(A)

9.

15. E_1 E_2
2200/220

f = 50Hz

$B_m = 1.5$

emf per turn = 10.

(a) The number of primary turns $= \frac{2200}{10} = 220$

The number of secondary turns $= \frac{220}{10} = 22$

(b) $\phi_{max} = \frac{\text{emf per turn}}{4.44 \times f} = \frac{10}{4.44 \times 50} = 0.045$

$\phi_{max} = B_{max} A$

$A = \frac{\phi_{max}}{B_{max}} = \frac{0.045}{1.5} = 3 \times 10^{-3} A.$

(35) Given data.

P = 25kVA

$N_1 = 500$

$N_2 = 400$

$E_1 = 3000V$

F = 50Hz.

i) $I_1/I_2 = K$.

$I_1 = P/E_1 = \frac{25 \times 10^3}{3000} = \frac{25}{3} A.$

$I_2 = \frac{I_1}{K} = \frac{25}{3} \times \frac{5}{4} = 10.41 A.$

Q2 a

ii) $\frac{E_2}{E_1} = K$

$\frac{N_2}{N_1} = K$

$\frac{400}{500} = K$

$K = 4/5$

$E_2 = K E_1 = 4/5 \times 3000^{600} = 2400$

(iii) $E_1 = 4.44 f \phi_m N_1$.

$3000 = 4.44 \times 50 \times \phi_m \times 500$

$\phi_m = \frac{6}{4.44 \times 50} = 0.027$.

(iv) $E_1 \quad E_2$
$2200/250\ V$

$f = 50Hz$

$A = 36cm^2 \Rightarrow 36 \times 10^{-4} m^2$

$B_m = 6 wb/m^2$

$\phi_m = B_m A = 6 \times 36 = 216 \times 10^{-4} wb = 0.0216 wb.$

$E_1 = 4.44 f \phi_m N_1$

$2200 = 4.44 \times 50 \times 0.0216 \times N_1$

$N_1 = 458.79$

$E_2 = 4.44 f \phi_m N_2$

$250 = 4.44 \times 50 \times 0.0216 \times N_2$

$N_2 = 52.13$

(6)

b. $P = 4$

$Z = 774$

$A = 2$

$\phi = 24 \times mwb$.

$I_a = 50A$.

$T = 0.159 \dfrac{\phi P Z I_a}{A} = \dfrac{0.159 \times 24 \times 10^{-3} \times 4 \times 774 \times 50}{2}$.