An inductor coil stores 64 J of magnetic field energy and dissipates energy at the rate of 640 W when a current of 8 A is passed through it. If this coil is joined across an ideal battery, the time constant of the circuit in seconds is:

(A) 0.8 (B) 0.2 (C) 0.125 (D) 0.4

Solution

We have, $\frac{1}{2}LI^2 = 64$ & $I^2 r = 640$ where r is the internal resistance and other symbols have their usual meanings.

$$L = \frac{2 \times 64}{8^2} = 2H \text{ \& } r = \frac{640}{8^2} = 10\Omega$$

Time constant for LR circuit $\tau = \frac{L}{r} = \frac{2}{10} = 0.2s$

Hence, (B)