ECE471 INDUSTRIAL POWER SYSTEMS

Homework # 7

From chapter 10 of the course text, turn in problems 1, 2, 3, 4 and 5, plus:

6.

a) Determine the fault energy and hence state the estimated level of damage if a 1200 A arcing ground fault occurs on a feeder protected by a 400 A frame breaker with a 300 A trip unit (figure 8.8). Assume maximum time delay.

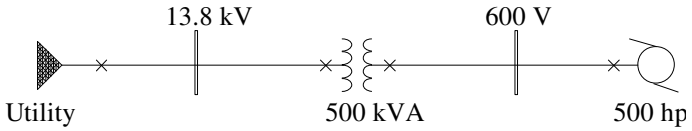
b) Repeat part (a) if the ground fault relay initiates the instantaneous trip.

7.

In the system shown below, the utility bus has a three-phase fault level of 7285 A with an X/R ratio of 10. The transformer is 500 kVA with 0.7% winding resistance and 7% leakage reactance. The 500 hp motor operates at 85% efficiency and 0.88 lag and has a starting impedance of 0.017 + j0.17pu on a 500 kVA base.

a) Draw the single-phase equivalent diagram and determine the percent drop in its terminal voltage if the motor is line-started.

b) It has been suggested that a starting capacitor bank of 2500 kVAR should be used. Determine what the percent voltage drop will be under these conditions.



10.1 The service entrance feeder conductors for a system are 300 MCM THW copper. Determine the minimum size of the common grounding electrode conductor (copper).

10.2 The service entrance feeder conductors for a system are No. 1 aluminum. Determine the minimum size of the common grounding electrode conductor (aluminum).

10.3 A feeder is protected by a 1600 A frame breaker with a 1200 A trip unit. Determine the minimum size of the equipment grounding conductor (copper).

10.4 A feeder is protected by a 600 A fuse. Determine the minimum size of the equipment grounding conductor (copper).

10.5 Determine the estimated level of damage if a 1000 rms ampere arcing ground fault occurs on a feeder protected by 400 A UL class RK-5 fuses (Figure 7.10).