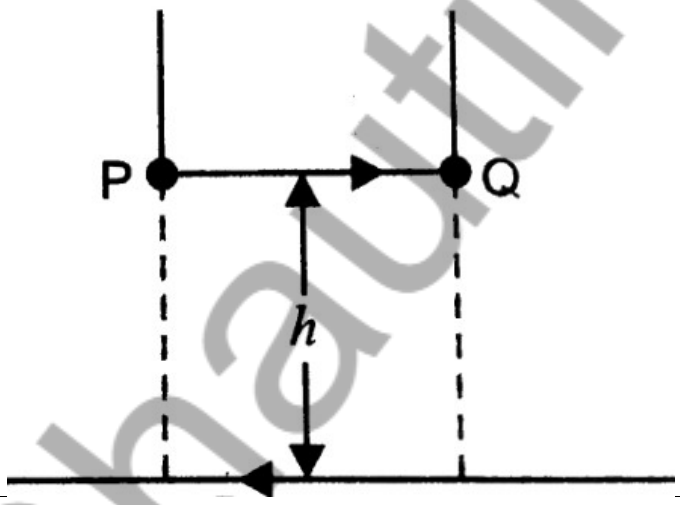
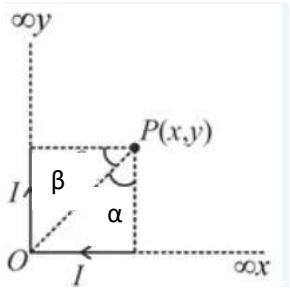
1.	Two long straight wires carrying the same current and separated by a distance r, exert force F per unit length on each other. If the current is decreased by a factor of $\frac{1}{2}$ and separation between them is increased to 2r, then force will become: (a) 8F (b) 2F (c)$\frac{F}{2}$ (d) $\frac{F}{8}$
2.	A straight wire of diameter 1 mm carries a current of 1A. It is replaced by another wire of diameter 2 mm, carrying same current. The strength of the magnetic field (a) Twice the former value (b) One half of the former value (c) Same as the former value (d) One quarter of the former value
3.	An electric current passes through a long straight wire. At a distance 4 cm from the wire, the magnetic field is B. The field at 12 cm from the wire would be (a) $\frac{B}{6}$ (b) $\frac{B}{3}$ (c) $\frac{B}{4}$ (d) $\frac{B}{2}$
4.	Two charged particles traverse identical helical paths in a completely opposite sense in a uniform magnetic field B=$B_0\hat{K}$. (a) They have equal z-components of momenta. (b) They must have equal charges (c) They necessarily represent a particle-antiparticle pair (d) The charge to mass ratio satisfy: $(\frac{e}{m})_1 + (\frac{e}{m})_2 = 0$
	Short Answer Type Qs (2 & 3 Marks)
5.	A charged particle of charge e and mass m is moving in an electric field E and magnetic field B. Constant dimensionless quantities and quantities of dimension $[T]^{-1}$.
6.	A solenoid of length 0·5m has a radius of 1cm and is made up of 500 turns. It carries a current of 5A. What is the magnitude of the magnetic field inside the solenoid?
7.	A tightly wound 100 turn coil of radius10cm is carrying a current of 1A. What is the magnitude of the magnetic field at the centre of the coil?

8.	(a) A current carrying circular loop lies on a smooth horizontal plane. Can a uniform magnetic field be set up in such a manner that the loop turns around itself (i.e., turns about the vertical axis. (b) A current-carrying circular loop is located in a uniform external magnetic field. If the loop is free to turn, what is its orientation of stable equilibrium? Show that in this orientation, the flux of the total field (external field + field produced by the loop) is maximum. (c) A loop of irregular shape carrying current is located in an external magnetic field. If the wire is flexible, why does it change to a circular shape?
9.	Do magnetic forces obey Newton's third law. Verify for two current elements $dl_2 = dl\hat{I}$ located at the origin and $dl_2 = dl\hat{J}$ located at (0, R, 0). Both carry current I.
10.	A long straight wire carrying current of 25A rests on a table as shown in figure. Another wire PQ of length 1m, mass 2·5g carries the same current but in the opposite direction. The wire PQ is free to slide up and down. To what height will PQ rise? 
11.	A current carrying loop consists of 3 identical quarter circles of radius R, lying in the positive quadrants of the x-y, y-z and z-x planes with their centres at the origin, joined together. Find the direction and magnitude to B at the origin.
12.	The horizontal component of the earth's magnetic field at a certain place is 3.0×10^{-5}T and the direction of the field is from the geographic south to the geographic north. A very long straight conductor is carrying a steady current of 1 A. What is the force per unit length on it when it is placed on a horizontal table and the direction of the current Is (a) east to west,(b) south to north?

	Long Answer Type Qs (5 Marks)
13.	Two infinitely long current carrying conductors are held at right angles to each other as shown in the following figures. Find the value of magnetic field at the point P(x,y). 
14.	A rectangular conducting loop consists of two wires on two opposite sides of length l joined together by rods of length d. The wires are each of the same material but with cross-sections differing by a factor of 2. The thicker wire has a resistance R and the rods are of low resistance, which in turn are connected to a constant voltage source V_0. The loop is placed in a uniform magnetic field B at 45° to its plane. Find τ, the torque exerted by the magnetic field on the loop about an axis through the centres of rods.

	HINTS AND ANSWER
1.	(d)
2.	(c)
3.	(b)
4.	(d)
5.	$[T^{-1}]$
6.	6.28×10^{-3} T
7.	6.28×10^{-4} T
8.	**Conceptual Type Problem** (A) No (B) Giving Rise to maximum flux of the total field (C) It assumes circular shape with its plane normal to the field to maximise flux, since for a given perimeter, a circle encloses greater area than any other shape.
9.	**Conceptual Type Problem** Magnetic force do not obey Newton's third law. However, they do obey Newton's third law if current- carrying elements are placed parallel to each other.
10.	h = 0.51cm
11.	**Conceptual Type Problem** Magnitude of $B_1 = B_2 = B_3$
12.	(A) The direction of the force is downwards. (B) No force on the conductor.
13.	**Expression type question** $B = \frac{\mu_0 I}{4\pi xy}\left[\sqrt{x^2+y^2}+(x+y)\right]$
14.	**Expression type question** $\tau = \frac{1}{4\sqrt{2}}\frac{V_0 AB}{R}$

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