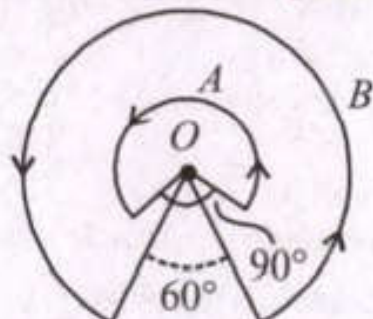**Q 4** A wire A, bent in the shape of an arc of a circle, carrying a current of 2 A and having radius 2 cm and another wire B, also bent in the shape of arc of a circle, carrying a current of 3 A and having radius of 4 cm, are placed as shown in the figure. The ratio of the magnetic fields due to the wires A and B at the common centre O is: [**Main Sep. 04, 2020 (I)**]

(a) $4:6$ (b) $6:4$ (c) $2:5$ (d) $6:5$

Ans

(d) Given : $I_A = 2$ A, $R_A = 2$ cm, $\theta_A = 2\pi - \dfrac{\pi}{2} = \dfrac{3\pi}{2}$

$I_B = 3$ A, $R_B = 4$ cm, $\theta_B = 2\pi - \dfrac{\pi}{3} = \dfrac{5\pi}{3}$

Using, magnetic field, $B = \dfrac{\mu_0 I \theta}{4\pi R}$

$\dfrac{B_A}{B_B} = \dfrac{I_A}{I_B} \times \dfrac{\theta_A R_B}{\theta_B R_A} = \dfrac{2 \times \dfrac{3\pi}{2} \times 4}{3 \times \dfrac{5\pi}{3} \times 2} = \dfrac{6}{5}$