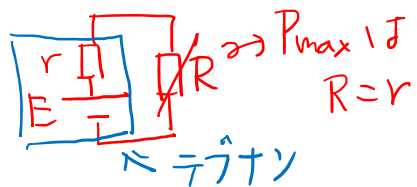


技術系専門試験問題演習講座 総合職 電気

H.10 国家I種 電気・電子職 No.26
(電気工学)

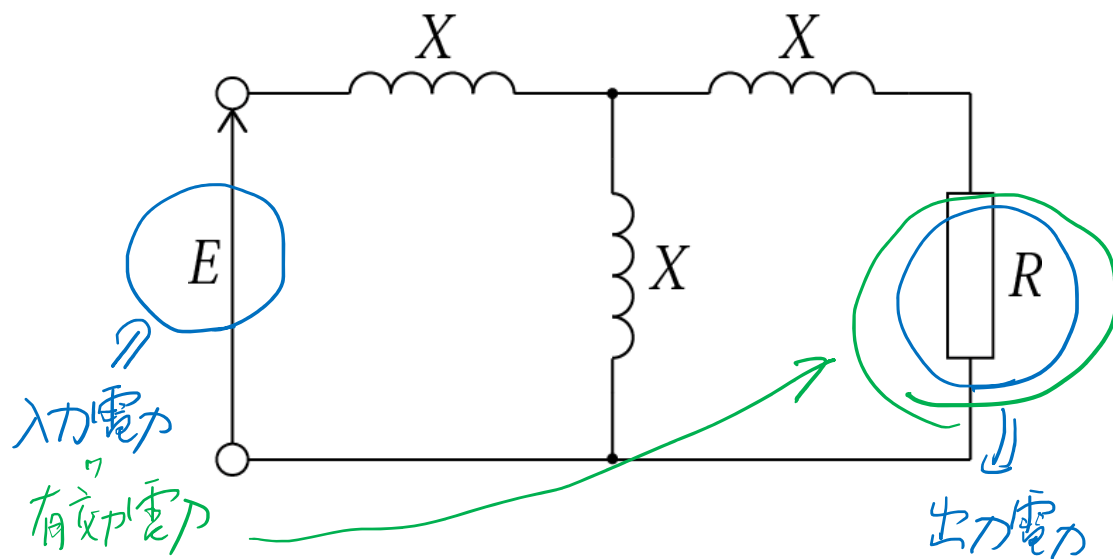
入力電力 $\rightarrow \max$

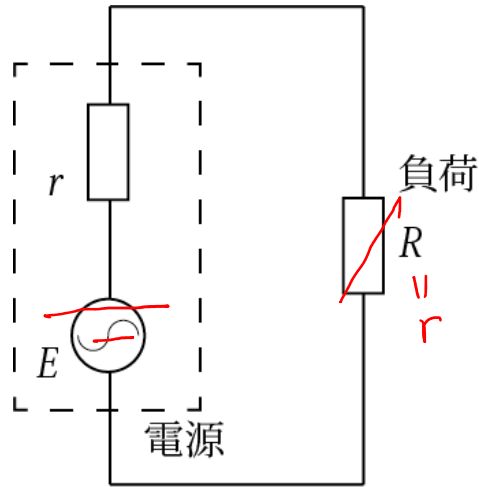
(1) 電力 $\max \Rightarrow \left(\frac{4}{30} + \frac{4}{29} \right)$



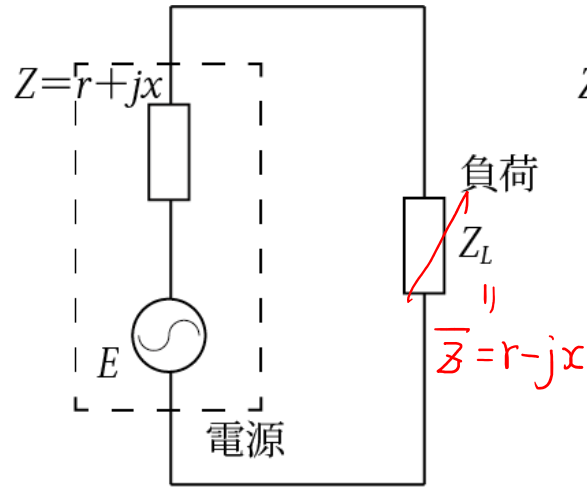
(2) 合成する

(解1) 電力 \max の 法則

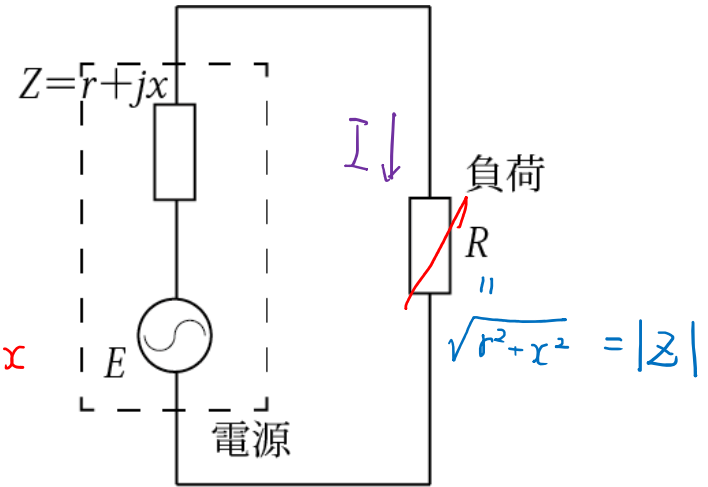




① 直流



② 交流 (4/30)



③

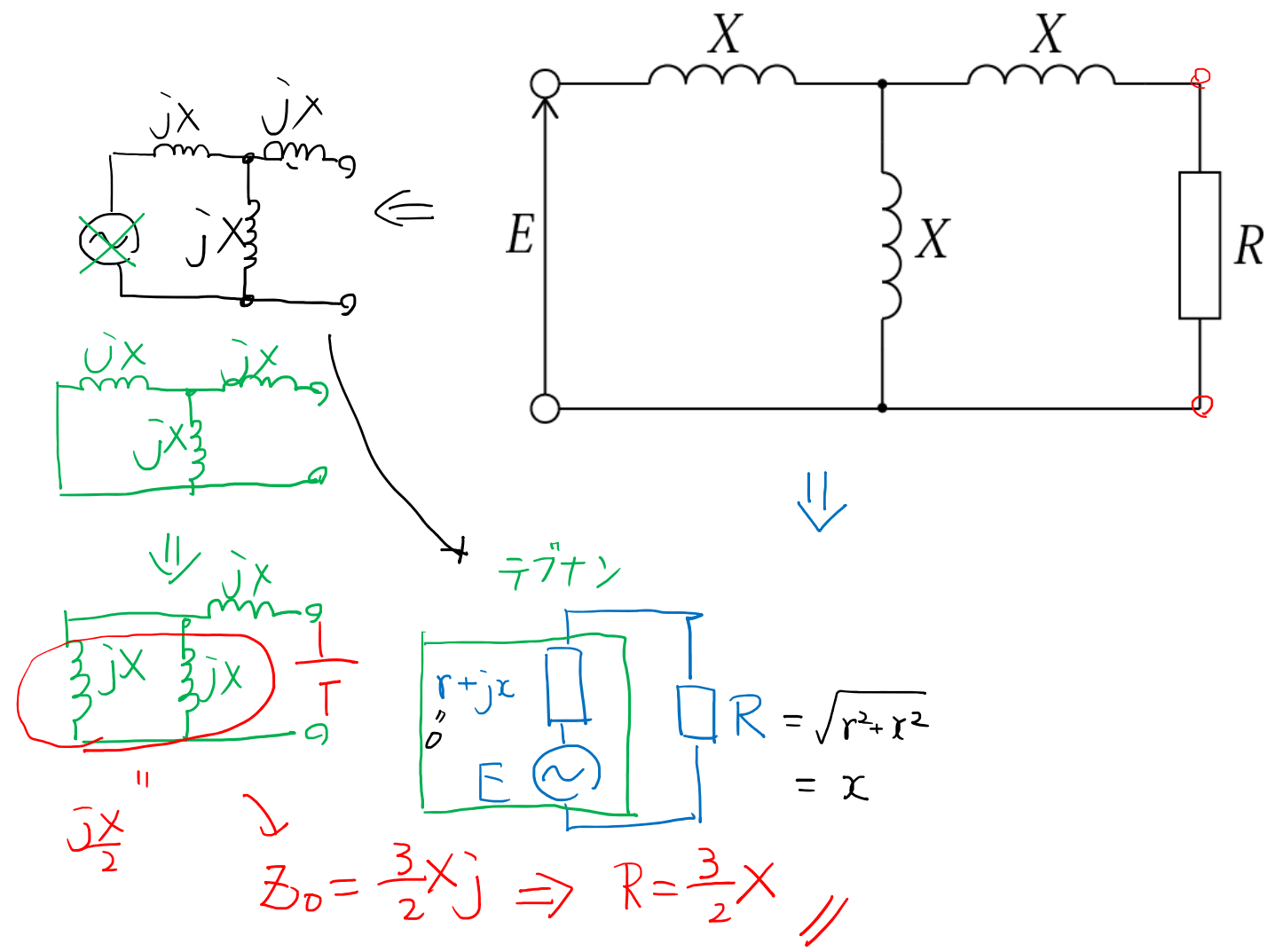
$$\frac{r^2 + x^2}{R} + R \geq 2 \sqrt{\frac{r^2 + x^2}{R} \cdot R} = 2\sqrt{r^2 + x^2}$$

$$\frac{r^2 + x^2}{R} = R \rightarrow R = \sqrt{r^2 + x^2}$$

$$P = |I|^2 R$$

$$I = \frac{E}{r + R + jx} \Rightarrow |I|^2 = \frac{E^2}{(r+R)^2 + x^2}$$

$$P = \frac{E^2 R}{r^2 + x^2 + R^2 + 2rR} = \frac{E^2}{\frac{r^2 + x^2}{R} + R + 2r}$$



② 合成可能

$$Z = jX + \frac{1}{\frac{1}{jX} + \frac{1}{R+jX}}$$

(× j × (R+jX))

$$= jX + \frac{jX(R+jX)}{R+2jX}$$

$$= jX \left(1 + \frac{R+jX}{R+2jX} \right) = jX \times \frac{2R+3jX}{R+2jX} = \frac{jX(2R+3jX)}{R+2jX}$$

$$\bar{P} = E \bar{I} = E \left(\frac{E}{Z} \right) = \frac{E^2}{Z} = \frac{E(R-2jX)}{-jX(2R-3jX)} = \frac{jE}{X} \times \frac{(R-2jX)(2R+3jX)}{(2R)^2 + (3X)^2} = \frac{E(XR+j(R^2-X^2))}{X(4R^2+9X^2)}$$

$$P[W] = \frac{E \times R}{X(4R^2+9X^2)} = \frac{ER}{4R^2+9X^2} = \frac{E \times (2R+3jX)}{4R + \frac{9X^2}{R}}$$

$$4R + \frac{9X^2}{R} \geq 2 \sqrt{4R \cdot \frac{9X^2}{R}} = 12X$$

$$4R = \frac{9X^2}{R} \rightarrow R = \frac{3}{2} X$$

