Physicsaholics

DPP –5 & 6 (EMI)

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Q 1. Mutual inductance of two coils is M. First coil has constant current i and second has no current. If current in first coil dies out in very short time, magnitude of charge which will move in second coil is a (resistance of each coil is R)

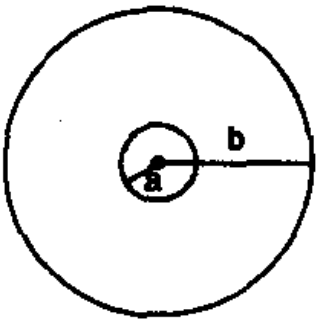
(a) $\frac{Mi}{R}$

(b) $\frac{2Mi}{R}$

(c) $\frac{Mi}{2R}$

(d) None of these

Q 2. Two concentric and coplanar circular coils have radii a and b(>>a) as shown in figure. Resistance of the inner coil is R. Current in the outer coil is increased from 0 to i, then the total charge circulating the inner coil is:

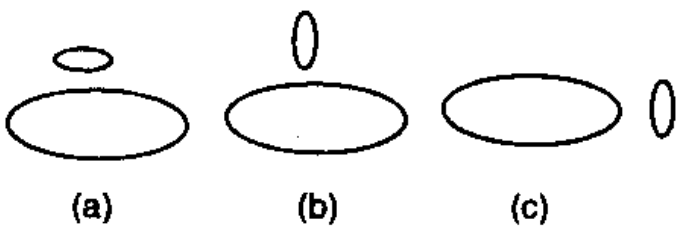


(a) $\frac{\mu_0 i a^2}{2Rb}$ (b) $\frac{\mu_0 iab}{2R}$ (c) $\frac{\mu_0 i\pi b^2}{2Ra}$ (d) $\frac{\mu_0 ib}{2\pi R}$

Q 3. A small square loop of wire of side l is placed inside a large square loop of wire of side L(L> > l). The loops are coplanar and their centres coincide. The mutual inductance of the system is proportional to:

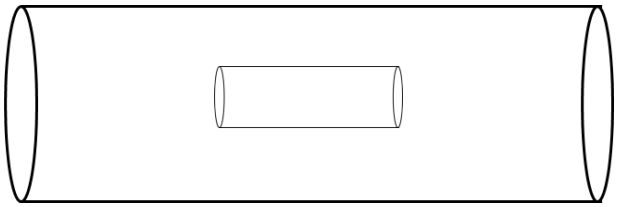
(a) l/L (b) l^2/L (c) L/l (d) L^2/l

Q 4. Two circular coils can be arranged in any of the three situations shown in the figure. Their mutual inductance will be:



(a) maximum In situation (a) (b) maximum in situation (b)
(c) maximum in situation (c) (d) the same in all situations

Q 5. A short solenoid of length l_1 , cross sectional area A_1, and no of turns per unit length n_1 is placed at centre of long solenoid of length l_2 , cross sectional area A_2, and no of turns per unit length n_2 . Mutual inductance of solenoid will be



(a) $\mu_0 A_1\ l_1\ n_1 n_2$
(b) $\mu_0 A_2\ l_2\ n_1 n_2$
(c) $\mu_0 A_1\ l_2\ n_1 n_2$
(d) $\mu_0 A_2\ l_1\ n_1 n_2$

Q 6. Two coils, 1 & 2, have a mutual inductance = M and resistances R each. A current flows in coil 1, which varies with time as; $I_1 = kt^2$, where k is a constant and 't' is time. Find the total charge that has flown through coil 2, between t = 0 and t = T.
(a) $2kMT^2/R$ (b) $kMT^2/2R$
(c) $4kMT^2/R$ (d) kMT^2/R

Q 7. Two coaxial solenoids are made by winding thin insulated wire over a pipe of cross-sectional area A = 10 cm^2 and length = 20 cm. If one of the solenoids has 300 turns and the other 400 turns, their mutual inductance is ($\mu_0 = 4\pi \times 10^{-7} TmA^{-1}$)
(a) $2.4\pi \times 10^{-5}$ H
(b) $4.8\ \pi \times 10^{-4}$H
(c) $4.8\pi \times 10^{-5}$H
(d) $2.4\ \pi \times 10^{-4}$H

Q 8. If we increase no of turns in a coil to n times, self inductance will increase to
(a) n times
(b) n^2 times
(c) n^3 times
(d) n^4 times

Q 9. Two identical solenoids are placed coaxially at large separation r from each other. Each solenoid has no of turns per unit length n and length l and cross sectional area A. mutual inductance of solenoids is
(a) $\frac{\mu_0 n^2 l^2 A^2}{2\pi r^3}$ (b) $\frac{\mu_0 n^2 l^4 A^2}{2\pi r^2}$
(c) $\frac{\mu_0 n^2 l^2 A^2}{4\pi r^3}$ (d) $\frac{\mu_0 n^2 l^2 A^2}{2\pi r^2}$

Q 10. Two coils are at fixed locations. When coil 1 has no current and the current in coil 2 increases at the rate 15.0 A/s the e.m.f. in coil 1 in 25.0 mV, when coil 2 has no current and coil 1 has a current of 3.6 A, flux linkage in coil 2 is-
(a) 16 mWb
(b) 10 mWb

(c) 4 mWb
(d) 6 mWb

Q 11. A long straight wire is placed along the axis of a circular ring of radius R. The mutual inductance of this system is-
(a) $\frac{\mu_0 R}{2}$
(b) $\frac{\pi\mu_0 R}{2}$
(c) $\frac{\mu_0 R}{4}$
(d) 0

Q 12. A solenoid of self inductance L is devided in to two equal parts to make two solenoids . Self inductance of one part
(a) is equal to L/2
(b) is less than L/2
(c) is greater than L/2
(d) None of these

Answer Key

Q.1 a	**Q.2 a**	**Q.3 b**	**Q.4 a**	**Q.5 a**
Q.6 d	**Q.7 d**	**Q.8 b**	**Q.9 a**	**Q.10 d**
Q.11 d	**Q.12 b**			