

QUES 01:-

A loop carrying current I lies in the xy plane as shown in the figure. The unit vector \hat{k} is coming out of the plane of the paper. The magnetic moment of the current loop is (2012)

- (a) $a^2 I \hat{k}$
- (b) $\left(\frac{\pi}{2} + 1\right) a^2 I \hat{k}$
- (c) $\left(\frac{\pi}{2} + 1\right) a^2 I \hat{k}$
- (d) $(2\pi + 1)a^2 I \hat{k}$



(b) Magnetic moment of a current carrying loop $\vec{M} = NI\vec{A}$

$$\text{Here } N = 1, A = a^2 + 2a\left(\frac{a}{2}\right) = a^2\left[1 + \frac{\pi}{2}\right]$$

From Screw law, direction of \vec{m} is outward or in +ve z -direction.

$$\therefore \vec{M} = Ia^2\left[1 + \frac{\pi}{2}\right]\hat{k}$$



(a)