

九十三年各農田水利會新進職員聯合統一甄試試題
應試類科：電機人員 **科目：電工概要**

答案:

一、選擇題 20 % (每題 1 分，答錯不倒扣)

1.(B) 2.(D) 3.(C) 4.(C) 5.(A) 6.(A) 7.(C) 8.(B) 9.(C) 10.(D)
 11.(B) 12.(A) 13.(B) 14.(A) 15.(C) 16.(D) 17.(D) 18.(C) 19.(C) 20.(C)

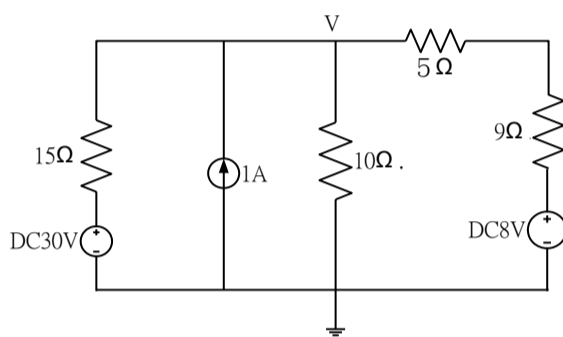
二、填充題 40 % (每格 2 分)

A.(100) B.(110) C.(1,3,11) D.(1-4,3-6,9-11) E.(1-5,3-7,8-11) F.(380) G.($10\sqrt{3}$ 或 17.32) H.(11.4) I.(4)
 J.($9/4$ 或 2.25) K.(0.8) L.($8+j6$) M.(1000) N.(150) O.(5) P.(0.06) Q.($12*10^3$ 或 12K) R.(10) S.(變壓比)
 T.(阻抗值)

三計算題 % (每題 10 分)

1. 本題有多種解法，舉節點電壓法為例。

$$\begin{aligned} \frac{30-v}{15} + 1 &= \frac{v-8}{5+9} + \frac{v-0}{10} \\ \Rightarrow 3 + \frac{8}{14} &= \left(\frac{1}{15} + \frac{1}{10} + \frac{1}{14}\right)v \\ \Rightarrow v &= 15 \quad (\text{V}) \\ \therefore I_{5\Omega} &= \frac{15-8}{14} = 0.5 \quad (\text{A}) \\ V_{10\Omega} &= \frac{v-0}{10} * 10 = 15 - 0 = 15 \quad (\text{V}) \end{aligned}$$



2.

$$\cos \theta = pf = 0.7, \quad \sin \theta = \sqrt{1 - \cos^2 \theta} = \sqrt{1 - 0.7^2} = 0.714$$

$$|S| = \frac{P}{\cos \theta} = \frac{P}{pf} = \frac{10^5}{0.7} = 1.429 * 10^5 \quad (\text{VA})$$

$$Q = |S| \sin \theta = 1.429 * 10^5 * 0.714 = 102 * 10^3 = 102 \quad (\text{kVAR})$$

$$X_C = \frac{|V_L|^2}{Q_C} = \frac{|V_S|^2}{102 * 10^3} = \frac{480^2}{102 * 10^3} = 2.258$$

$$C = \frac{1}{\omega * (2.258)} = \frac{0.4429}{\omega}$$

$$\left(\begin{array}{l} \text{設 } \omega = 377 \text{ (rad/s)} \\ \text{代入得} \\ C = 1175 \quad (\mu\text{F}) \end{array} \right)$$

3.

$$\begin{aligned} i_L &= \frac{V_B}{R} \left(1 - e^{-\frac{R}{L}t}\right) + i_L(0^-) e^{-\frac{R}{L}t} \\ &= \frac{48}{4} \left(1 - e^{-\frac{4}{0.1}t}\right) + i_L(0^-) e^{-\frac{4}{0.1}t} \\ &= 12(1 - e^{-40t}) + i_L(0^-) e^{-40t} \quad (\text{A}) \\ &\left(\begin{array}{l} \text{設 } i_L(0^-) = 0 \text{ 代入上式得} \\ i_L = 12(1 - e^{-40t}) \quad (\text{A}) \end{array} \right) \end{aligned}$$

4.

$$(a) N^2 = \frac{R_L}{R_s} = \frac{400}{10} = 40$$

$$N = \sqrt{40} = 6.325$$

$$(b) X_S = \omega * 0.1 = 37.7 \quad (\Omega)$$

$$X_L = -40 * 37.7 = -1508 \quad (\Omega)$$