

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52. Two long parallel copper wires carrying currents in the opposite directions of 5 A each. If the wires are separated by a distance of 0.5

m, then the force per unit length between the two wires is

A. $10^{-5}N$ attractice force

B. 10^{-5}N nepulsive force

C. 2×10^{-5} N attractive force

D. 2×10^{-5}N repulsive force

Answer: B

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53. The pole strength of a 12 cm long bar magnet is 2.0 A-m. The magnetic induction at a point 10 cm away from the centre of the magnet on the axial line is $\left(\frac{\mu_0}{4\pi} = 10^{-7} Hm^{-1}\right)$

A. $1.1 \times 10^{-4} T$

B. $2.2 \times 10^{3} T$

C. $1.1 \times 10^{-2} T$

D. $2.2 \times 10^{-2} T$

Answer: A

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54. There are no couple acting when two bar magnets are placed coaxially separated by a distance because

A. There are no forces on the poles

B. The forces are parallel and their lines of action do not coincide

C. The forces are perpendicular to each other

D. The forces act along the same line

Answer: D

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55. Two similar moments P and Q each of magnetic moment M are taken. If P is cut along its axial line and Q is cut along its equatorial line all the four pieces obtained have each of

A. Equal pole strength

B. Magnetic moment M/4

C. Magnetic moment M/2

D. Magnetic moment M

Answer: C

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56. A short bar magnet with its north pole facing north forms a neutral point at P in the horizontal plane. If the magnet is rotated by 90° in the horizontal plane, the net magnetic

induction at P is (horizontal component of earth's magnetic field = B_H)

A. Zero

B. 2 B_(H)

C. $\frac{\sqrt{5}}{2}B_H$

D. $\sqrt{5}B_H$

Answer: D

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57. When two infinitely long parallel wires separated by a distance of 1 m, each carry a currentof 3 A, the force in Nm^{-1} length experienced by each will be given $\mu_0 = 4\pi \times 10^{-7} Hm^{-1}$ SI units

A. 2×10^{-7}

B. 3×10^{-7}

C. 6×10^{-7}

D. 18×10^{-7}

Answer: D

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58. The temperature at which a ferromagnetic material becomes paramagnetic is called

A. Neutral temperature

B. Curie temperature

C. Inversion temperature

D. None of these

Answer: B

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59. The magnetic field strangth at a distance d from the centre, on the axial line of a very short bar magnet of magnetic moment M, is B. The magnetic induction at a distance 2 d from centre, on equatoroal line of magnet of magnetic moment 8M, will be'

A. 4B

B. $\frac{B}{2}$

C. 2B

D. $\frac{B}{4}$

Answer: B

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60. A magnetic needle is placed with its north pole facing north in north south direction. In its map of magnetic field the null point will be

A. On its equatoral line

B. On its axial line

C. On line making 45° with its axial line

D. At a distance equal to twice the length of magnet on both line

Answer: A

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61. If a long hollow copper pipe carries a current, the magnetic field produced will be

A. Inside the pipe only

B. Outside the pipe only

C. Neither inside nor outside the pipe

D. Both inside and outside the pipe

Answer: B

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62. A current carrying wire in its neighbourhood produces

A. Electric and magnetic fields

B. Electric field only

C. Magnetic field only

D. No field

Answer: C

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63. The null points are on the equatorial line of a bar magnet when the north pole of the magnet is pointing

A. North

B. South

C. East

D. West

Answer: A

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64. Diamagnetic substances are

A. Feebly attracted by magnets

B. Strongly attracted by magnets

C. Feebly repelled by magnets

D. Strongly repelled by magnets

Answer: C

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65. Two parallel wires of length 9 m each, are separated by a distance of 0.15 m. If they carry equal current in the same direction and exert

a total force of $30 \times 10^{-7} N$ on each other, the value of the current must be

A. 1.5 A

B. 2.25 A

C. 0.5 A

D. 0.25 A

Answer: C

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66. A bar magnet of pole strength 2 A-m is kept in a magnetic field of induction $4 \times 10^{-5} Wbm^{-2}$ such that the axis of the magnet makes an angle 30° with the direction of the field. The couple acting on the magnet is found to be $80 \times 10^{-7} N - m.$ Then, the distance between the poles of the magnet is

A. 20 cm

B. 2 cm

C. 3 cm

D. 200 cm

Answer: A

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67. In a direction magnetometer experiment in "tan" A position, a short bar magnet placed at 18 cm from the centre of the compass needle produces a deflection of 30°. If another magnet of same length but 16 times pole

strength as that of first magnet is placed "tan"B position at 36 cm, the deflection will be

A. 0°

B. 30°

C. 45°

D. 60°

Answer: B

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68. An electric current passes through a long straight wire. At a distance 5 cm from the wire, the magnetic field is B. The field at 20 cm from the wire would be

A. 2B

B. $\frac{B}{4}$

C. $\frac{B}{2}$

D. B

Answer: B

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69. Two circular coils are made of two identical wires of the same length. If the number of turns in the two coils are 4 and 2, then the ratio of magnetic inductions at the centre will be

A. $4:1$

B. $2:1$

C. $1:2$

D. $1:1$

Answer: A

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70. A bar magnet of magnetic moment 2.0 A m^2 is free to rotate about a vertical axis passing through its centre, the magnet is released from rest from east-west position. Then, the kinetic energy of the magnet as it takes north-south position is (horizontal component of earth field is 25μT)

A. $25\mu j$

B. $50\mu j$

C. $100\mu j$

D. $12.5\mu j$

Answer: B

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71. In a deflection magnetometer experiment the deflections produced separately by two short bar magnets kep at the same distance

are 45° and 30°. Then, the ratio of the magnetic moments of the two magnets is

A. $\sqrt{3}:2$

B. $\sqrt{3}:1$

C. $\sqrt{2}:1$

D. $1:\sqrt{3}$

Answer: B

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72. The moment of a magnet is $1\mu Wb - m$ and the force acting on each pole in a uniform magnetic field of strength 0.38 oersted is $1.024 \times 10^{-4} N$. Distance between the poles of the magnet is

A. $1.56 \times 10^{-4} cm$

B. $0.37 \times 10^{-4} cm$

C. $2.34 \times 10^{-4} cm$

D. $1.17 \times 10^{-4} cm$

Answer: B

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73. A bar magnet of magnetic moment vecM is placed in a magnetic field of induction vecB. The torque exerted on it is

A. $\overrightarrow{M} \quad \overrightarrow{B}$

B. $-\overrightarrow{M} \times \overrightarrow{B}$

C. $\overrightarrow{M} \times \overrightarrow{B}$

D. $\overrightarrow{B} \times \overrightarrow{M}$

Answer: C

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74. When a diamagnetic substance is brought near north or south pole of a bar magnet it is

A. Attracted by the poles

B. Repelled by the poles

C. Attracted by the north north pole and repelled by the south pole

D. Repelled by the north pole and attracted by the south pole

Answer: B

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75. If the magnitude of the intensity of a magnetic field at a distance x on the axial line and at a distance y on the equatorial line of a given dipole have the same value the Ratio x:y is

A. $1:\sqrt{2}$

B. $\sqrt{2}:1$

C. $1:2$

D. $2^{\frac{1}{3}}:1$

Answer: D

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76. Substance which when placed in a magnetic field, acquire feeble magnetization in a direction opposite to that of the applied field are called

A. Diamagnetic substances

B. Partamagnetic substances

C. Ferromagnetic substances

D. Ferrimagnetic substances

Answer: A

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77. The couple acting on a magnet of length 10 cm placed in a uniform magnetic field of intensity $40NA^{-1}m^{-1}$ such that the axis of

the magnet makes 45° with the field direction is $\frac{\sqrt{2}}{10} Nm$. The pole strength of the magnet (in Wb) is

A. 5×10^{-3}

B. 0.5

C. 0.05

D. 5

Answer: C

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78. The magnetic induction at a point, distance x from the centre, on the axis of a circular current carrying coil is inversely proportional to (if $x > > $ Radius of coil)

A. X

B. X^2

C. X^{-3}

D. $\frac{X^3}{2}$

Answer: C

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79. In the experiment to verify inverse law, with deflection magnetometer the value of $\frac{\tan\theta_A}{\tan\theta_B}$ will come out as

A. 0.25

B. 0.5

C. 1

D. 2

Answer: D

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80. A material for which magnetic susceptibility is independent of temperature and applied magnetic field, is

A. Diamagnetic

B. Paramagnetic

C. Ferromagnetic

D. Antiferromagnetic

Answer: A

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81. To a charged particle which is moving with a constant initial velocity vecV, uniform magnetic field is applied in the direction of the velocity

A. The particle moves in a spiral path

B. The particle moves in a circular path

C. The particle moves in a parabolic path

D. There is no change in the motion of the particle

Answer: D

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82. A and B are sections of two long parallel wires placed perpendicular to the plane of the paper. They carry currents of 5 A and 10 A respectively in the directions indicated in the figure. If the separation between them is 3 m the zero of the magnetic field in the plane of the paper is at a point.

A. 3 m to left of A

B. 3 m to the right of B

C. 2 m to the right of A

D. 2 m to the left B

Answer: D

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83. Which one of the following statement is true ?

A. Paramagnetic ceases to exit below a certain temperature

B. Ferromagnetic ceases to exist below a certain temperature

C. Onset of paramagnetism requires the presence of paramagnet magnetic dipoles

D. Ferromagnetism ceases to exist above a certain temperature

Answer: D

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84. If a bar of moment mu is suspended in a uniform magnetic field B and it is given an angular deflection theta w.r.t. its equilibrium position, the restoring torque on magnet is

A. $\mu B \sin\theta$

B. $\mu B \cos\theta$

C. $\mu B \tan\theta$

D. $\mu^2 B^2 \sin\theta \cos\theta$

Answer: A

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85. When the radius of a circular current carrying coil is doubled and current in it is halved, the magnetic dipole moment of coil originally 4 units become.

A. 18 unit

B. 16 unit

C. 8 unit

D. 4 unit

Answer: C

86. When a material is placed in magnetic fields B magnetic moment proportional to B but opposite in direction is induced. The material is

A. Diamagnetic

B. Paramagnetic

C. Ferromagnetic

D. Anti-ferromagnetic

Answer: A

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87. The ratio of magnetic moments of two short magnets which give deflection in "tan"B position when placed at 12 cm and 18 cm from centre of a deflection magnetometer is

A. $\frac{2}{3}$

B. $\frac{4}{9}$

C. $\frac{8}{27}$

D. $\frac{8}{9}$

Answer: C

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88. Material getting magnetized of atomic magnetic moment in external magnetic fields are

A. Diamagnetic

B. Paramagnetic

C. Ferromagnetic

D. Antiferromagnetic

Answer: B

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