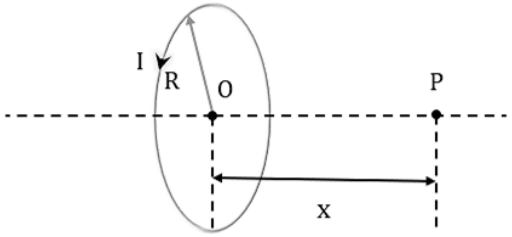
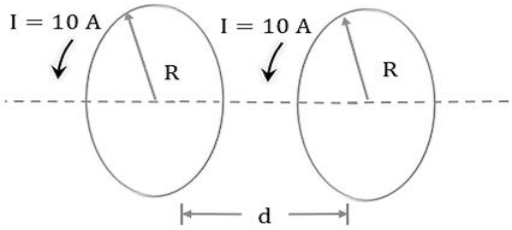
Q.1 Maximum magnetic field is found at a distance x from the centre along the axis of circular loop (radius = R) of the current carrying conductor. What is the value of x?



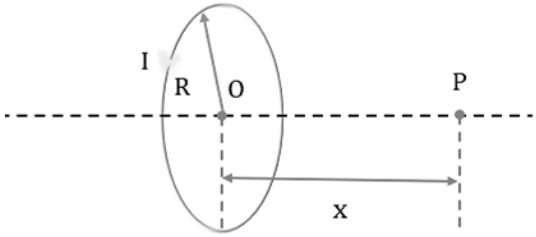
(A) $\frac{R}{2}$ **(B)** Zero **(C)** R **(D)** $\frac{R}{\sqrt{2}}$

Q.2 Two identical, flat, circular coils of wire each have 100 turns and a radius of 0.4 m. The coils are arranged coaxially, one beside the other, with their planes parallel and with separation 0.6 m. Each coil carries a current of 10 A as shown. Determine the magnitude of the magnetic field at a point on the common axis of the coils and midway between them.



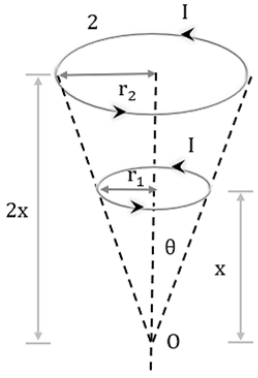
(A) 2.016×10^{-3} T **(B)** 2.016×10^{-7} T **(C)** 1.6×10^{-3} T **(D)** 1.6×10^{-5} T

Q.3 The magnetic field due to a current carrying a circular loop of radius 10 cm at a point on the axis, at a distance of 10 cm from the centre, is B. What will be its value at the centre of the loop?



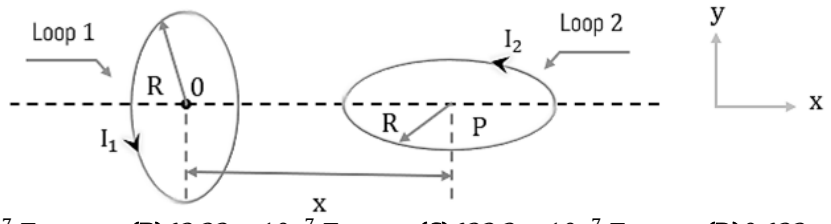
(A) $\sqrt{8}$B **(B)** 4B **(C)** 2B **(D)** B

Q.4 The figure shows two coaxial circular loops 1 and 2 carrying equal current I, forming the same solid angle θ at point O. If B_1 and B_2 are the magnetic fields produced at point O due to loop 1 and 2 respectively, then,



(A) $\frac{B_1}{B_2} = 1$ **(B)** $\frac{B_1}{B_2} = 2$ **(C)** $\frac{B_1}{B_2} = 8$ **(D)** $\frac{B_1}{B_2} = 4$

Q.5 Two circular loops of same radii, R = 1 m carrying the same current, I = 1 A as shown in the figure. The effective distance between the centres of the loop is, $x = \sqrt{3}$ m. Find the net magnetic field at point P.

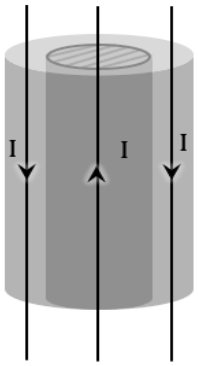


(A) 6.33×10^{-7} T **(B)** 63.33×10^{-7} T **(C)** 633.3×10^{-7} T **(D)** 0.633×10^{-7} T

Q.6 The magnetic field normal to the plane of a circular coil of n turns and radius r which carries a current i is measured on the axis of coil at a very small distance h from the centre of coil. The measured field is smaller than the magnetic field at centre by a fraction

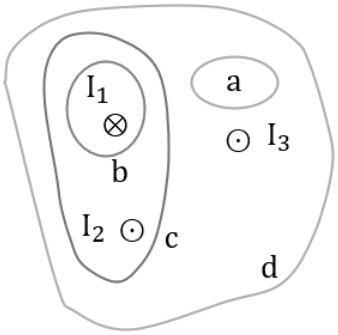
(A) $\frac{2r^2}{3h^2}$ **(B)** $\frac{3r^2}{2h^2}$ **(C)** $\frac{2h^2}{3r^2}$ **(D)** $\frac{3h^2}{2r^2}$

Q.7 In a coaxial, straight cable, the central conductor and the outer conductor carry equal currents in opposite directions. The magnetic field is zero at



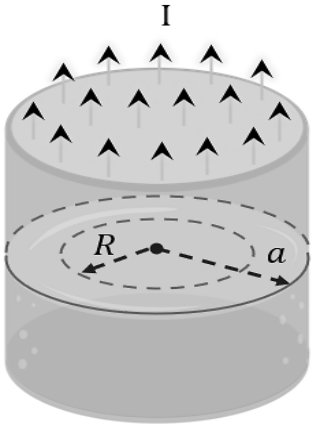
(A) Outside the cable **(B)** Inside the inner conductor
(C) Inside the outer conductor **(D)** In between the two conductors

Q.8 The diagram shows a cross-section of several conductors that carry currents perpendicular to the plane of the diagram. The currents have magnitudes $I_1 = 3.5$ A, $I_2 = 6.5$ A, $I_3 = 1.5$ A and their directions are as shown. Four closed paths labelled a to d are shown. The line integral $\oint \vec{B} \cdot \vec{dl}$ for the paths a, b, c and d will be respectively (Each integral going around the path in counterclockwise direction).



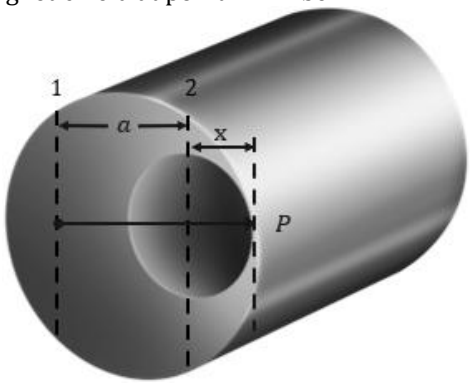
(A) $0,\ -3.5\mu_o,\ 3\mu_o,\ 4.5\mu_o$ **(B)** $0,\ 3.5\mu_o,\ -3\mu_o,\ -4.5\mu_o$
(C) $0,\ 3\mu_o,\ -3.5\mu_o,\ 11.5\mu_o$ **(D)** All integrals will be equal to zero

Q.9 Current density in a wire varies with r(distance from the centre) according to the relation, $J = kr^2$. Here, k is a constant. What will be the magnitude of the magnetic field at a distance R ($R < a$) from the centre?[a is the radius of the wire]



(A) $\frac{\mu_o kR^2}{12}$ **(B)** $\frac{\mu_o kR^2}{4}$ **(C)** $\frac{\mu_o kR^3}{12}$ **(D)** $\frac{\mu_o kR^3}{4}$

Q.10 Inside an infinitely long wire, having circular cross-section, there is a hole that runs throughout the length of the wire, as shown in the diagram. A current, with current density J, flows through the wire over the cross-section. The magnetic field at point P will be –



(A) $\frac{\mu_o aJ}{2}$ **(B)** $\frac{\mu_o aJ}{8}$ **(C)** $\frac{\mu_o aJ}{4}$ **(D)** $\mu_o aJ$

ANSWER KEY

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