NEET PHYSICS 2018-19 - Chennai

Periodic Test : 026 **Test ID :** 026

Number of questions: 150 **Test date: 03.04.2019**

Name: _____ **Time**: 3HRS

ID No: _____

Negative Marks : 4 marks for correct attempt & 1 mark deducted for every wrong attempt.

1. If Θ_1 and Θ_2 be the apparent angles of dip observed in two vertical planes at right angles to each other, then the true angle of dip Θ is given by

(a) $\tan^2\Theta = \tan^2\Theta_1 + \tan^2\Theta$
(b) $\cot^2\Theta = \cot^2\Theta_1 - \cot^2\Theta$
(c) $\tan^2\Theta = \tan^2\Theta_1 - \tan^2\Theta$
(d) $\cot^2\Theta = \cot^2\Theta_1 + \cot^2\Theta 2$

2. A 250-turn rectangular coil of length 2.1 cm and width 1.25 cm carries a current of 85 µA and subjected to a magnetic field of strength 0.85 T. Work done for rotating the coil by 180° against the torque is

(a) 4.55 µ J
(b) 2.3 µ J
(c) 1.15 µ J
(d) 9.1 µ J

3. A bar magnet is hung by a thin cotton thread in a uniform horizontal magnetic field and is in equilibrium state. The energy required to rotate it by 60° is *W*. Now the torque required to keep the magnet in this new position is

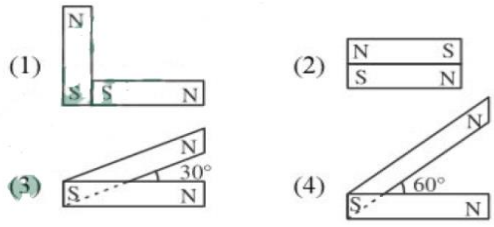
(a) $W/\sqrt{3}$
(b) $\sqrt{3}\,W$
(c)) $\sqrt{3}\,W/2$
(d) $2W/\sqrt{3}$

4. The magnetic susceptibility is negative for
(a) ferromagnetic material only
(b) paramagnetic and ferromagnetic materials
(c) diamagnetic material only
(d) paramagnetic material only

5. A rectangular coil of length 0.12 m and width 0.1 m having 50 turns of wire is suspended vertically in a uniform magnetic field of strength 0.2 Weber/m^2. The coil carries a current of 2 A. If the plane of the coil is inclined at an angle of 30° with the direction of the field, the torque required to keep the coil in stable equilibrium will be

(a) 0.24 Nm
(b) 0.12 Nm
(c) 0.15 Nm
(d) 0.20 Nm

6. Following figures show the arrangement of bar magnets in different configurations. Each magnet has magnetic dipole moment $\vec{m}$. Which configuration has highest net magnetic dipole moment?

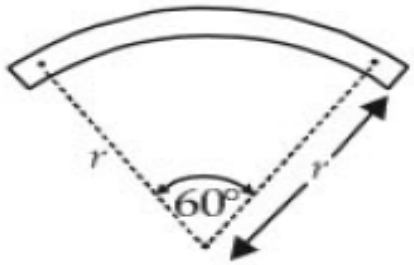


(a) (1)
(b) (2)
(c) (3)
(d) (4)

7. A current loop in a magnetic field

(a) can be in equilibrium in two orientations, both the equilibrium states are unstable.
(b) can be in equilibrium in two orientations, one stable while the other is unstable.
(c) experiences a torque whether the field is uniform or non uniform in all orientations.
(d) can be in equilibrium in one orientation.

8. A bar magnet of length '*l*' and magnetic dipole moment '*M*' is bent in the form of an arc as shown in figure. The new magnetic dipole moment will be



(a) $\frac{2}{\pi}$ M

(b) $\frac{M}{2}$

(c) M

(d) $\frac{3}{\pi}$M

9. A bar magnet of magnetic moment *M* is placed at right angles to a magnetic induction *B*. If a force *F* is experienced by each pole of the magnet, the length of the magnet will be

(a) MB/F

(b) BF/M

(c) MF/B

(d) F/MB

10. A compass needle which is allowed to move in a horizontal plane is taken to a geomagnetic pole. It

(a) will become rigid showing no movement

(b) will stay in any position

(c) will stay in north-south direction only

(d) will stay in east-west direction only

11. A magnetic needle suspended parallel to a magnetic field requires $\sqrt{3}$ J of work to turn it through 60°. The torque needed to maintain the needle in this position will be

(a) $2\sqrt{3}$ J

(b) 3 J

(c) $\sqrt{3}\,J$

(d) 3/2 J

12. There are four light-weight-rod samples A, B, C, D separately suspended by threads. A bar magnet is slowly brought near each sample and the following observations are noted

(i) A is feebly repelled

(ii) B is feebly attracted

(iii) C is strongly attracted

(iv) D remains unaffected

Which one of the following is true?

(a) B is of a paramagnetic material
(b) C is of a diamagnetic material
(c) D is of a ferromagnetic material
(d) A is of a non-magnetic material

13. A short bar magnet of magnetic moment 0.4 J T^{-1} is placed in a uniform magnetic field of 0.16 T. The magnet is in stable equilibrium when the potential energy is

(a) 0.064 J
(b) - 0.064 J
(c) zero
(d) - 0.082 J

14. Electromagnets are made of soft iron because soft iron has

(a) low retentivity and high coercive force
(b) high retentivity and high coercive force
(c) low retentivity and low coercive force
(d) high retentivity and low coercive force

15. A vibration magnetometer placed in magnetic meridian has a small bar magnet. The magnet executes oscillations with a time period of 2 sec in earth's horizontal magnetic field of 24 microtesla. When a horizontal field of 18 microtesla is produced opposite to the earth's field by placing a current carrying wire, the new time period of magnet will be

(a) 1 s
(b) 2 s
(c) 3 s
(d) 4 s

16. The magnetic moment of a diamagnetic atom is

(a) much greater than one
(b) 1
(c) between zero and one
(d) equal to zero

17. Two identical bar magnets are fixed with their centres at a distance *d* apart. A stationary charge *Q* is placed at *P* in between the gap of the two magnets at a distance *D* centre *O* as shown in the figure

The force the charge Q is

(a) zero
(b) directed along *OP*
(c) directed along *PO*
(d) directed perpendicular to the plane of paper

18. If a diamagnetic substance is brought near the north or the south pole of a bar magnet, it is

(a) repelled by the north pole and attracted by the south pole
(b) attracted by the north pole and repelled by the south pole
(c) attracted by both the poles
(d) repelled by both the poles

19. A bar magnet having a magnetic moment of 2 x 10^4 JT^{-1} is free to rotate in a horizontal plane. A horizontal magnetic field B= 6 x 10^{-4} T exists in the space. The work done in taking the magnet slowly from a direction parallel to the field to a direction 60° from the field is

(a) 12 J
(b) 6 J
(c) 2 J
(d) 0.6 J

20. Curie temperature above which

(a) paramagnetic material becomes ferromagnetic material
(b) ferromagnetic material becomes diamagnetic material
(c) ferromagnetic material becomes paramagnetic material
(d) paramagnetic material becomes diamagnetic material

21. Nickel shows ferromagnetic property at room temperature. If the temperature is increased beyond Curie temperature, then it will show

(a) anti ferromagnetism
(b) no magnetic property
(c) diamagnetism
(d) paramagnetism

22. A charged particle (charge q) is moving in a circle of radius R with uniform speed *v*. The associated magnetic moment μ is given by

(a) qvR^2
(b) $qvR^{2/}2$
(c) qvR
(d) qvR/2.

23. If the magnetic dipole moment of an atom of diamagnetic material, paramagnetic material and ferromagnetic material are denoted by μ_d, μ_p and μ_f respectively, then

(a) $\mu_d = 0$ and $\mu_p \neq 0$
(b) $\mu_d \neq 0$ and $\mu_p = 0$
(c) $\mu_p = 0$ and $\mu_f \neq 0$
(d) $\mu_d \neq 0$ and $\mu_f \neq 0$

24. A coil in the shape of an equilateral triangle of side l is suspended between the pole pieces of a permanent magnet such that $\vec{B}$ is in plane of the coil. If due to a current *i* in the triangle a torque τ acts on it, the side l of the triangle is

(a) $\frac{2}{\sqrt{3}}\left(\frac{\tau}{Bi}\right)$ (b) $2\left(\frac{\tau}{\sqrt{3}Bi}\right)^{1/2}$
(c) $\frac{2}{\sqrt{3}}\left(\frac{\tau}{Bi}\right)^{1/2}$ (d) $\frac{1}{\sqrt{3}}\frac{\tau}{Bi}$

25. A diamagnetic material in a magnetic field moves

(a) from stronger to the weaker parts of the field

(b) from weaker to the stronger parts of the field

(c) perpendicular to the field

(d) in none of the above directions

26. According to Curie's law, the magnetic susceptibility of a substance at an absolute temperature *T* is proportional to

(a) 1/T

(b) T

(c) $1/T^2$

(d) T^2

27. A bar magnet is oscillating in the Earth's magnetic field with a period T. What happens to its period and motion if its mass is quadrupled ?

(a) motion remains simple harmonic with time period = T/2
(b) motion remains S.H.M with time period = 2T
(c) motion remains S.H.M with time period = 4T
(d) motion remains S.H.M and period remains nearly constant

28. Two bar magnets having same geometry with magnetic moments *M* and *2M*, are firstly placed in such a way that their similar poles are same side then its time period of oscillation is T_1. Now the polarity of one of the magnet is reversed then time period of oscillation is T_2, then

(a) $T_1 < T_2$
(b) $T_1 = T_2$
(c) $T_1 > T_2$
(d) T2= Infinite.

29. Among which the magnetic susceptibility does not depend on the temperature?

(a) diamagnetism.
(b) paramagnetism
(c) ferromagnetistlihy
(d) ferrite.

30. Tangent galvanometer is used to measure

(a) potential difference
(b) current
(c) resistance
(d) charge.

31. A bar magnet of magnetic moment $\vec{M}$, is placed in a magnetic field of induction $\vec{B}$. The torque exerted on it is

(a) $\vec{M}\ X\ \vec{B}$

(b) - $\vec{M}\ .\ \vec{B}$

(c) $\vec{M}\ .\ \vec{B}$

(d) - $\vec{B}\ X\ \vec{M}$

32. For protecting a sensitive equipment from the external magnetic field, it should be

(a) surrounded with fine copper sheet

(b) placed inside an iron can

(c) wrapped with insulation around it when passing current through it

(d) placed inside an aluminium can.

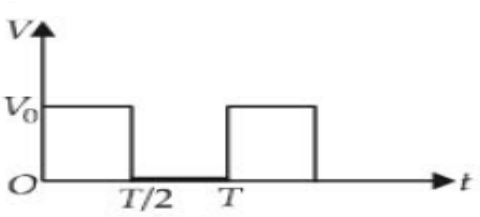
33. A bar magnet of magnetic moment *M* is cut into two parts of equal length. The magnetic moment of each part will be

(a) *M*
(b) 2*M*
(c) zero
(d) 0.5 *M*.

34. The work done in turning a magnet of magnetic moment *M* by an angle of 90° from the meridian, is *n* times the corresponding work done to turn it through an angle of 60°. The value of *n* is given by

(a) 1/2
(b) 1/4
(c) 2
(d) 1.

35. The r.m.s. value of potential difference *V* shown in the figure is



(a) $V_0/\sqrt{3}$

(b)V_0

(c) $V_0/\sqrt{2}$

(d) $V_0/2$

36. A coil has resistance 30 ohm and inductive reactance 20 ohm at 50 Hz frequency. If an ac source, of 200 volt, 100 Hz, is connected across the coil, the current in the coil will be

(a) 2.0 A

(b) 4.0 A

(c) 8.0 A

(d)$20/\sqrt{13}$ A

37. A conducting circular loop is placed in a uniform magnetic field, B = 0.025 T with its plane perpendicular to the loop. The radius of the loop is made to shrink at a constant rate of 1 mms^{-1}. The induced emf when the radius is 2 cm, is

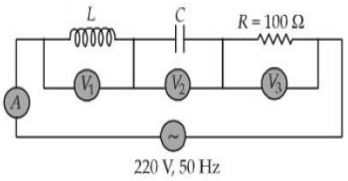
(a) 2πμV

(b) πμV

(c) π/2 μV

(d) 2μV

38. In the given circuit the reading of voltmeter V_1 and V_2 are 300 volts each. The reading of the voltmeter V_3 and ammeter A are respectively



(a) 150 V, 2.2A

(b) 220 V, 2.2A

(c) 220 V, 2.0 A

(d) 100 V, 2.0A

39. A 220 volt input is supplied to a transformer. The output circuit draws a current of 2.0 ampere at 440 volts. If the efficiency of the transformer is 80%, the current drawn by the primary windings of the transformer is

(a) 3.6 ampere

(b) 2.8 ampere

(c) 2.5 ampere

(d) 5.0 ampere

40. A condenser of capacity C is charged to a potential difference of V_1. The plates of the condenser are then connected to an ideal inductor of inductance L. The current through the inductor when the potential difference across the condenser reduces to V_2 is

(a) $\left(\frac{C(V_1-V_2)^2}{L}\right)^{\frac{1}{2}}$ (b) $\frac{C(V_1^2-V_2^2)}{L}$

(c) $\frac{C(V_1^2+V_2^2)}{L}$ (d) $\left(\frac{C(V_1^2-V_2^2)}{L}\right)^{\frac{1}{2}}$

41. Power dissipated in an LCR series circuit connected to an A.C. source of emf e is

(a) $\frac{\varepsilon^2\sqrt{R^2+\left(L\omega-\frac{1}{C\omega}\right)^2}}{R}$

(b) $\frac{\varepsilon^2\left[R^2+\left(L\omega-\frac{1}{C\omega}\right)^2\right]}{R}$

(c) $\frac{\varepsilon^2 R}{\sqrt{R^2+\left(L\omega-\frac{1}{C\omega}\right)^2}}$

(d) $\frac{\varepsilon^2 R}{\left[R^2+\left(L\omega-\frac{1}{C\omega}\right)^2\right]}$

42. A conducting circular loop is placed in a uniform magnetic field 0.04 T with its plane perpendicular to the magnetic field. The radius of the loop starts shrinking at 2 mm/s. The induced emf in the loop when the radius is 2 cm is

(a) 4.87 πμV

(b) 0. πμV

(c) 1.6 πμV

(d) 3.2 πμV

43. A long solenoid has 500 turns. When a current of 2 ampere is passed through it, the resulting magnetic flux linked with each turn of the solenoid is 4 x 10^{-3} Wb. The self-inductance of the solenoid is

(a) 1.0 henry

(b) 4.0 henry

(c) 2.5 henry

(d) 2.0 henry

44. In an a.c. circuit the e.m.f. (ϵ) and the current (i) at any instant are given respectively by $\epsilon = E_o \sin\omega t$, $i = I_o \sin(\omega t - \phi)$

The average power in the circuit over one cycle of a.c. is

(a) $\frac{E_0 I_0}{2}\cos\phi$ (b) $E_0 I_0$

(c) $\frac{E_0 I_0}{2}$ (d) $\frac{E_0 I_0}{2}\sin\phi$

45. A circular disc of radius 0.2 meter is placed in a uniform magnetic field of induction $\frac{1}{\pi}\left(\frac{Wb}{m^2}\right)$ in such a way that its axis makes an angle of 60° with $\vec{B}$. The magnetic flux linked with the disc is

(a) 0.08 Wb

(b) 0.01 Wb

(c) 0 .02 Wb

(d) 0.06 Wb

46. Theprimary and secondary coils of a transformer have 50 and 1500 turns respectively. If the magnetic flux ϕ linked with the primary coil is given by $\phi = \phi_0 + 4t$, where ϕ is in webers, t is time in seconds and ϕ_o is a constant, the output voltage across the secondary coil is

(a) 120 volts

(b) 220 volts

(c) 30 volts

(d) 90 volts.

47. A transformer is used to light a 100 W and 110 V lamp from a 220 V mains. If the main current is 0.5 amp, the efficiency of the transformer is approximately

(a) 50%

(b) 90%

(c) 10%

(d) 30%.

48. What is the value of inductance L for which the current is maximum in a series LCR circuit with C = μF and ω = 1000s^{-1}?

(a) 1 mH

(b) cannot be calculated unless R is known

(c) 10 mH

(d) 100 mH.

49. A coil of inductive reactance 31 Ω has a resistance of 8 Ω. It is placed in series with a condenser of capacitative reactance 25 Ω. The combination is connected to an a.c. source of 110 V. The power 41fie circuit is

(a) 0.33

(b)0.56

(c) 0.64

(d) 0.80

50. Two coils of self inductance 2 mH and 8 mH are placed so close together that the effective flux in one coil is completely linked with the other. The mutual inductance between these coils is

(a) 16 mH

(b) 10 mH

(c) 6 mH

(d) 4 mH.