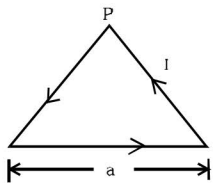
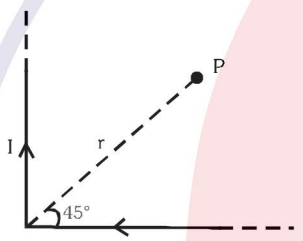
1. An equilateral triangle of side 'a' carries a current 'I'. Magnetic field at point 'P' which is vertex of triangle. :-



(1) $\frac{\mu_0 I}{2\sqrt{3}\pi a}\odot$ (2) $\frac{\mu_0 I}{2\sqrt{3}\pi a}\otimes$

(3) $\frac{9}{2}\left(\frac{\mu_0 I}{\pi a}\right)\odot$ (4) $\frac{9}{2}\left(\frac{\mu_0 I}{\pi a}\right)\otimes$

2. Magnetic field at point 'P' due to given current distribution is :-



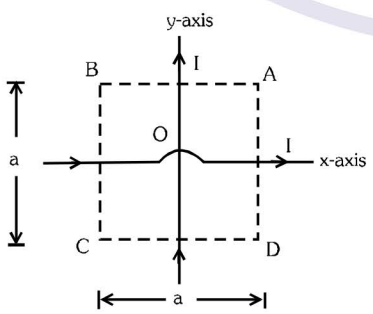
(1) $\frac{\mu_0 I}{4\pi r}\left(1+\sqrt{2}\right)\odot$ (2) $\frac{\mu_0 I}{2\pi r}\left(1+\sqrt{2}\right)\odot$

(3) $\frac{\mu_0 I}{4\pi r}\left(1+\sqrt{2}\right)\otimes$ (4) $\frac{\mu_0 I}{2\pi r}\left(1+\sqrt{2}\right)\otimes$

3. Two long parallel wires carry i and 2i current in same direction. Magnetic field just between the wires is 'B'. If 2i current is switched off then magnetic field at the same point is :-

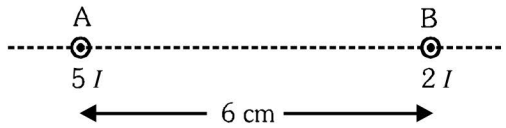
(1) 2B (2) B (3) B/2 (4) $\sqrt{2}$ B

4. Two infinite length wires carry equal current and placed along x and y axis respectively. At which points the resultant magnetic field is zero ?



(1) A, B (2) B, D
(3) A, C (4) C, D

5. The position of point from wire 'B', where net magnetic field is zero due to following current distribution.



(1) 6/7 cm (2) 12/7 cm
(3) 18/17 cm (4) 16/7 cm

6. Two concentric coplanner coils of equal turns have radii 10 cm and 30 cm respectively. Same current flowing in both the coils in same direction. Now direction of current is reversed in one coil then ratio of magnetic field at their common centre in two conditions respectively :-

(1) 2 : 1 (2) 1 : 2
(3) 1 : 1 (4) 4 : 1

7. A circular coil of one turn in formed by a 6.28m length wire, which carries a current of 3.14A. The magnetic field at the centre of coil is :-

(1) 1×10^{-6} T (2) 4×10^{-6} T
(3) 0.5×10^{-6} T (4) 2×10^{-6} T

8. A hollow cylinderical wire carries a current I, having inner and outer radii 'R' and 2R respectively. Magnetic field at a point which 3R/2 distance away from its axis is :-

(1) $\frac{5\mu_0 I}{18\pi R}$ (2) $\frac{\mu_0 I}{36\pi R}$

(3) $\frac{5\mu_0 I}{36\pi R}$ (4) $\frac{5\mu_0 I}{9\pi R}$

9. A long straight wire (radius = 3.0 mm) carries a constant current distributed uniformly over a cross section perpendicular to the axis of the wire. If the current density is 100 A/m^2. The magnitudes of the magnetic field at (a) 2.0 mm from the axis of the wire and (b) 4.0 mm from the axis of the wire is :-

(1) $2\pi\times10^{-8}$ T, $\frac{9\pi}{2}\times10^{-8}$T

(2) $4\pi\times10^{-8}$ T, $\frac{\pi}{2}\times10^{-8}$T

(3) $4\pi\times10^{-8}$ T, $\frac{9\pi}{2}\times10^{-8}$T

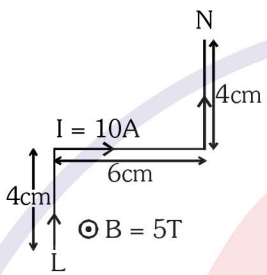
(4) $\pi\times10^{-4}$ T, $\frac{9\pi}{2}\times10^{-8}$T

10. A long solenoid carrying a current produces a magnetic field B along its axis. If the current is doubled and the number of turns per cm is halved, the new value of the magnetic field is :-

(1) B/2 (2) B

(3) 2B (4) 4B

11. A wire 'LN' bent as shown in figure is placed in uniform perpendicular magnetic field of 5T. A 10A current flows through the wire. Magnetic force experienced by the wire is :-



(1) 5N (2) 10N

(3) 2.5 N (4) 1.25 N

12. Two identically charged particles A and B initially at rest, are accelerated by a common potential differene V. They enters into a uniform transverse magnetic field B and describe a circular path of radii r_1 and r_2 respectively then their mass ratio is :-

(1) $\left(\frac{r_1}{r_2}\right)^2$ (2) $\left(\frac{r_2}{r_1}\right)^2$ (3) $\left(\frac{r_1}{r_2}\right)$ (4) $\left(\frac{r_2}{r_1}\right)$

13. A uniform electric field and a uniform magnetic field are acting along the same direction in a certain region. If an electron is projected along the direction of the fields with a certain velocity then:-

(1) it will turn towards left of direction of motion

(2) it will turn towards right of direction of motion

(3) its velocity will increase

(4) its velocity decrease

14. A proton of mass 1.67×10^{-27} kg and charge 1.6×10^{-19}C is projected with a speed of 2×10^6 ms^{-1} at an angle of 60° to the X-axis. If a uniform magnetic field of 0.104 tesla is applied along Y-axis, the path of proton is :-

(1) A circle of radius = 0.2 m and time period = $2\pi \times 10^{-7}$ s

(2) A circle of radius = 0.1 m and time period = $2\pi \times 10^{-7}$ s

(3) A helix of radius = 0.1 m and time period = $2\pi \times 10^{-7}$ s

(4) A helix of radius = 0.2 m and time period = $2\pi \times 10^{-7}$ s

15. Two particles each of mass m and charge q, are attached to the two ends of a light rigid rod of length 2l. The rod is rotated at constant angular speed about a perpendicular axis passing through its centre. The ratio of the magnitudes of the magnetic moment of the system and its angular momentum about the centre of the rod is :-

(1) $\frac{q}{\pi m}$ (2) $\frac{q}{m}$ (3) $\frac{2q}{m}$ (4) $\frac{q}{2m}$

16. The magnetic field at a point X on the axis of a small bar magnet is equal to the field at a point Y on the equator of the same magnet. The ratio of the distances of point X and Y from the centre of the magnet is :-

(1) 2^{-3} (2) $2^{-1/3}$ (3) 2^3 (4) $2^{1/3}$

17. 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 :-

(1) $\tan^2\theta = \tan^2\theta_1 + \tan^2\theta_2$

(2) $\cot^2\theta = \cot^2\theta_1 - \cot^2\theta_2$

(3) $\tan^2\theta = \tan^2\theta_1 - \tan^2\theta_2$

(4) $\cot^2\theta = \cot^2\theta_1 + \cot^2\theta_2$

18. A solenoid of length 0.4 m, having 500 turns and 3A current flows through it. A coil of radius 0.01 m and have 10 turns and carries current of 0.4 A has to placed such that its axis is perpendicular to the axis of solenoid, then torque on coil will be:-

(1) 5.92×10^{-6} N.m (2) 5.92×10^{-5} N.m

(3) 5.92×10^{-4} N.m (4) 0.592×10^{-3} N.m

19. The magnetic susceptibility of a paramagnetic material at −73°C is 0.0075 then its value at −173°C will be :-

(1) 0.0045 (2) 0.0030

(3) 0.015 (4) 0.0075

20. The material of permanent magnet has

(1) High relentivity, low coercivity

(2) Low retentivity, high coercivity

(3) Low relentivity, low coercivity

(4) High retentivity, high coercivity

21. Soft iron is used to make the core of transformer, because of its :

(1) low coercivity and low retentivity

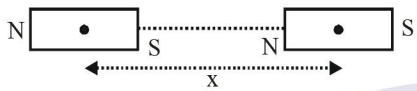
(2) low coercivity and high retentivity

(3) high coercivity and high retentivity

(4) high coercivity and low retentivity

22. Which of the following statements is correct for diamagnetic materials :-
(1) $\mu_r < 1$
(2) χ is negative and low
(3) χ does not depend on temperature
(4) All of the above

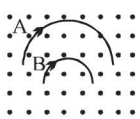
23. The mid points of two small magnetic dipoles of length d in end-on positions, are separated by a distance x, (x >> d). The force between them is proportional to x^{-n} where n is :-



(1) 3 (2) 4 (3) 2 (4) 1

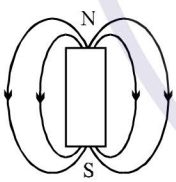
24. Horizontal magnetic field of earth at Mumbai is 1.5×10^{-4} T in North direction. A small bar magnet of magnetic moment 10 Am^2 is kept on a horizontal table such that its North pole points due North. What is the magnetic field at 10 cm from centre of magnet at a point on its axis due North of it :-
(1) 3.5×10^{-4} T (2) 5×10^{-5} T
(3) 2.15×10^{-3} T (4) 1.15×10^{-3} T

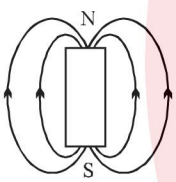
25. Two particles A and B of masses m_A and m_B respectively and having the same charge are moving in a plane. A uniform magnetic field exists perpendicular to this plane. The speeds of the particles are v_A and v_B respectively and the trajectories are as shown in the figure. Then

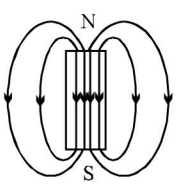


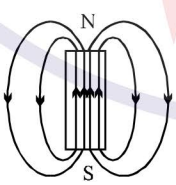
(1) $m_A v_A < m_B v_B$ (2) $m_A v_A > m_B v_B$
(3) $m_A < m_B$ and $v_A < v_B$ (4) $m_A = m_B$ and $v_A = v_B$

26. The magnetic field lines due to a bar magnet are correctly shown in:-

(1) 

(2) 

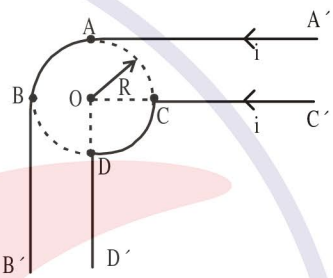
(3) 

(4) 

27. Two bar magnets of the same mass, same length and breadth but having magnetic moments M and 2M are joined together north pole to north pole and suspended by a string. The time period of assembly in a magnetic field of strength H is 3 seconds. If now the polarity of one of the magnets is reversed and the combination is again made to oscillate in the same field, the time of oscillations is :

(1) $\sqrt{3}$ sec (2) $3\sqrt{3}$ sec (3) 3 sec (4) 6 sec

28. All straight wires are very long. Both AB and CD arc area of the same circle, both subtending right angles at the centre O. Then the magnetic field at O is



(1) $\frac{\mu_0 i}{4\pi R}$ (2) $\frac{\mu_0 i}{4\pi R}\sqrt{2}$

(3) $\frac{\mu_0 i}{2\pi R}$ (4) $\frac{\mu_0 i}{2\pi R}(\pi+1)$

29. A closely wound solenoid 80 cm long has 5 layers of windings of 400 turns each. The diameter of the solenoid is 1.8 cm. If the current carried is 8.0 A. estimate the magnitude of B inside the solenoid near its centre.
(1) zero (2) $8\pi \times 10^{-3}$ T
(3) $15\pi \times 10^{-3}$ T (4) $\pi \times 10^{-3}$ T

30. A particle of mass m and charge q moves with a constant velocity v along the positive x direction. It enters a region containing a uniform magnetic field B directed along the negative z direction, extending from x = a to x = b. The minimum value of v required so that the particle can just enter the region x > b is :-
(1) q b B/m (2) q(b – a) B/m
(3) q a B/m (4) q(b + a) B/2m

ANSWER KEY — Exercise-I

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	1	4	2	3	2	1	4	3	3	2
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	1	1	4	3	4	4	4	1	3	4
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	1	4	2	3	2	4	2	3	2	2