

Q8: A coil having n turns and resistance $R \Omega$ is connected with a galvanometer of resistance $4R\Omega$. This combination is moved in time t seconds from a magnetic field W_1 weber to W_2 weber. The induced current in the circuit is

- (a) $-(W_2 - W_1)/5Rnt$
- (b) $-n(W_2 - W_1)/5Rt$
- (c) $-(W_2 - W_1)/Rnt$
- (d) $-(W_2 - W_1)/5Rnt$

Solution

The emf induced in the coil is $e = -n(d\Phi/dt)$

Induced current, $I = e/R' = - (n/R')(d\Phi/dt) \text{ ---(1)}$

Given, $R' = R + 4R = 5R$

$d\Phi = W_2 - W_1$

$dt = t$

(here, W_1 and W_2 are flux associated with one turn)

Substituting the given values in equa(1) we get

$I = (-n/5R)(W_2 - W_1/t)$

Answer: (b) $-n(W_2 - W_1)/5Rt$