Project 2

Tuesday, March 31, 2020 5:03 PM

Note: Chap. 13 & 14 & 15

HP = 15
# of phases = 3
V = 460 V
FLA = 21 A
V_{speed} = 1080 rpm
eff = 85%
P.F. = 85%
Service Factor = 1.05%
Enclosure: TEFC

Given

a) V_{util} = 480V

b) f = 60Hz, # of poles = 6 (3-phase)

$N_s = \frac{120 \cdot 60Hz}{6}$ = 1200 rpm

c) 6 poles

d) $s = \frac{n_s - n}{n_s}$, n_s = 1200 rpm, n = 1090 rpm

$s = \frac{1}{10}$

e) $\frac{(I_{FLA} \cdot V) \cdot eff}{746}$ ≈ 11HP ← converts to HP

f) P.F. = P/S = .95

9,660 W / S = .85, S = 11.36 kVA

$Q = \sqrt{S^2 - P^2} = \sqrt{11.36k^2 - 9.66k^2}$

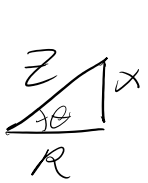
Q = 5.986 kVAR

$Q = I^2 \cdot X$, $X = Q/I^2 = \frac{5.986\,kVAR}{(21A)^2} \simeq 13.57\Omega$

$P = I^2 \cdot A$, $R = P/I^2 \simeq 21.9\Omega$

$X/R \simeq .6197$

g) $Z = S/I^2 = \frac{11.36\,kVA}{(21A)^2} \simeq 25.77\Omega$



$\theta = \cos(\frac{R}{Z}) \simeq .99989^\circ \angle 1^\circ$

(Resistive?)

$Z = 25.77\Omega \angle .999^\circ$ (Inductive)

h) $R = P/I^2 = \frac{9.66kW}{(21A)^2} \simeq 21.9\Omega$

i) $X = Q/I^2 = \frac{5.986\,kVAR}{(21A)^2} \simeq 13.57\Omega$

j) $P = 460V \cdot 21A$ = 9660 W

k) $Q = \sqrt{S^2 - P^2} = \sqrt{11.36k^2 - 9.66k^2}$

Q = 5.986 kVAR