

ECE 3600 homework # 16

Textbook problems 13-1 through 13-3

1. Textbook problem 13-1

Due to a single-line to ground fault on phase-a, $I_{fa} = 5 \angle 0^\circ$ pu and $I_{fb} = I_{fc} = 0$.

Calculate the symmetrical components I_{fa1} , I_{fa2} and I_{fa0} .

2. Textbook problem 13-2

Due to a line-line fault on between phase-b and phase-c $I_{fa} = 0$ and $I_{fb} = -I_{fc} = 5 \angle 0^\circ$ pu.

Calculate the symmetrical components I_{fa1} , I_{fa2} and I_{fa0} .

3. Textbook problem 13-3

At point f in the system, there is an open-circuit fault on phase-a with a voltage across the open-circuit of $V_{fa} = 5 \angle 0^\circ$ pu, other voltages are $V_{fb} = V_{fc} = 0$.

Similar to the calculations of the short-circuit currents by making use of the sequence networks, calculate the sequence components V_{fa1} , V_{fa2} and V_{fa0} at the fault point.

4. Work out the details of Example 13-2, p.13-10. You may take everything in Fig. 13-10 as given, but you will need to calculate all other values. Note: Ignore the V_1 shown in figure 13-12, that is not valid when the fault is in place.

5. Textbook problem 13-4

Repeat Example 13-2 if the single-line to ground (SLG) fault is through a fault impedance $Z_f = 0.15 \angle 0^\circ$ pu.

6. Textbook problem 13-5

Repeat Example 13-2 if before the fault, the load was zero, that is, $P_{Load} = 0$.

Answers

1. $\begin{bmatrix} \frac{5}{3} \\ \frac{5}{3} \\ \frac{5}{3} \end{bmatrix} \cdot \text{pu}$	2. $\begin{pmatrix} 2.887 \cdot j \\ -2.887 \cdot j \\ 0 \end{pmatrix} \cdot \text{pu}$	3. $\begin{bmatrix} \frac{1}{3} \\ \frac{1}{3} \\ \frac{1}{3} \end{bmatrix} \cdot V_{fa}$	4. a) $4.691 \cdot \text{pu}$ - 83.33-deg	5. a) 3.477 - 52.18-deg	6. 4.5455 - 90-deg
			b) $5.716 \cdot \text{pu}$ - 84.63-deg	b) $3.948 \cdot \text{pu}$ - 48.46-deg	5.5556 - 90-deg