Magnetism and matter

1. With the tangent galvanometer it is desirable to have a deflection near 45°; then the percentage error:
   (a) is less in the reading of deflection
   (b) is negligible in the reading of deflection
   (c) is less in the measurement of current
   (d) is large in the measurement of current
2. The sensitivity of a moving coil galvanometer depends on:
   (a) the angle of deflection
   (b) the earth's magnetic field
   (c) torsional constant of the spring
   (d) the moment of inertia of the coil
3. An ammeter can be converted into a voltmeter by connecting:
   (a) a high resistance in series
   (b) a low resistance in parallel
   (c) a low resistance in series
   (d) a high resistance in parallel
4. In a moving coil galvanometer the deflection of the coil θ is related to the electric current *I* by the relation:
   (a) $I \propto \tan\theta$ (b) $I \propto \theta$ (c) $I \propto \theta^2$ (d) $I \propto \sqrt{\theta}$
5. A voltmeter of range 2V and resistance 300 Ω cannot be converted into ammeter of range:
   (a) 1 A (b) 1 mA (c) 100 mA (d) 10 mA
6. 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 not torque
7. A voltmeter has a resistance of G ohm and range V volt. The value of resistance used in series to convert it into voltmeter of range nV volt is:
   (a) nG (b) (n – 1)G (c) G/n (d) G/(n – 1)
8. An ammeter has a resistance of G ohm and a range of *I* amp. The value of resistance used in parallel to convert it into an ammeter of range *nI* amp is:
   (a) nG (b) (n – 1)G (c) G/n (d) G/(n – 1)
9. To reduce the range of a voltmeter, its resistance need to be reduced. Which of the following resistance when connected in parallel will convert it into a voltmeter of range (V/n)?
   (a) nR_0 (b) $(n + 1)R_0$ (c) $(n – 1)R_0$ (d) None of these

10. A soft iron cylinder is used in a moving coil galvanometer because without it in galvanometer:
    (a) magnetic field will not be radial and strong
    (b) magnetic field will be radial but weak
    (c) magnetic field will be radial and strong
    (d) magnetic field will not be radial and weak
11. The resistance of an ammeter is 13 Ω and its scale is graduated for a current of 100 A. After an additional shunt has been connected it becomes possible to measure the current upto 750 A by this instrument. Find resistance of the shunt:
    (a) 8 Ω (b) 6 Ω (c) 4 Ω (d) 2 Ω
12. An ammeter is obtained by shunting a 30 Ω galvanometer with a 30 Ω resistance. What additional shunt should be connected across it to double the range?
    (a) 15 Ω (b) 10 Ω (c) 5 Ω (d) None of these
13. A galvanometer having a resistance of 8 Ω is shunted by a wire of resistance 2 Ω. If the total current is 1 amp, the part of it passing through the shunt will be:
    (a) 0.25 A (b) 0.8 A (c) 0.2 A (d) 0.5 A
14. A moving coil galvanometer has a resistance of 900 Ω. In order to send only 10% of the main current through the galvanometer, the resistance of the required shunt is:
    (a) 0.9 Ω (b) 100 Ω (c) 405 Ω (d) 90 Ω
15. A steel wire of length L has a magnetic moment M. It is then bent into a semi-circular are; the new magnetic moment will be:
    (a) M (b) $2M/\pi$ (c) M/L (d) $M \times L$
16. A thin bar magnet of length 2L is bent at the mid-point so that the angle between them is 60°. The new length of the magnet is:
    (a) $\sqrt{2}L$ (b) $\sqrt{3}L$ (c) 2L (d) L
17. Two identical magnets each of moment M are kept at an angle of 60°, such that like poles are touching each other. The magnetic moment of the combination will be:
    (a) M (b) 2M (c) $\sqrt{2}M$ (d) $\sqrt{3}M$
18. Find the angle through which a magnet is to be rotated from rest position when it is suspended in a magnetic field so that it experiences half of the maximum couple:
    (a) 60° (b) 30° (c) 45° (d) 90°
19. The susceptibility of a diamagnetic substance is:
    (a) infinite (c) small but negative
    (b) zero (d) small and positive
20. An atom is paramagnetic if it has:
    (a) a magnetic moment
    (b) an electric dipole moment
    (c) no electric dipole moment
    (d) no magnetic moment

21. A sample of diamagnetic substance when placed near a permanent bar magnet is:
    (a) repelled away
    (b) attracted towards
    (c) unaffected
    (d) attracted or repelled dependent on the size of the sample
22. The magnetic moment of atomic neon is equal to:
    (a) zero (b) $\mu_B/2$ (c) μ_B (d) $3\mu_B/2$
23. If a magnetic is suspended at an angle of 30° to the magnetic meridian, the dip needle makes an angle of 45° with the horizontal. The real dip is:
    (a) $\tan^{-1}(\sqrt{3}/2)$ (b) $\tan^{-1}(\sqrt{3})$ (c) $\tan^{-1}(\sqrt{3}/\sqrt{2})$ (d) $\tan^{-1}(2/\sqrt{3})$
24. At a placed the angle of dip is 30°. If the horizontal component of the earth's magnetic field is H, then the total field intensity will be given by:
    (a) H/2 (b) $2H/\sqrt{3}$ (c) $H\sqrt{2}$ (d) $H\sqrt{3}$
25. The ratio of voltage sensitivity (V_S) and current sensitivity (I_S) of a moving coil galvanometer is:
    (a) 1/G (b) $1/G^2$ (c) G (d) G^2
26. A current carrying small drop behaves like a small magnet. If A be its area and M its magnetic moment, the current is the loop will be:
    (a) M/A (b) A/M (c) MA (d) A^2M
27. The work done in deflecting a magnet of magnetic moment M through an angle θ in a field of strength H is:
    (a) MH(1-cos θ) (b) MH(1-sin θ) (c) MH sin θ (d) MH(1+cos θ)
28. A neutral point is obtained at the centre of a vertical circular coil carrying current. The angle between the plane of the coil and the magnetic meridian is:
    (a) 0° (b) 45° (c) 60° (d) 90°
29. If horizontal and vertical components of the earth's magnetic field are equal at a certain place, then the angle of dip at that place will be:
    (a) 90° (b) 60° (c) 45° (d) 0°
30. The ratio of magnetic fields due to a small bar magnet in the endon position to that in broad-side on position for the same distance from it is:
    (a) 1 : 4 (b) 1 : 2 (c) 1 : 1 (d) 2 : 1
31. A magnet of magnetic moment M is cut is into two equal parts. The two parts are placed perpendicular to each other so that their north poles touch each other. The resultant magnetic moment is:
    (a) $\sqrt{2}M$ (b) $M/\sqrt{2}$ (c) $\sqrt{3}M$ (d) $M/\sqrt{3}$
32. The deflection in moving coil galvanometer falls from 50 division to 10 division when a shunt of 12 Ω is applied. The resistance of galvanometer coil is:
    (a) 24 Ω (b) 12 Ω (c) 50 Ω (d) 48 Ω
33. A hydrogen atom is paramagnetic. A hydrogen molecule is:
    (a) diamagnetic (c) ferromagnetic
    (b) paramagnetic (d) none of these

34. The accuracy of a tangent galvanometer is maximum when angle of deflection of magnet needle is:

(a) 90° (b) 45° (c) 30° (d) 60°

35. Two magnetic isolated north poles each of strength m ampere- metre are placed one at each of two vertices of an equilateral triangle of side a. The resultant magnetic induction at third vertex is:

(a) $\mu_0/4\pi\ (m/a^2)$ (b) $\mu_0/4\pi\ \sqrt{2}m/a^2$ (c) $\mu_0/4\pi\ \sqrt{3}m/a^2$ (d) $\mu_0/4\pi\ m/a^2$