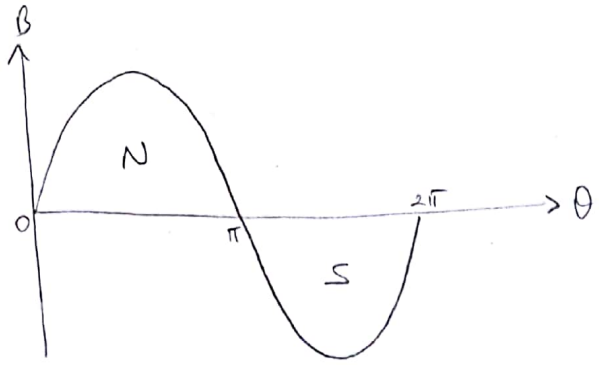

$$B_{av} = \frac{2}{\pi} B_{max}$$

$$\phi_{pp} = \left(\frac{2\pi r l}{p}\right)\left(\frac{2}{\pi} B_m\right) = \frac{4 r l}{p} B_m$$

$p=2 \Rightarrow \phi_{pp} = 2 r l B_m = 2(17.5\times10^{-3})(0.1)(0.6)$

$\phi_{pp} = 2.1\times10^{-3}$ Wb

$\lambda = N\, 2.1\times10^{-3}$ Wb

Assuming

Winding thickness : 4 mm

$r = 18$ mm

$\phi_{pp} = 2\,(18\times10^{-3})(0.1)(0.6) = 2.16\times10^{-3}$ Wb

$1500 \text{ rpm} = \frac{120 f}{p} \underset{p=2}{\Longrightarrow} f = 25$ Hz

$E_{rms} = 24V = 4.44\, f\, N_{ph}\, \phi\, k_w$, $k_w = k_d \cdot \underbrace{k_p}_{1} = \frac{\sin\left(q\frac{\gamma}{2}\right)}{q\sin\left(\frac{\gamma}{2}\right)}$ $q\gamma = 60°$ electrical

$\Rightarrow N_{ph} k_d = 100.1$

24 slots double layer $\Rightarrow$ $\underbrace{\frac{q\,(\#cond)\cdot 2\cdot 2}{N_{ph}}}\ \frac{\sin 30}{q\sin(7.5)} = 100.1$ $\Rightarrow N_{ph} \simeq 104$

$\gamma = 15°$

$q = 4$

$\#cond \simeq 6$

Area per phase $= \frac{\pi\,(20^2 - 16^2)}{3} = 150.8 \text{ mm}^2$

Coil area per phase $= 150.8 \times 0.7 = 105.56 \text{ mm}^2$

Coil area per phase per coil $= \frac{105.56}{208} = 0.51 \text{ mm}^2$

AWG 20

Diameter: 0.812 mm

$I = 4\,(0.51) = 2.04$ A

Total length of the coil per phase $= 2\,(18\text{mm} + 100\text{mm}) \times 104 = 24.544$ m

Coil resistance $= 24.544\ (33.31) = 817.56$ mΩ

$P_{copper} = (2.04)^2 (817.56) = 3.4$ W per phase