

108 學年度四技二專第二次聯合模擬考試 動力機械群 專業科目(二) 詳解

108-2-02-5

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

第一部分：電工概論與實習

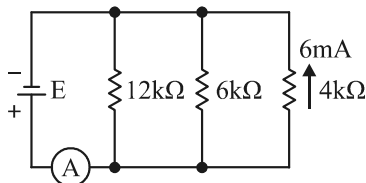
1. $V_{BA} = \frac{W_{BA}}{Q} = \frac{4}{2} = 2 \text{ V}$

2. 線徑為原來的一半，則 $A_2 = \frac{1}{4}A_1$ ， $l_2 = 4l_1$

$$\therefore R_2 = \rho \frac{l_2}{A_2} = \rho \frac{4l_1}{\frac{1}{4}A_1} = 16R_1 = 16 \times 10 = 160 \Omega$$

3. 電路電流 10 A，故電阻器需能承受之功率為 $I^2R = 300 \text{ W}$ ，故 3 Ω/500 W 規格較適當

4. 將原圖轉換成下圖，可知 4 kΩ、6 kΩ、12 kΩ 三電阻為並聯

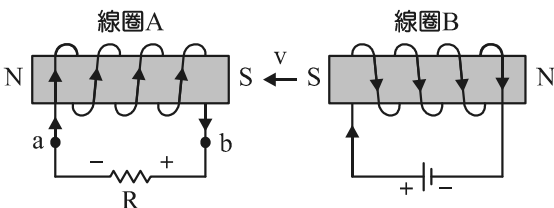


$$E = 6 \text{ m} \times 4 \text{ k} = 24 \text{ V}$$

$$\therefore \textcircled{A} = 6 \text{ m} + \frac{24}{6 \text{ k}} + \frac{24}{12 \text{ k}} = 12 \text{ mA}$$

5. $e = N \frac{\Delta\phi}{\Delta t} = 40 \times \frac{0.2 - 0.1}{1} = 4 \text{ V}$

6. 如下圖所示：



為 a 負 b 正

7. (1) 測試家裡、教室、實習工廠的插座，是純交流電壓 AC110 V，測試棒應插在 +、- 兩插孔

(2) 測量直流中含交流漣波信號電壓，且僅要測純交流電壓值時，測試棒應插在 OUTPUT、- 兩插孔

8. 實際誤差百分率為 $\varepsilon\% = \frac{|23.8 - 26|}{26} \times 100\% = 8.46\%$

9. $V_{p-p} = 311 \text{ V} \Rightarrow V_m = 155.5 \text{ V}$

$$\therefore V = \frac{1}{\sqrt{2}} V_m = \frac{155.5}{\sqrt{2}} \cong 110 \text{ V}$$

10. $v(0) = 5\sqrt{2} \sin(628 \times 0 + 45^\circ) = 5\sqrt{2} \sin 45^\circ$

$$= 5\sqrt{2} \times \frac{1}{\sqrt{2}} = 5 \text{ V}$$

11. $X_C = \frac{1}{\omega C} = \frac{1}{\infty} = 0$ ， $X_L = \omega L = \infty$

12. $\bar{I}_1 = 6 \angle 0^\circ$ (安培) = 6 (安培)

$$\bar{I}_2 = 8 \angle 90^\circ$$
 (安培) = $j8$ (安培)

$$\bar{I} = \bar{I}_1 + \bar{I}_2 = 6 + j8 = \sqrt{6^2 + 8^2} \angle \tan^{-1} = 10 \angle 53^\circ$$
 (安培)
 $I = 10$ (安培)

13. $S = VI = \frac{100\sqrt{2}}{\sqrt{2}} \times \frac{100\sqrt{2}}{\sqrt{2}} = 10000 \text{ VA}$

$$P = VI \cos \theta_p = \frac{100\sqrt{2}}{\sqrt{2}} \times \frac{100\sqrt{2}}{\sqrt{2}} \times \cos(-60^\circ) = 5000 \text{ W}$$

$$Q = VI \sin \theta_p = \frac{100\sqrt{2}}{\sqrt{2}} \times \frac{100\sqrt{2}}{\sqrt{2}} \times \sin(-60^\circ) = -8660 \text{ VAR}$$
 (負號表示電感性電抗功率)

$$PF = \frac{P}{S} = \frac{5000}{10000} = 0.5$$

14. $W = Pt = 1.6 \text{ kW} \times 3 \text{ hr} \times 30 \text{ 天} \times 4000 \text{ 家} = 576000 \text{ 度電} = 57.6 \text{ 萬度電}$

15. 10 W/100 V 之額定電阻大於 100 W/100 V 之額定電阻 \therefore 兩燈泡串聯時，燈泡一較亮

16. 負載為 4 Ω 時：

$$I_{4\Omega} = \frac{E}{r + 4} = \frac{V_{4\Omega}}{R_{4\Omega}} = \frac{8}{4} = 2 \text{ A} \Rightarrow E = 2r + 8$$

負載為 2 Ω 時：

$$I_{2\Omega} = \frac{E}{r + 2} = \frac{V_{2\Omega}}{R_{2\Omega}} = \frac{6}{2} = 3 \text{ A} \Rightarrow E = 3r + 6$$

$$\therefore 2r + 8 = 3r + 6 \Rightarrow r = 2 \Omega$$

17. 固定電阻的電流不變

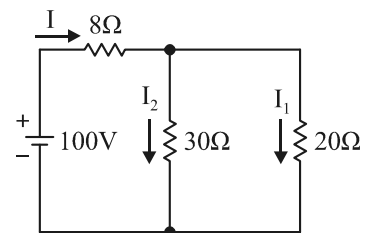
20. $R = 8 + \frac{30 \times 20}{30 + 20} = 8 + 12 = 20 \Omega$

$$I = \frac{E}{R} = \frac{100}{20} = 5 \text{ A}$$

$$I_1 = \frac{30}{30 + 20} \times 5 = 3 \text{ A}$$

$$I_2 = \frac{20}{30 + 20} \times 5 = 2 \text{ A}$$

$$\therefore I_1 > I_2, V_{30\Omega} = V_{20\Omega} = 3 \times 20 = 60 \text{ V}$$



第二部分：電子概論與實習

21. 一般銲接過程中應用於 C 點，無半熔解狀態
22. $T = 4 \text{ ms}$, $f = 250 \text{ kHz}$, $\omega = 2\pi f = 500\pi \text{ rad/s}$
 $V_{dc} = 1 \text{ V}$, $V_m = 2 \text{ V}$
 $V_s(t) = V_{dc} + V_m \sin \omega t \text{ V} = 1 + 2 \sin 500\pi t \text{ V}$
23. 要觀察複合波形，示波器輸入選擇開關要切至 DC，才能顯示直流加交流的訊號
24. (B) -20 dB ：衰減 10 倍輸出信號之電壓，對頻率沒有衰減
25. 當電源供應器由 CV 模式跳到 CC 模式時，表示供給電流不足，此時應提高供給電流
26. (C) 探棒 $\times 10$ ：將信號電壓大小衰減 10 倍顯示在螢幕上，要還原此信號電壓大小才乘 10 倍
27. $12 \text{ V} > 5 \text{ V}$ ，所以二極體導通視為短路，所以 $V_o = 5 \text{ V}$
28. (A) 發光二極體的發光顏色由材料能帶間隙決定
29. $12 \text{ V} \times \frac{2}{3} = 8 \text{ V} < V_z = 9 \text{ V}$ ，所以稽納二極體未達崩潰電壓，故 $I_z = 0$ ，故選(A)
30. 電容器視為理想，故 $V_o = V_m = 10 \times 1.414 = 14.14 \text{ V}$
31. 車門開關控制電路大多仍為接點開關控制電路
32. $\gamma = 1 + \beta = 100$, $\beta = 99$, $\alpha = \frac{\beta}{1 + \beta} = 0.99$
33. $I_B = \frac{10 - 0.7}{93 \text{ k}} = 0.1 \text{ mA}$, $I_C = \beta I_B = 5 \text{ mA}$
 $R_C = \frac{10 - 2.5}{5 \text{ mA}} = 1.5 \text{ k}\Omega$
34. $I_{C(\text{SAT})} \leq \beta I_B$, $\frac{12 - 0.2}{1 \text{ k}} \leq 50 \times \frac{5 - 0.7}{R_B}$, $R_B \leq 18.2 \text{ k}\Omega$
35. 根據此電子符號上 I_C 的電流流向與箭頭方向相同，故取正。PNP 電晶體的 V_{EC} 為正，而坐標 X 軸為 V_{CE} ，故取負
37. (D) 電容抗 $X_C = \frac{1}{2\pi fC}$ ，故電容抗與頻率成反比
38. (D) 電壓增益 $A_V = -\frac{V_o}{V_i}$
39. $A_{VT} = 20 \times 5 \times (-10) = -1000$
 $\text{dB}_T = 20 \log |A_V| = 20 \log |-1000| = 60 \text{ dB}$
40. 共射極放大器 $A_V = \frac{-R_C}{r'_e} = -\frac{4 \text{ k}}{10} = -400$