Resonance®
Educating for better tomorrow
TARGET : NEET (UG) 2024
Course : SARANSH (Youtube Live CRASH COURSE)
PHYSICS
DPP
DAILY PRACTICE PROBLEMS
DPP NO. 1

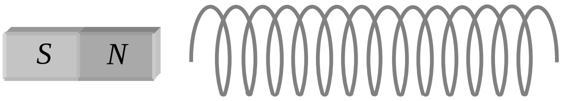
PHYSICS: EMI

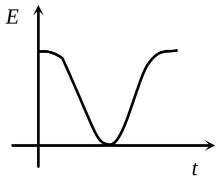
DPP No. : 1

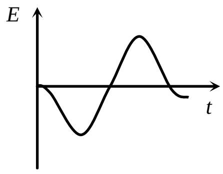
1. A copper rod of length l is rotated about one end perpendicular to the magnetic field B with constant angular velocity ω. The induced e.m.f. between the two ends is

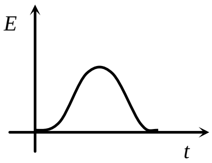
(1) $\frac{1}{2}B\omega\ell^2$ (2) $\frac{3}{4}B\omega\ell^2$ (3) $B\omega\ell^2$ (4) $2B\omega\ell^2$

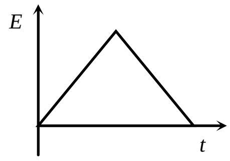
2. The variation of induced emf (E) with time (t) in a coil if a short bar magnet is moved along its axis with a constant velocity is best represented as



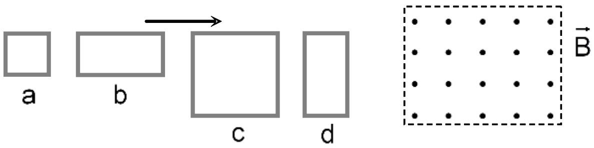
(1) 

(2) 

(3) 

(4) 

3. The figure shows four wire loops, with edge lengths of either L or 2L. All four loops will move through a region of uniform magnetic field $\vec{B}$ (directed out of the page) at the same constant velocity. Rank the four loops according to the maximum magnitude of the e.m.f. induced as they move through the field, greatest first



(1) $(e_c = e_d) < (e_a = e_b)$ (2) $(e_c = e_d) > (e_a = e_b)$
(2) (3) $e_c > e_d > e_b > e_a$ (4) $e_c < e_d < e_b < e_a$

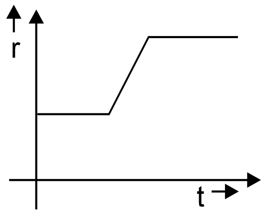
4. A circular coil and a bar magnet placed near by are made to move in the same direction. The coil covers a distance of 1 m in 0.5 sec and the magnet a distance of 2 m in 1 sec. The induced emf produced in the coil

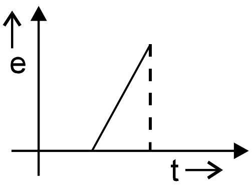
(1) Zero
(2) 1 V
(3) 0.5 V
(4) Cannot be determined from the given information

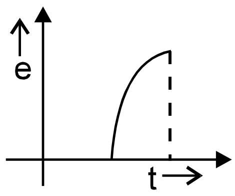
5. A rectangular loop of sides of length ℓ and b is placed in x–y plane. A uniform but time varying magnetic field of strength = $20\,t\,\hat{i} + 10\,t^2\,\hat{j} + 50\,\hat{k}$ where t is time elapsed. The magnitude of induced e.m.f. at time t is:

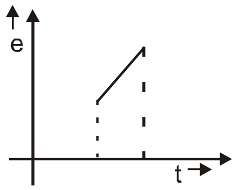
(1) 20 + 20 t (2) 20 (3) 20 t (4) zero

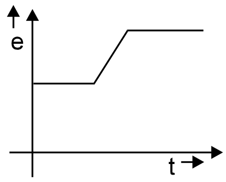
6. Radius of a circular ring is changing with time and the coil is placed in uniform constant magnetic field perpendicular to its plane. The variation of ' r ' with time ' t ' is shown in the figure. Then induced e.m.f. ε with time will be best represented by :



(1) 

(2) 

(3) 

(4) 

7. A loop of area 2 m^2 is placed in a magnetic field in which the rate of change of magnetic flux in the loop is 10 wb/s. The magnitude of the induced emf in the loop is :

(1) 10 volt (2) 5 volt (3) 20 volt (4) 40 volt

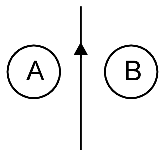
8. The magnetic flux ϕ through a metal ring varies with time t according to :

$\phi = 3(at^3 - bt^2)Tm^2$, with $a = 2s^{-3}$ and $b = 6\ s^{-2}$.

The resistance of the ring is 3 Ω. The maximum current induced in the ring during the interval t = 0 to t = 2s, is

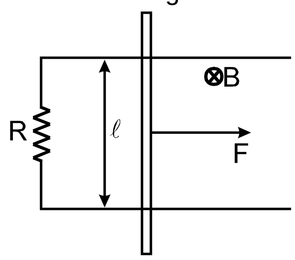
(1) 1 A (2) 2A (3) 3A (4) 6 A

9. A and B are two metallic rings placed at opposite sides of an infinitely long straight conducting wire as shown. If current in the wire is slowly decreased, the direction of induced current will be :



(1) clockwise in A and anticlockwise in B (2) anticlockwise in A and clockwise in B
(3) clockwise in both A and B (4) anticlockwise in both A & B

10. A constant force F is being applied on a rod of length 'ℓ' kept at rest on two parallel conducting rails connected at ends by resistance R in uniform magnetic field B as shown.



(1) the power delivered by force will be constant with time
(2) the power delivered by force will be increasing first and then will decrease
(3) the rate of power delivered by the external force will be increasing continuously
(4) the rate of power delivered by external force will be decreasing continuously.