

회로이론 HW5

20 (b) 선전압 100V, $R_w = 0$

상당 300W, 0.92의 앞선 역률

$$P_{total} = 3 V_{an} I_{aA} \cos \phi$$

$$= 3 \times \frac{1}{\sqrt{3}} V_{aA} I_{aA} \cos \phi$$

$$900 = 3 \times (57.74) \times I_{aA} (0.92)$$

$$\therefore I_{aA} = 5.647 [A]$$

0.92의 앞선 역률이므로,

$$Z_p = \frac{V_{an}}{I_{aA}} = \frac{57.74 \angle -23.67^\circ}{5.647}$$

$$= 9.4 - j4 [\Omega]$$

26. 0.7 앞선 역률, 10kW,

상전압 208V, 전원 50V

(a) Δ 결선에서, 부하의 상전압 = 전원의 선전압

$$P_{total} = 3 \times \frac{1}{\sqrt{3}} V_L I_L \cos \theta$$

$$10 \times 10^3 = 3 \times 208 \times I_L \times 0.7$$

$$I_L = 22.89 [A]$$

(b) 0.7 앞선 역률이므로,

$$Z_p = \frac{V_p}{I_p} \angle \theta = \frac{V_p}{I_L / \sqrt{3}} \angle \theta$$

$$= \frac{208\sqrt{3}}{22.89/\sqrt{3}} \angle -45.57^\circ$$

$$= 27.26 \angle -45.57^\circ$$

26(c). 원래 임피던스 : $Z_p = 27.26 \angle -45.57^\circ$

인덕터 임피던스 : $Z_L = j\omega L = j785$

새로운 임피던스 : $Z_{new} = \frac{Z_p \cdot Z_L}{Z_p + Z_L}$

$$= 27.94 \angle -44.14$$

$$\therefore \text{역률} = \cos(-44.14) = 0.718$$

전력 : $P_{new} = 3 V_p I_p \cos \theta$

$$= 3 V_L \frac{V_L}{|Z_p|} \cos \theta = 3 (\sqrt{3} 208) \frac{(208\sqrt{3})}{27.94} (0.718)$$

$$= 10 \text{ kW}$$

28. 50Hz, 400V 상전압

(500 Ω , 10mH, 1mF 병렬)

$$X_C = -j3.18\Omega, X_L = j3.14\Omega$$

$$\frac{1}{Z} = \frac{1}{R} + \frac{1}{X_C} + \frac{1}{X_L}, Z_p = 99.76 + j99.82j$$

$$= 223.34 \angle 63.47^\circ$$

(a) Y-Y 결선

$$I_L = \frac{400}{|Z_p|} = 1.79 [A], V_L = 400\sqrt{3} [V]$$

$$I_p = I_L = 1.79 [A], \cos(\theta) = 0.4467$$

(b) Y- Δ 결선

$$V_L = 400\sqrt{3}, I_p = \frac{400\sqrt{3}}{|Z_p|} = 3.10 [A]$$

$$I_L = \sqrt{3} I_p = 5.37 [A]$$

$$\cos(\theta) = 0.4467$$