RK VISION ACADEMY

PHYSICS

XII – MAGNETIC EFFECT OF CURRENT

SECTION A

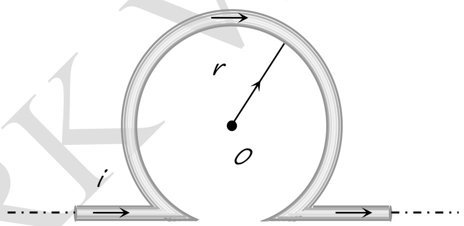
1. If a long hollow copper pipe carries a direct current, the magnetic field associated with the current will be

(1) Only inside the pipe
(2) Only outside the pipe
(3) Neither inside nor outside the pipe
(4) Both inside and outside the pipe

2. A charge q coulomb moves in a circle at n revolutions per second and the radius of the circle is r metre. Then magnetic field at the centre of the circle is ($NA^{-1}m^{-1}$)

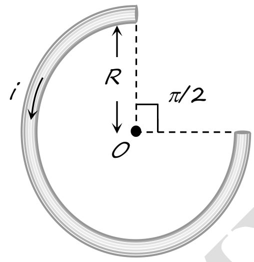
(1) $\frac{2\pi q}{nr}$ x 10^{-7}
(2) $\frac{2\pi q}{r}$ x 10^{-7}
(3) $\frac{2\pi nq}{nr}$ x 10^{-7}
(4) $\frac{2\pi q}{r}$ x 10^{-7}

3. An infinitely long straight conductor is bent into the shape as shown in the figure. It carries a current of i ampere and the radius of the circular loop is r metre. Then the magnetic induction at its centre will be



(1) $\frac{\mu_0}{4\pi}\frac{2i}{r}(\pi + 1)$
(2) $\frac{\mu_0}{4\pi}\frac{2i}{r}(\pi - 1)$
(3) Zero
(4) Infinite

4. A current i ampere flows in a circular arc of wire whose radius is R, which subtend an angle 3π / 2 radian at its centre. The magnetic induction B at the centre is



(1) $\frac{\mu_0}{R}$
(2) $\frac{\mu_0}{2R}$
(3) $\frac{2\mu_0}{R}$
(4) $\frac{3\mu_0}{8R}$

5. A current i ampere flows along the inner conductor of a coaxial cable and returns along the outer conductor of the cable, then the magnetic induction at any point outside the conductor at a distance r metre from the axis is

(1) Infinite
(2) Zero
(3) $\frac{\mu_0}{4\pi}\frac{2i}{r}$
(4) $\frac{\mu_0}{4\pi}\frac{2\pi i}{r}$

6. A helium nucleus makes a full rotation in a circle of radius 0.8 metre in two seconds. The value of the magnetic field B at the centre of the circle will be

(1) $\frac{10^{-19}}{\mu_0}$
(2) $10^{-19}\ \mu_0$
(3) 2 x $10^{-10}\ \mu_0$
(4) $\frac{2\ X\ 10^{-10}}{\mu_0}$

7. A solenoid of 1.5 metre length and 4.0 cm diameter has 10 turns per cm. A current of 5 ampere is flowing through it. The magnetic induction at axis inside the solenoid is

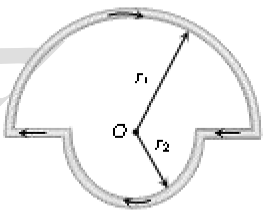
(1) $2\pi \times 10^{-3}$ Tesla
(2) $2\pi \times 10^{-5}$ Tesla
(3) $4\pi \times 10^{-2}$ Gauss
(4) $2\pi \times 10^{-5}$ Gauss

8. The magnetic induction at a point P which is distant 4 cm from a long current carrying wire is 10^{-8} Tesla. The field of induction at a distance 12 cm from the same current would be
(1) 3.33×10^{-9} Tesla
(2) 1.11×10^{-4} Tesla
(3) 3×10^{-3} Gauss
(4) 9×10^{-2} Gauss

9. Field at the centre of a circular coil of radius r, through which a current I flows is
(1) Directly proportional to r
(2) Inversely proportional to I
(3) Directly proportional to I
(4) Directly proportional to I^2

10. Field inside a solenoid is
(1) Directly proportional to its length
(2) Directly proportional to current
(3) Inversely proportional to total number of turns
(4) Inversely proportional to current

11. In the figure shown there are two semicircles of radii r_1 and r_2 in which a current i is flowing. The magnetic induction at the centre O will be

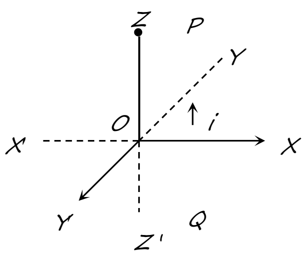


(1) $\frac{\mu_0 i}{r}(r_1 + r_2)$
(2) $\frac{\mu_0 i}{4}(r_1 - r_2)$
(3) $\frac{\mu_0 i}{4}\frac{(r_1+r_2)}{(r_1 r_2)}$
(4) $\frac{\mu_0 i}{4}\frac{(r_1-r_2)}{(r_1 r_2)}$

12. Magnetic effect of current was discovered by
(1) Faraday
(2) Oersted
(3) Ampere
(4) Bohr

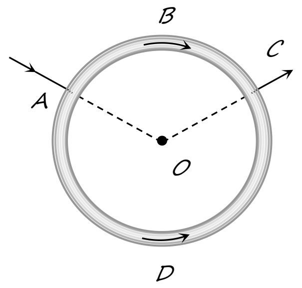
13. If the strength of the magnetic field produced 10cm away from a infinitely long straight conductor is 10^{-5} weber/m^2, the value of the current flowing in the conductor will be
(1) 5 ampere
(2) 10 ampere
(3) 500 ampere
(4) 1000 ampere

14. A vertical wire kept in Z-X plane carries a current from Q to P (see figure). The magnetic field due to current will have the direction at the origin O along



(1) OX
(2) OX'
(3) OY
(4) OY'

15. A uniform wire is bent in the form of a circle of radius R. A current I enters at A and leaves at C as shown in the figure: If the length ABC is half of the length ADC, the magnetic field at the centre O will be



(1) Zero

(2) $\frac{\mu_0 i}{2r}$

(3) $\frac{\mu_0 i}{4r}$

(4) $\frac{\mu_0 i}{6r}$

16. A circular coil 'A' has a radius R and the current flowing through it is I. Another circular coil 'B' has a radius 2R and if 2I is the current flowing through it, then the magnetic fields at the centre of the circular coil are in the ratio of

(1) 4 : 1

(2) 2 : 1

(3) 3 : 1

(4) 1 : 1

17. A straight wire of diameter 0.5 mm carrying a current of 1 A is replaced by another wire of 1 mm diameter carrying the same current. The strength of magnetic field far away is

(1) Twice the earlier value

(2) Half of the earlier value

(3) Quarter of its earlier value

(4) Unchanged

18. One Tesla is equal to

(1) 10^7 Gauss

(2) 10^{-4} Gauss

(3) 10^4 Gauss

(4) 10^{-8} Gauss

19. Magnetic fields at two points on the axis of a circular coil at a distance of 0.05m and 0.2m from the centre are in the ratio 8 : 1. The radius of the coil is

(1) 1.0 m

(2) 0.1 m

(3) 0.15 m

(4) 0.2 m

20. The dimension of the magnetic field intensity B is

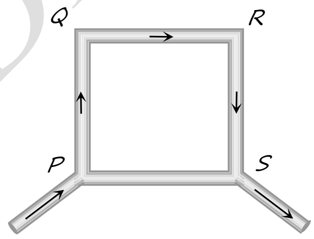
(1) $MLT^{-2}A^{-1}$

(2) $MT^{-2}A^{-1}$

(3) ML^2TA^{-2}

(4) $M^2LT^{-2}A^{-1}$

21. PQRS is a square loop made of uniform conducting wire the current enters the loop at P and leaves at S. Then the magnetic field will be



(1) Maximum at the centre of the loop

(2) Zero at the centre of loop

(3) Zero at all points inside the loop

(4) Zero at all points outside of the loop

22. A magnetic field can be produced by

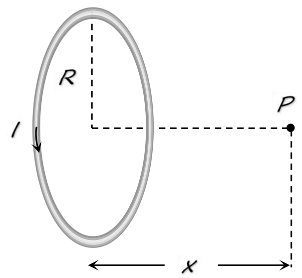
(1) A moving charge

(2) A changing electric field

(3) None of these

(4) Both of these

23. A coil having N turns carry a current I as shown in the figure. The magnetic field intensity at point P is



(1) $\frac{\mu_0 NI\,R^2}{2(R^2+X^2)^{\frac{3}{2}}}$

(2) $\frac{\mu_0 NI}{2R}$

(3) $\frac{\mu_0 NI\, R^2}{(R^1+X^1)^{\frac{2}{1}}}$

(4) Zero

24. The current in the windings on a toroid is 2.0A. There are 400 turns and the mean circumferential length is 40cm. If the inside magnetic field is 1.0T, the relative permeability is near to

(1) 100

(2) 200

(3) 300

(4) 400

25. The current is flowing in south direction along a power line. The direction of magnetic field above the power line (neglecting earth's field) is

(1) South

(2) East

(3) North

(4) West

26. A proton moving with a constant velocity passes through a region of space without any change in its velocity. If E and B represent the electric and magnetic fields respectively, then this region of space may not have

(1) $E = 0; B = 0$

(2) $E = 0; B \neq 0$

(3) $E \neq 0; B = 0$

(4) $E \neq 0; B \neq 0$

27. A beam of ions with velocity 2×10^5 m/s enters normally into a uniform magnetic field of 4×10^{-2} Tesla. If the specific charge of the ion is 5×10^7 C/kg, then the radius of the circular path described will be

(1) 0.10 m

(2) 0.16 m

(3) 0.20 m

(4) 0.25 m

28. The path executed by a charged particle whose motion is perpendicular to magnetic field is

(1) A straight line

(2) An ellipse

(3) A circle

(4) A helix

29. Particles having positive charges occasionally come with high velocity from the sky towards the earth. On account of the magnetic field of earth, they would be deflected towards the

(1) North

(2) South

(3) East

(4) West

30. An electron is moving with a speed of 10^8 m/s perpendicular to a uniform magnetic field of intensity B. Suddenly intensity of the magnetic field is reduced to B/2. The radius of the path becomes from the original value of r

(1) No change

(2) Reduces to r / 2

(3) Increases to 2r

(4) Stops moving

31. If a proton, deutron and α-particle on being accelerated by the same potential difference enters perpendicular to the magnetic field, then the ratio of their kinetic energies is

(1) 1 : 2 : 2

(2) 2 : 2 : 1

(3) 1 : 2 : 1

(4) 1 : 1 : 2

32. An electron and a proton enter region of uniform magnetic field in a direction at right angles to the field with the same kinetic energy. They describe circular paths of radius r_e and r_p respectively. Then

(1) $r_e = r_p$
(2) $r_e < r_p$
(3) $r_e > r_p$
(4) re may be less than or greater than rp depending on the direction of the magnetic field

33. A proton (or charged particle) moving with velocity v is acted upon by electric field E and magnetic field B. The proton will move undeflected if
(1) E is perpendicular to B
(2) E is parallel to v and perpendicular to B
(3) E, B and v are mutually perpendicular and v = E/B
(4) E and B both are parallel to v

34. A proton and an electron both moving with the same velocity v enter into a region of magnetic field directed perpendicular to the velocity of the particles. They will now move in circular orbits such that
(1) Their time periods will be same
(2) The time period for proton will be higher
(3) The time period for electron will be higher
(4) Their orbital radii will be same

35. A charge + Q is moving upwards vertically. It enters a magnetic field directed to the north. The force on the charge will be towards
(1) North
(2) South
(3) East
(4) West

SECTION B

36. A moving charge will gain energy due to the application of
(1) Electric field
(2) Magnetic field
(3) Both of these
(4) None of these

37. An electron and a proton with equal momentum enter perpendicularly into a uniform magnetic field, then
(1) The path of proton shall be more curved than that of electron
(2) The path of proton shall be less curved than that of electron
(3) Both are equally curved
(4) Path of both will be straight line

38. In a cyclotron, the angular frequency of a charged particle is independent of
(1) Mass
(2) Speed
(3) Charge
(4) Magnetic field

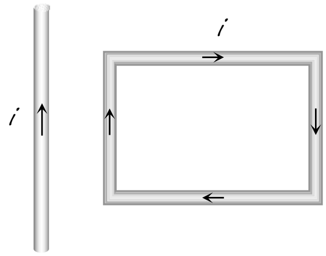
39. A charged particle is moving in a uniform magnetic field in a circular path. Radius of circular path is R. When energy of particle is doubled, then new radius will be
(1) $\sqrt{2}$R
(2) $\sqrt{3}$R
(3) 2R
(4) 3R

40. A charge q is moving in a magnetic field then the magnetic force does not depend upon
(1) Charge
(2) Mass
(3) Velocity
(4) Magnetic field

41. An electron (mass = 9×10^{-31} kg. Charge = 1.6×10^{-19} C) whose kinetic energy is 7.2×10^{-18} joule is moving in a circular orbit in a magnetic field of 9×10^{-5} weber/m^2. The radius of the orbit is
(1) 1.25 cm
(2) 2.5 cm
(3) 12.5 cm
(4) 25.0 cm

42. **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**
(1) 4 : 3
(2) 2 : 3
(3) 3 : 1
(4) 1 : 4

43. **A rectangular loop carrying a current i is situated near a long straight wire such that the wire is parallel to the one of the sides of the loop and is in the plane of the loop. If a steady current I is established in wire as shown in figure, the loop will**



(1) Rotate about an axis parallel to the wire
(2) Move away from the wire or towards right
(3) Move towards the wire
(4) Remain stationary

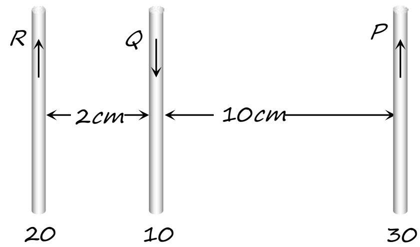
44. **If two streams of protons move parallel to each other in the same direction, then they**
(1) Do not exert any force on each other
(2) Repel each other
(3) Attract each other
(4) Get rotated to be perpendicular to each other

45. **A current carrying loop is placed in a uniform magnetic field. The torque acting on it does not depend upon**
(1) Shape of the loop
(2) Area of the loop
(3) Value of the current
(4) Magnetic field

46. **Two long and parallel wires are at a distance of 0.1 m and a current of 5 A is flowing in each of these wires. The force per unit length due to these wires will be**
(1) 5 x 10^{-5} N/m
(2) 5 x 10^{-3} N/m
(3) 2.5 x 10^{-5} N/m
(4) 2.5 x 10^{-4} N/m

47. **A current of 10 ampere is flowing in a wire of length 1.5 m. A force of 15 N acts on it when it is placed in a uniform magnetic field of 2 tesla. The angle between the magnetic field and the direction of the current is**
(1) 30^0
(2) 45^0
(3) 60^0
(4) 90^0

48. **Three long, straight and parallel wires carrying currents are arranged as shown in figure. The force experienced by 10 cm length of wire Q is**



(1) 1.4 x 10^{-4} N towards right
(2) 1.4 x 10^{-4} N towards left
(3) 2.6 x 10^{-4} N towards right
(4) 2.6 x 10^{-4} N towards left

49. **If a current is passed in a spring, it**
(1) Gets compressed
(2) Gets expanded
(3) Oscillates
(4) Remains unchanged

50. **A conductor in the form of a right angle ABC with AB = 3 cm and BC = 4 cm carries a current of 10 A. There is a uniform magnetic field of 5 T**

perpendicular to the plane of the conductor. The force on the conductor will be

(1) 1.5 N
(2) 2.0 N
(3) 2.5 N
(4) 3.5 N

RK VISION ACADEMY

PHYSICS	
XII – MAGNETIC EFFECT OF CURRENT	
SECTION A	
1.	2
2.	3
3.	2
4.	4
5.	2
6.	2
7.	1
8.	1
9.	3
10.	2
11.	3
12.	2
13.	1
14.	4
15.	1
16.	4
17.	4
18.	3
19.	2
20.	2
21.	2
22.	4
23.	1
24.	4
25.	4
26.	3
27.	1
28.	3
29.	3
30.	3
31.	4
32.	2
33.	3
34.	2
35.	4
SECTION B	
36.	1
37.	3
38.	2
39.	1
40.	2
41.	4
42.	1
43.	3
44.	2
45.	1
46.	1
47.	1
48.	1
49.	1
50.	3