

## ECET 4520 - Lab Assignment #4 - Solutions

Transformer #1 500 KVA, 1.3% Z, 480V

$$I_{FLA(sec)} = \frac{500,000}{\sqrt{3} \cdot 480} = 601.4 \text{ A}$$

$$M = \frac{100\%}{1.3\%} = 76.92$$

$$I_{SCA(1)} = I_{FLA(sec)} \cdot M = (601.4)(76.92) = \boxed{46,262 \text{ A F\#1}}$$

Feeder #3 600 kcmil, Cu. in Al. conduit 120'  $\rightarrow C = 28,033$

$$f = \frac{\sqrt{3} \cdot L \cdot I_{sc}}{C \cdot n \cdot V_L} = \frac{\sqrt{3} (120)(46262)}{(28033)(1)(480)} = 0.7146$$

$$M = \frac{1}{1+f} = \frac{1}{1.7146} = 0.5832$$

$$I_{SCA(2)} = (46,262)(0.5832) = \boxed{26,981 \text{ A F\#2}}$$

Feeder #2 #2 Cu. in Al. conduit 25'  $\rightarrow C = 6044$

$$f = \frac{\sqrt{3} (25)(26981)}{(6044)(1)(480)} = 0.4027$$

$$M = \frac{1}{1+f} = \frac{1}{1+0.4027} = 0.7129$$

$$I_{SCA} = (26981)(0.7129) = \underline{19,235 \text{ A}}$$

Transformer #2 75 KVA, 1.6% Z, 480-208V

$$f = \frac{\sqrt{3} I_{sc} \cdot V_P \cdot \%Z}{100,000 \cdot \text{kVA}} = \frac{\sqrt{3} (19235)(480)(1.6)}{(100,000)(75)} = 3.4115$$

$$M = \frac{1}{1+f} = \frac{1}{1+3.4115} = 0.22668$$

$$I_{SCA(sec)} = I_{SCA(1)} \cdot M \cdot \frac{V_P}{V_S} = (19,235)(0.22668) \left( \frac{480}{208} \right) = \boxed{10,061 \text{ A F\#3}}$$

Feeder #1 3/0 Cu. in Al. conduit 10'  $\rightarrow C = 13,923$

$$f = \frac{\sqrt{3} (10)(10,061)}{(13923)(1)(208)} = 0.0612$$

$$M = \frac{1}{1+0.0612} = 0.9432$$

$$I_{SCA(4)} = (10,061)(0.9432) = \boxed{9,490 \text{ A F\#4}}$$