

Fault @ (a) 34.5 kV HS

$$I_{3\phi} = \frac{100 \angle 0^\circ \text{ puV}}{Z_1}$$

$$I_{3\phi} = \frac{100 \angle 0^\circ \%}{4.16 + j29.18\%} = \frac{100 \angle 0^\circ}{29.48 \angle 82^\circ}$$

$$I_{3\phi} = 3.39 \angle -82^\circ \text{ pu}$$

$$I_{3\phi} = 3.39 \text{ pu} \left(I_{\text{base}} = \frac{100 \text{ MVA}}{\sqrt{3} (34.5 \text{ kV})} \right)$$

$$I_{3\phi} = 3.39 \text{ pu} (1675 \text{ A}) = 5676 \text{ A}$$

$$I_{\phi\phi} = \frac{\sqrt{3} (100 \angle 0^\circ)}{Z_+ + Z_-} = \frac{\sqrt{3} (100\%)}{2 Z_1}$$

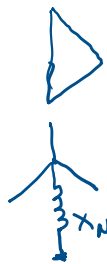
$$I_{\phi\phi} = \frac{\sqrt{3}}{2} I_{3\phi} = 4915 \text{ A}$$

$$I_{\phi g} = \frac{3 (100 \angle 0^\circ)}{Z_+ + Z_- + Z_0}$$

$$I_{\phi g} = \frac{300}{2 (4.16 + j29.18) + (14.85 + j127.7)}$$

$$I_{\phi g} = \frac{300}{187.6\%} = 1.60 \text{ pu}$$

$$I_{\phi g} = 1.60 (1675 \text{ A}) = 2675 \text{ A}$$



$$34.5 \text{ kV}$$

$$X_N = 2.38 \Omega$$

$$X_N = \frac{3 (2.38 \Omega)}{Z_{\text{base}}} = \frac{(34.5 \text{ kV})^2}{100 \text{ MVA}}$$

$$= \frac{3 (2.38)}{11.50} = 0.60 \text{ pu}$$

(b)

① Z_{ca} 34.5 kV HS

$$Z_+ = Z_-$$

$$Z_1 = Z_2 = 4.16 + j29.18\%$$

$$\frac{Z_0}{14.85 + j127.70\%}$$

$$3.38 + j58.23\%$$

$$3.38 + j58.23\%$$

$$2.54 + j87.41\%$$

$$3.38 + j58.23\%$$

$$D = \frac{V}{Z} = \frac{12.47 \text{ kV}}{34.5}$$

① Z_{ca} 12.47 kV Bus

$$I_{3\phi} = \frac{V}{Z} = \frac{100\%}{87.73\%} = 1.14 \text{ pu} (4630 \text{ A}) = 5277 \text{ A}$$

$$2 (100\%) = \frac{300}{1.28 \text{ pu}} = 5941 \text{ A}$$

$$I_{ag} = \frac{3(100\%)}{2Z_1 + Z_0} = \frac{300}{233.8\%} = 1.28pu \rightarrow \underline{5941A}$$

$$I_{3\phi} \text{ as seen at } 138kV = (1.14pu)(418.4A) = 477A$$

