Question #81860

Calculate the maximum value of the e.m.f. generated in a coil which is rotating at 50 rev/s in a uniform magnetic field of 0.8 Wb/m^3. The coil is wound on a square former having sides 5 cm in length and is wound with 300 turns.

Answer:

The maximum value of the e.f.m. E_{max} is given by

$$E_{max} = BAN\omega, \quad (1)$$

where B = 0.8 Wb/m^3 – flux density of the magnetic field,

N = 300 – number of the coil,

A = 5 x 5 cm^2 = 0.0025 m^2 – the area of the coil,

ω = 50 rev/s = 100π rad/s – the rotational speed of the coil.

Substitute into (1):

$$E_{max} = 0.8 \cdot 0.0025 \cdot 300 \cdot 100\pi = 188.5\, V.$$