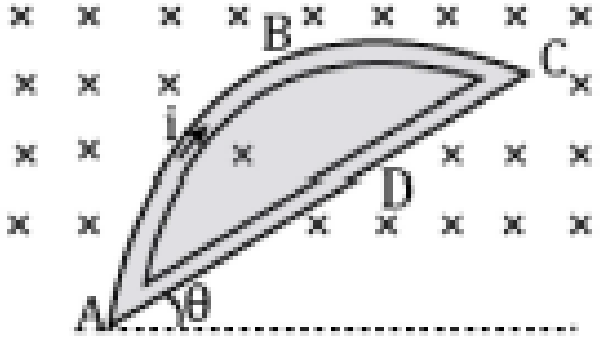
Q.1 StatementA: A current carrying wire is placed parallel to the external magnetic field. The force on it due to the external magnetic field is zero.
StatementR: The net charge on the current wire is zero.
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C)A is true, but R is false.
(D)A is false, but R is true.

Q.2 A wire of length l carries a current I along thex −axis. A magnetic field exists which is given as $\vec{B} = B_0(\hat{i} + \hat{j} + \hat{k})$ T. The magnitude of the magnetic force acting on the wire will be

(A)$B_0 Il$ **(B)**$B_0 Il\sqrt{2}$ **(C)**$2B_0 Il$ **(D)**$\frac{B_0 Il}{\sqrt{2}}$

Q.3 A circular wire ABC and a straight conductor ADC are assumed to be a carrying current i and are kept in the magnetic field B then considering points A and C as shown in the figure.



(A) Force on ABC is more than that on ADC **(B)**Force on ABC is less than that on ADC
(C) Force on ABC is equal to that on ADC **(D)**Cannot be predicted with the given data

Q.4 A wire PQ of mass 10 g is at rest on two parallel metallic rails. The separation between the rails is 4.9 cm. A magnetic field of 0.80 T is applied perpendicular to the plane of the rails, directed downwards. The resistance of the circuit is slowly decreased. When the resistance decreases to below 20Ω, the wire PQ begins to slide on the rails. Calculate the coefficient of friction between the wire and the rails.

(A)0.24 **(B)**0.36 **(C)**0.12 **(D)**0.48

Q.5 A current carrying conductor of mass m is floating in air such that it is making an angle θ with the direction of the magnetic field. The conductor and uniform magnetic field both lie in a horizontal plane. Then the value of current i in the conductor will be:(length of conductor is l, magnetic field induction is B)

(A)$\frac{2mg}{Bl\sin\theta}$ **(B)**$\frac{mg}{Bl\sin\theta}$ **(C)**$\frac{mg}{2Bl\sin\theta}$ **(D)**$\frac{mg}{4Bl\sin\theta}$

Q.6 A conductor of length l and mass m carrying i is placed on a smooth incline plane making an angle θ horizontal. A magnetic field B is directed vertically upwards. Then for equilibrium of the conductor cotθ is given by

(A)$\frac{BiL}{mg}$ **(B)**$\frac{mg}{BiL}$ **(C)**$\frac{mg}{BiL}$ **(D)**$\frac{mg}{2BiL}$

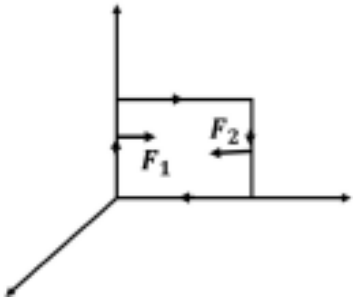
Q.7 A conductor in the form of a right angle ABC with $AB = 3\ cm$ and $BC = 4\ cm$ carries a current 10 A. There exists a uniform magnetic field of magnitude 5 T perpendicular to the plane of conductor. The magnetic force acting on conductor will be: (Assume the conductor is in gravity free space)

(A)1.5 N **(B)**2 N **(C)**2.5 N **(D)**3.5 N

Q.8 A closed loop PQRS carrying a current is placed in a uniform magnetic field. If the magnetic forces on segmentsPS, SR and RS are F_1, F_2 and F_3 respectively and are in the plane of the paper and along the directions shown, the force on the segment QP is

(A) $F_3 - F_1 + F_2$ **(B)** $F_3 - F_1 - F_2$ **(C)** $\sqrt{(F_3 - F_1)^2 + F_2^2}$ **(D)** $\sqrt{(F_3 - F_1)^2 - F_2^2}$

Q.9 The magnetic field in a region is given by $\vec{B} = B_0\left(1 + \frac{2x}{l}\right)\hat{k}$. A square loop of edge l carrying a current i, is placed with one of its edges parallel to the $x - y$ axes. Find the magnitude of the net magnetic force experienced by the loop



(A) $\frac{1}{2}iB_0l$ **(B)** Zero **(C)** iB_0l **(D)** $2iB_0l$

Q.10 A wire is bent in the form of an equilateral triangle PQR of side 20 cm and carries a current of 2.5 A. It is placed in a magnetic field B of magnitude 2.0 T directed perpendicularly to the plane of the loop. Find the forces on the three sides of the triangle (Given an integer).

ANSWER KEY

Q.	1	2	3	4	5	6	7	8	9	10
Sol.	(B)	(B)	(A)	(C)	(B)	(B)	(C)	(C)	(D)	