

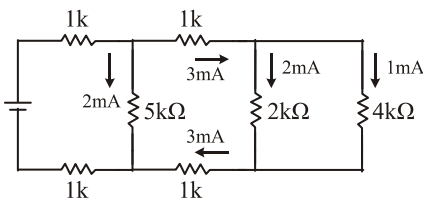
## 九十八學年四技二專第二次聯合模擬考試 電機與電子群 專業科目 (一) 詳解

98-2-03-4  
98-2-04-4

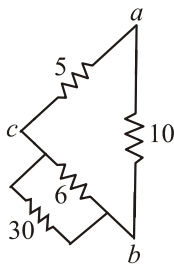
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
C	D	B	A	C	D	B	C	C	A	B	C	A	A	B	C	D	D	D	A	D	B	B	A	A
26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
C	A	C	B	D	B	D	A	D	D	C	A	B	D	C	B	C	D	D	A	B	C	A	C	B

### 第一部份：基本電學

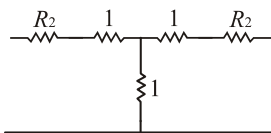
1.  $(1.25 + 10^{18} + 6.25 \times 10^{18}) \div 6.25 = 1.2 \text{ A}$
2.  $\eta_T = 0.6 \times 0.5 \times 0.9 = 0.27$
3.  $W = Q \cdot V = \text{正} \times \text{負} = \text{負}$
4.  $\alpha_t = \frac{1}{T_o + t}$ ,  $\therefore t \uparrow \alpha \downarrow$
5.  $R_{\min} = 30 \times 10^{-1} (1 - 20\%) = 2.4 \Omega$
6.  $V_N = 10 \text{ V} \times \frac{1}{2} = 5 \text{ V}$
7.  $9 \times 0.3 = 2.7 \text{ W}$
8.  $P = (2\text{m})^2 \times 5 \text{ k} = 20 \text{ mW}$



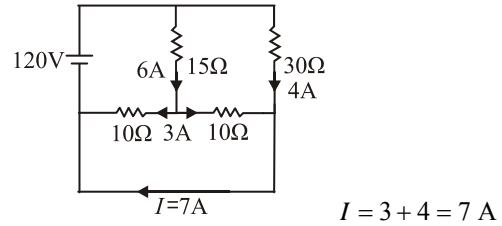
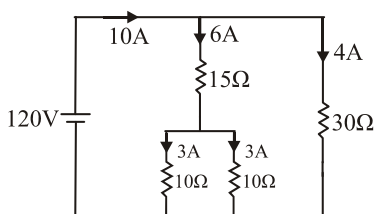
9.  $R_{ab} = [(30 // 6) + 5] // 10 = 5 \Omega$



10.  $R_2 + 1 = 3$   
 $R_2 = 2$   
 $R_1 = 1$



11.



13.  $E_{ab} = (\frac{60 \text{ V}}{4+4} + \frac{-90 \text{ V}}{R+3}) [8 // R_{ab} // (3+R)] = 0$   
 $\Rightarrow R = 9 \Omega$

14.  $Z_i = 10 + 10 + (10 // Z_i)$ ,  $Z_i^2 - 20Z_i - 200 = 0$   
 $Z_i = \frac{20 \pm 20\sqrt{3}}{2} = 10 \pm 10\sqrt{3}$ ,  $10 - 10\sqrt{3} < 0$  (不合)

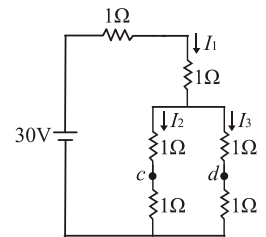
15.  $R_T = \frac{10}{3} \Omega$

$I_1 = 30 \text{ V} \div \frac{10}{3} \Omega = 9 \text{ A}$

$I_2 = \frac{4}{2+4} \times 9 = 6 \text{ A}$

$I_3 = 3 \text{ A}$

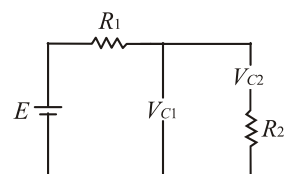
$V_{cd} = 6 \times 1 - 3 \times 3 = -3 \text{ V}$



16.  $\frac{W_2}{W_1} = \frac{\frac{1}{d_1} - \frac{1}{d_2}}{\frac{1}{d_2} - \frac{1}{d_3}}$ ,  $W_2 = 10 \times \frac{\frac{1}{5} - \frac{1}{10}}{\frac{1}{10} - \frac{1}{20}} = 20 \text{ J}$

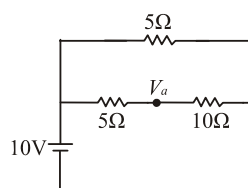
19.  $M = \frac{L_{\max} - L_{\min}}{4} = \frac{12 \text{ m} - 8 \text{ m}}{4} = 1 \text{ mH}$

20.  $V_{C1} = V_{C2} = E$   
 $\therefore V_{C1} / V_{C2} = 1$



21.  $t = 0^-$

$V_a(0^-) = 10 \text{ V}$

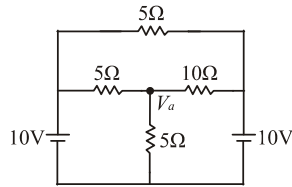


$$t = 0^+$$

$$\frac{V_a - 10}{5} + \frac{V_a}{5} + \frac{V_a - 10}{10} = 0$$

$$V_a = 6$$

$$V_a(0^+) = 6$$



22. 若  $X_L > X_C$ ，則為純電感性  $V$  超前  $I$   $90^\circ$   
 23.  $f = 0$ ， $X_C = \infty$ ， $X_L = 0$ ，故  $R_{ab} = 60 \Omega$   
 24. 電流落後電壓  $90^\circ =$  純電感性

$$25. Z = 10 + j10 \times 10^{-3} \omega - j \frac{10^6}{50 \omega}$$

$$= 10 + j(10 \times 10^{-3} \omega - \frac{10^6}{50 \omega})$$

$$\tan 45^\circ = 1 = \frac{10 \times 10^{-3} \omega - \frac{10^6}{50 \omega}}{10}, \omega = 1000$$

**第二部份：電子學**

26. 最低能量  
 27. 有正離子

$$28. I_D = I_2 - I_1 = \frac{9 - 0.6}{3 \text{ k}} - \frac{0.6}{6 \text{ k}} = 2.7 \text{ mA}$$

29. 設  $D_1$  ON

$$\therefore V_o = 8 \text{ V} \times \frac{4 \text{ k}}{4 \text{ k} + 12 \text{ k}} = 2 \Rightarrow D_2 \text{ 亦 ON}$$

$$\therefore V_o = \left( \frac{8 \text{ V}}{12 \text{ k}} + \frac{6 \text{ V}}{3 \text{ k}} \right) (12 \text{ k} // 3 \text{ k} // 4 \text{ k}) = 4 \text{ V}$$

30.  $10 \times 0.707 = 7.07$   
 31. 形成半波整流  $10 \times 0.318 = 3.18$   
 32. 適用於輕負載電路  
 33.  $V_{o2} = V_{C3} = 1 V_m = 100 \times \frac{1}{4} = 25 \text{ V}$   
 34. 3 V 往上才是答案  
 35. 向上移至 3 V 以上，故  $V_{o(\max)} - 3 = 24$

$$V_{o(\max)} = 27, V_{o(\min)} = 3$$

37. 集極回授型  $V_{CE} \gg 0.2 \text{ V}$

$$38. I_C = \beta I_B + I_{CEO} = 100 \times \frac{2.7 - 0.7}{500 \text{ k}} + 4 \mu\text{A} = 404 \mu\text{A}$$

$$39. (1) I_{4k} = \frac{7 - 0.6}{4 \text{ k}} = 1.6 \text{ m}$$

$$(2) I_{1k} = \frac{0.6}{1 \text{ k}} = 0.6 \text{ m} \Rightarrow I_B = 1.6 - 0.6 = 1 \text{ m}$$

$$\therefore I_C = \beta I_B = 10 \text{ m}$$

$$(3) R_C = \frac{18.6 - 7}{1.6 \text{ m} + 10 \text{ m}} = 1 \text{ k}$$

$$40. A_I = \frac{i_o}{100 i_b} \times \frac{100 i_b}{i_b} \times \frac{i_b}{I_s} = \frac{-5}{6} \times 100 \times \frac{3}{9} = \frac{500}{18} \cong -28$$

$$41. A_V = 4 = \frac{8 \text{ k} // R_L}{1 \text{ k}}, \therefore R_L = 8 \text{ k}$$

44.  $C_1$ 、 $C_2$ 、 $C_3$  為交連電容  
 45.  $R_{B1}$ 、 $R_{B2}$  不會影響  $V_i$  的值  
 46.  $C_{E1}$ 、 $C_{E2}$  為旁路電容，會影響  $A_V$  的大小  
 47. P 通道，n 閘極，接逆向，故  $V_{GS} > 0$   
 $V_{GS} < V_P$  才不會 OFF  
 48. n 通道，P 閘極，接逆向，故  $V_{GS} < 0$   
 $\Rightarrow e < d < c < b < a < 0$   
 49. 為電壓控制元件

$$50. A_{V1} = \frac{4 \text{ m} \times 4.5 \text{ k}}{1 + 4 \text{ m} \times 0.5 \text{ k}} = \frac{-18}{3}$$

$$A_{V2} = \frac{4 \text{ m} \times 4.5 \text{ k}}{1 + 4 \text{ m} \times 2 \text{ k}} = \frac{-18}{9}, \frac{A_{V1}}{A_{V2}} = 3$$