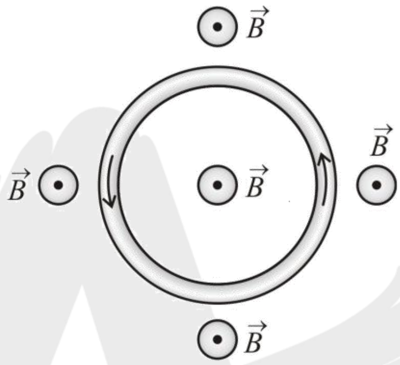
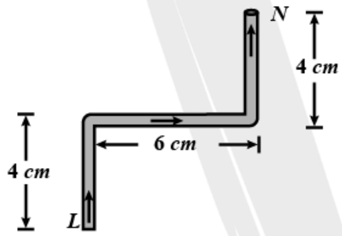
DPP – 2

Q.1 An arbitrary shaped closed coil is made of a wire of length L and a current I ampere is flowing in it. If the plane of the coil is perpendicular to magnetic field $\vec{B}$, the force on the coil is $k^2 - 1$. Value of K is equal to

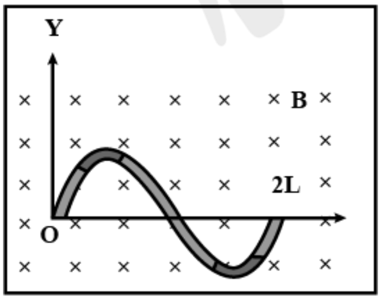
Q.2 An elastic circular wire of length l carries a current I. It is placed in a uniform magnetic field $\vec{B}$ (out of paper) such that its plane is perpendicular to the direction of $\vec{B}$. the tension in string is $(9IRB)/(\alpha+2)$. Value of α^2 IS



Q.3 A current-carrying wire LN is bent in the form as shown below. If wire carries a current of 10 A and it is placed in a magnetic field of 5 T which acts perpendicular to the paper outwards then it will experience a force of ____N.

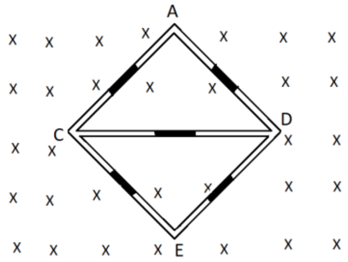


Q.4 A wire carrying current i is placed in a uniform magnetic field in the form of the curve $y = a \sin\left(\frac{\pi x}{L}\right) 0 \leq x \leq 2L$. The force acting on the wire is



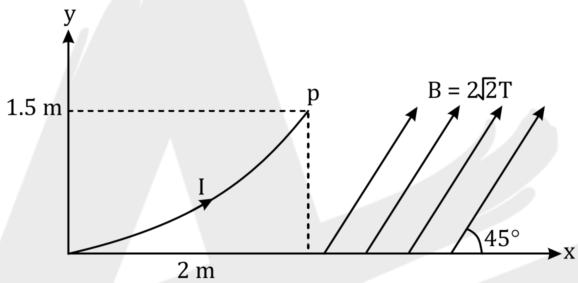
(a) $\frac{iBL}{\pi}$ (b) $iBL\pi$ (c) 2iBL (d) Zero

Q.5 Same current $i = 2$ A is flowing in a wire frame as shown in the figure. The frame is a combination of two equilateral triangles ACD and CDE of side 1 m. It is placed in uniform magnetic field $B = 4$ T acting perpendicular to the plane of frame. The magnitude of magnetic force acting on the frame is



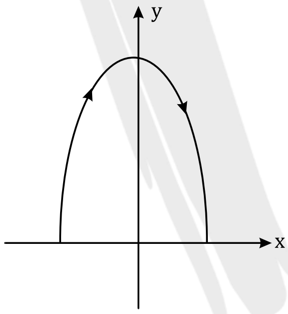
(a) 24 N (b) zero (c) 16 N (d) 8 N

Q.6 A parabolic wire as shown in the figure is located in $x - y$ plane and carries a current $I = 10$ A. A uniform magnetic field of intensity $2\sqrt{2}$T, making an angle of 45° with x-axis exists throughout the plane. If the coordinates of end point ' P ' of wire are (2 m, 1.5 m), then the total force acting on the wire is



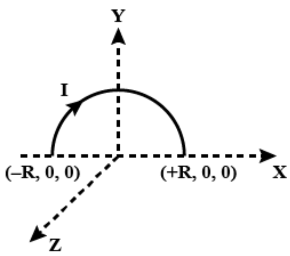
(a) $40\text{N}\hat{k}$ (b) $10\text{N}\hat{k}$ (c) $-10\ \text{N}\hat{k}$ (d) $-40\ \text{N}\hat{k}$

Q.7 A wire carrying a current of 4 A is bent in the form of a parabola $x^2 + y = 16$ as shown in figure, where x and y are in meter. The wire is placed in a uniform magnetic field $\vec{B} = 5\vec{k}$ T. The force acting on the wire is



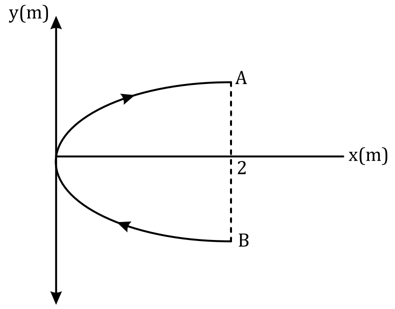
(a) $80\hat{j}$ N (b) $-80\hat{j}$ N (c) $-160\hat{j}$ N (d) $160\hat{j}$ N

Q.9 A semi-circular current-carrying wire having radius R is placed in $x - y$ plane with its centre at origin ' O '. There is non-uniform magnetic field $\vec{B} = \frac{B_0 x}{2R}\hat{k}$ (here B_0 is +ve constant) is existing in the region. The magnetic force acting on semi-circular wire will be along



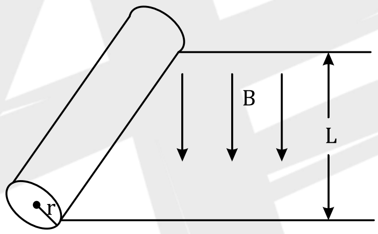
(a) −x-axis (b) +y-axis (c) −y-axis (d) +x-axis

Q.9 A conducting wire bent in the form of a parabola $y^2 = 2x$ carries a current $i = 2$ A as shown in figure. This wire is placed in a uniform magnetic field $\vec{B} = -4\hat{k}$ T. The magnetic force on the wire is (in newton)



(a) $-16\hat{i}$ (b) $32\hat{i}$ (c) $-32\hat{i}$ (d) $16\hat{i}$

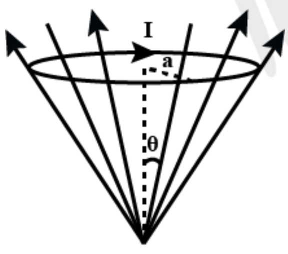
Q.10 A cylindrical rod of mass m, radius r and length L rests on two rails (see figure). A uniform magnetic field B acts vertically downwards. The rods carries a current i and can roll along the rails without slipping. If the rod starts from rest, calculate its linear speed as a function of its linear displacement x.



(a) $v = \left[\frac{4BiLx}{3m}\right]^{1/2}$ (b) $v = \left[\frac{4BiLx}{m}\right]^{1/2}$

(c) $v = \left[\frac{BiLx}{3m}\right]^{1/2}$ (d) $v = \left[\frac{BiLx}{m}\right]^{1/2}$

Q.10 A circular current loop of radius a is placed in a radial field B as shown. The net force acting on the loop is



(a) zero (b) 2π BaI cos θ

(c) $2\pi a l B \sin\ \theta$ (d) None

ANSWER KEY

1.	(1)	**2.**	(49)	**3.**	(5)	**4.**	(C)	**5.**	(A)	**6.**	(B)	**7.**	(C)
8.	(A)	**9.**	(C)	**10.**	(A)	**11.**	(C)						