Question 32839

$N=1000$, $B_0=0.1\,T$, $\nu=120\,Hz$, $S=30\,cm^2$.

The induced emf, according to Faraday's law is $\varepsilon=\frac{-\partial\Phi}{\partial t}$.

The magnetic flux might be expressed as $\Phi(t)=N\,B\,S$. It is more convenient to let the magnetic field rotate (not the coil). Thus, magnetic field as the function of time is $B(t)=B_0\cos(\omega t)=B_0\cos(2\pi\nu t)$.

Then, EMF as a function of time is $\varepsilon(t)=2\pi B_0\,\nu\,N\,S\cdot\sin(2\pi\nu t)$.

Obviously, the peak value reaches when sine function is equal to one (the amplitude).

Hence, the peak value of induced EMF is $\varepsilon_{max}=2\pi B_0 N S\nu=226.195\,V\approx 226.2\,V$.

The answer is d)