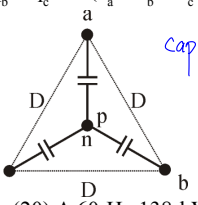
2022/05/31 電力工程導論　姓名_____學號_____

1. (20) Assume that 1. conductors are equally spaced, D, and have equal radii r. 2. $q_a + q_b + q_c = 0$ ($c_a = c_b = c_c = c$, $v_a + v_b + v_c = 0$) 3. $i_a + i_b + i_c = 0$. Find (a) c=? (b) λ_a=?



$$\gamma = (y\,z)^{0.5} = \alpha + j\,\beta$$

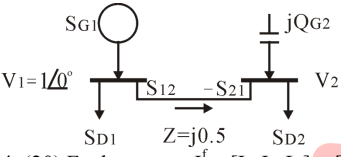
When x= l , V=V_1 , I = I_1 =>

$$V_1 = V_2 \cosh \gamma l + Z_c I_2 \sinh \gamma l\ ;$$

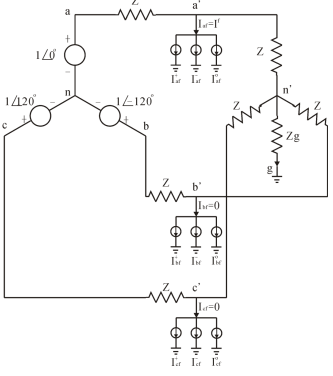
$$I_1 = I_2 \cosh \gamma l + (V_2 / Z_c) \sinh \gamma l$$

2. (20) A 60-Hz 138-kV 3Φ transmission line is 225mile long. The distributed line parameters are r =0.169 Ω/mile , l = 2.093 mH/mile , c = 0.01427 μF/mile , g = 0. The transmission line delivers 40 Mwat 132 kV with 95% power factor lagging. (a) Find the sending-end voltage and current. (b) Find the transmission line efficiency.

3. (20) $V_1 = 1\angle 0°$, $jQ_{G2} = j1.0$, $Z_L = j0.5$, $S_{D2} = P_{D2} + j1.0$. Find S_1 and V_2. We consider the solution as a function of P_{D2} for $P_{D2} \geqq 0$. (a) If $P_{D2} > 1$ => V_2 =? (b) If $P_{D2} = 1$ => V_2 =? (c) If $P_{D2} = 0.5$ => V_2 =?



4. (20) Fault current: $I^f = [I_{af}\ I_{bf}\ I_{cf}] = [I^f\ 0\ 0]$. Find the symmetrical components of single line-to-ground faults currents.



5.(20) $v_a = 180 \cos \omega t$, $v_b = 180 \cos(\omega t - 120°)$, $v_c = 180 \cos(\omega t + 120°)$ (a) Find abc

Reference Frame to Stationary Reference Frame (b) Stationary Reference Frame to Synchronous Reference Frame

(1) $$\begin{bmatrix} V_{qs} \\ V_{ds} \end{bmatrix} = \begin{bmatrix} 2/3 & -1/3 & -1/3 \\ 0 & -1/\sqrt{3} & 1/\sqrt{3} \end{bmatrix} \begin{bmatrix} V_a \\ V_b \\ V_c \end{bmatrix}$$

(2) $$\begin{bmatrix} V_{qe} \\ V_{de} \end{bmatrix} = \begin{bmatrix} \cos \omega t & -\sin \omega t \\ \sin \omega t & \cos \omega t \end{bmatrix} \begin{bmatrix} V_{qs} \\ V_{ds} \end{bmatrix}$$