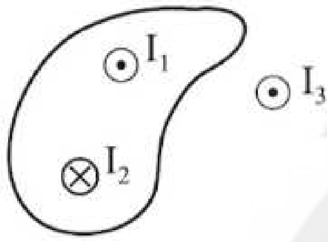
Physics JEE (2025)

Physics

Magnetism

DPP: 3

Q1 $\overrightarrow{B_1}, \overrightarrow{B_2}$ and $\overrightarrow{B_3}$ are the magnetic field due to I_1,I_2 and I_3. Amperes circuital law is given by $\oint \vec{B} \cdot \vec{dl} = \mu_0 I$, here $\vec{B}$ is



(A) $\vec{B} = \overrightarrow{B_1} - \overrightarrow{B_2}$

(B) $\vec{B} = \overrightarrow{B_1} + \overrightarrow{B_2} + \overrightarrow{B_3}$

(C) $\vec{B} = \overrightarrow{B_1} + \overrightarrow{B_2} - \overrightarrow{B_3}$

(D) $\vec{B} = \overrightarrow{B_1} - \overrightarrow{B_3}$

Q2 A closed curve encircles several conductors. The line integral $\int \vec{B} \cdot \vec{dl}$ around this curve is $3.83 \times 10^{-7}\ \mathrm{T-m}$. What is the net current in the conductors?

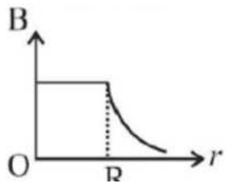
(A) $0.1\ \mathrm{A}$

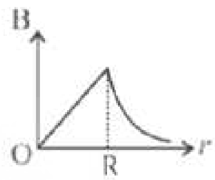
(B) $0.2\ \mathrm{A}$

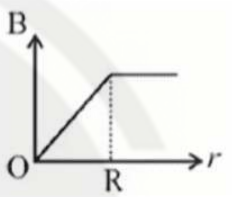
(C) $0.3\ \mathrm{A}$

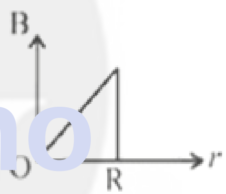
(D) $0.4\ \mathrm{A}$

Q3 The correct plot of the magnitude of magnetic field $\vec{B}$ vs distance r from centre of the wire is, if the radius of wire is R

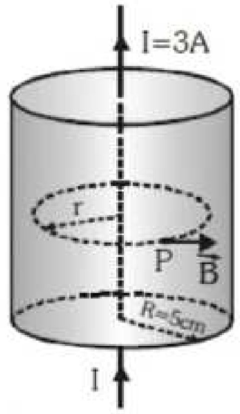
(A) 

(B) 

(C) 

(D) 

Q4 A long straight conductor of radius $5\ \mathrm{cm}$ carries a current of $3\ \mathrm{A}$, which is uniformly distributed over its circular cross-section. Find the magnetic field induction at a distance $4\ \mathrm{cm}$ from the axis of the conductor (Relative permeability of the conductor = 1000).



(A) $9.6 \times 10^{-2}\ \mathrm{T}$.

(B) $9.6\ X\ 10^{-3}T$

(C) 8.6×10^{-3} T

(D) 5.6×10^{-3} T

Q5 A solid cylindrical wire of radius R carries a current I. The ratio of magnetic fields at points which are located at $\mathrm{R}/2$ and $2\mathrm{R}$ distance away from the axis of the wire.

(A) $1:1$
(B) $1:2$
(C) $2:1$
(D) $1:4$

Q6 A hollow cylindrical wire carries a current I, having inner and outer radii R and $2\mathrm{R}$ respectively. Magnetic field at a point which $3\mathrm{R}/2$ distance away from its axis is.

(A) $\frac{5\mu_0 I}{18\pi R}$

(B) $\frac{\mu_0 I}{36\pi R}$

(C) $\frac{5\mu_0 I}{36\pi R}$

(D) $\frac{5\mu_0 I}{9\pi R}$

Q7 Mean radius of a toroid is 10 cm and number of turns are 500. If current flowing through it is 0.1 ampere then value of magnetic field (in tesla) for toroid:-

(A) 10^{-2}
(B) 10^{-5}
(C) 10^{-3}
(D) 10^{-4}

Q8 A long solenoid carrying a current produced a magnetic field B along its axis. If the current is doubled and the number of turns per cm is halved, the new value of the magnetic field is.

(A) $\mathrm{B}/2$

(B) B

(C) 2 B

(D) 4 B

Q9 A long solenoid having 200 turns /cm and carries current i. Magnetic field at its axis is $6.28 \times 10^{-2}\ \mathrm{wb/m^2}$. Another solenoid having 100 turns /cm and carries $\frac{i}{3}$ current, then magnetic field at its axis will be-

(A) $1.05 \times 10^{-4}\ \mathrm{Wb/m^2}$

(B) $1.05 \times 10^{-2}\ \mathrm{Wb/m^2}$

(C) $1.05 \times 10^{-5}\ \mathrm{Wb/m^2}$

(D) $1.05 \times 10^{-3}\ \mathrm{Wb/m^2}$

Q10 Consider a co-axial cable which consists of an inner wire of radius a surrounded by an outer shell of inner and outer radii b and c respectively. The inner wire carries a current I and outer shell carries an equal and opposite current. The magnetic field at a distance x from the axis where $b < x < c$ is

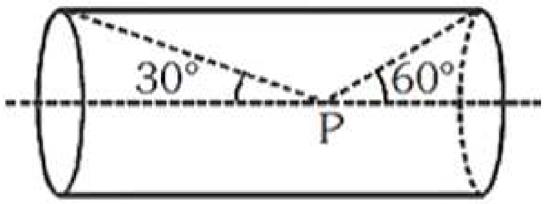
(A) $\frac{\mu_0 I(c^2-b^2)}{2\pi x(c^2-a^2)}$

(B) $\frac{\mu_0 I(c^2-x^2)}{2\pi x(c^2-a^2)}$

(C) $\frac{\mu_0 I(c^2-x^2)}{2\pi x(c^2-b^2)}$

(D) Zero

Q11 Find out magnetic field at axial point P of solenoid shown in figure (where turn density n and current through it is I)



(A) $\frac{\mu_0 n I}{4}(\sqrt{3}+1)$

(B) $\frac{\mu_0 n I}{2}(\sqrt{3}+1)$

(C) $\frac{\mu_0 n I}{2}(\sqrt{3}+2)$

(D) $\frac{\mu_0 n I}{4}(\sqrt{3}+2)$

Answer Key

Q1	B
Q2	C
Q3	B
Q4	B
Q5	A
Q6	C
Q7	D
Q8	B
Q9	B
Q10	C
Q11	A

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