

107 學年度四技二專第五次聯合模擬考試 動力機械群 專業科目(二) 詳解

107-5-02-5

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

第一部分：電工概論與實習

1. $V_{AB} = \frac{W}{Q} = \frac{0.3}{3 \times 10^{-3}} = 100 \text{ V}$, $V_{AB} = V_A - V_B$

$\therefore V_B = V_A - V_{AB} = 120 - 100 = 20 \text{ V}$ (伏特)

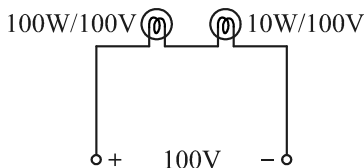
2. $V = IR = 5 \text{ mA} \times 2 \text{ k}\Omega = 10 \text{ V}$

$I = \frac{V}{R} = \frac{10}{500} = 20 \text{ mA}$

3. $R_{100W} = \frac{100^2}{100} = 100 \Omega$, $R_{10W} = \frac{100^2}{10} = 1000 \Omega$

\therefore 串聯, $\therefore I$ 相等

又 $P = I^2 R$, 故 R 愈小 P 愈小, 所以 100 W 燈泡較暗



4. 並聯電壓相同, $V = 6 \times 5 = 30 \text{ V}$

$P_{R_2} = I \times V = 4 \times 30 = 120 \text{ W}$

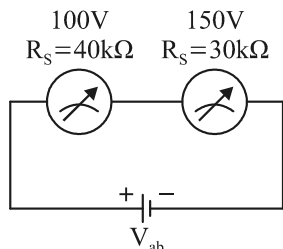
5. $I = \frac{E}{6}$, $P_{2\Omega} = I^2 \times 2$, $18 = (\frac{E}{6})^2 \times 2 \Rightarrow E = 18 \text{ V}$

6. 串聯電路, 電流相同

$I = \frac{100}{40 \text{ k}} = 2.5 \text{ mA}$, $I = \frac{150}{30 \text{ k}} = 5 \text{ mA}$

I 取小值

$V_{ab} = I \times (40 \text{ k} + 30 \text{ k}) = 2.5 \text{ mA} \times (70 \text{ k}) = 175 \text{ V}$



7. $R_{ab} = 9 + (6 // 12) + 7 = 20 \Omega$

8. $L = N \frac{\Phi}{I} = 500 \times \frac{5 \times 10^{-3}}{10} = 0.25 \text{ H}$ (亨利)

9. $L_1 = N \frac{\Phi}{I} = 1000 \times \frac{2 \times 10^{-2}}{2} = 10 \text{ H}$, $\frac{L_2}{L_1} = \frac{N_2^2}{N_1^2}$

$\therefore L_2 = \frac{L_1 \times N_2^2}{N_1^2} = \frac{10 \times (600)^2}{(1000)^2} = 3.6 \text{ H}$ (亨利)

12. $V_{\text{eff}} = \sqrt{\frac{30^2 \times 1 + (\frac{30}{\sqrt{3}})^2 \times 2 + (-10)^2 \times 1}{4}} = \sqrt{400} = 20 \text{ V}$

13. $\bar{X}_L = \omega L \angle 90^\circ = 50 \angle 90^\circ \Omega$

$i(t) = 30 \sin(5t + 90^\circ) \text{ A} \Rightarrow \bar{I} = \frac{30}{\sqrt{2}} \angle 90^\circ \text{ A}$

$\bar{V} = \bar{I} \cdot \bar{X}_L = \frac{1500}{\sqrt{2}} \angle 180^\circ \text{ V}$

$\Rightarrow v(t) = 1500 \sin(5t + 180^\circ) = -1500 \sin 5t \text{ V}$

14. $\bar{Z} = R + j(X_L - X_C) = 50 + j(50 - 100)$

$= 50 - j50 = 50\sqrt{2} \angle -45^\circ \Omega$

$\bar{I} = \frac{\bar{V}}{\bar{Z}} = \frac{100 \angle 0^\circ}{50\sqrt{2} \angle -45^\circ} = 1.414 \angle 45^\circ \text{ 安培}$

$\bar{V}_C = \bar{I} \times \bar{X}_C = (1.414 \angle 45^\circ)(100 \angle -90^\circ)$
 $= 141.4 \angle -45^\circ \text{ 伏特}$

15. $\bar{I}_R = \frac{\bar{V}}{R} = \frac{50 \angle 0^\circ}{5} = 10 \angle 0^\circ \text{ A} = 10 \text{ A}$

$\bar{I}_L = \frac{\bar{V}}{X_L} = \frac{50 \angle 0^\circ}{5 \angle 90^\circ} = 10 \angle -90^\circ \text{ A} = -j10 \text{ A}$

$\bar{I}_C = \frac{\bar{V}}{X_C} = \frac{50 \angle 0^\circ}{2.5 \angle -90^\circ} = 20 \angle 90^\circ \text{ A} = +j20 \text{ A}$

$\bar{I} = \bar{I}_R + \bar{I}_L + \bar{I}_C = 10 - j10 + j20 = 10 + j10 \text{ A}$

$= 10\sqrt{2} \angle 45^\circ \text{ A}$

$\therefore I = \sqrt{10^2 + 10^2} = 10\sqrt{2} \text{ A}$

16. 由題意知: $\bar{V} = 100 \angle 20^\circ \text{ V}$, $\bar{I} = 10 \angle -40^\circ \text{ V}$

$\therefore V = 100 \text{ V}$, $I = 10 \text{ A}$

$\theta_p = \theta_v - \theta_i = 20^\circ - (-40^\circ) = 60^\circ$

$P = VI \cos \theta = 100 \times 10 \times \cos(60^\circ) = 500 \text{ W}$

17. 因為 $E_1 = 4.44f\Phi N_1$

所以 $\Phi = \frac{E_1}{4.44f\Phi N_1} = \frac{6600}{4.44 \times 60 \times 2000}$

$= 0.0124 \text{ Wb}$ (韋伯)

18. $a = \frac{V_1}{V_2} = \frac{N_1}{N_2} = \frac{I_2}{I_1} \Rightarrow \frac{3000}{100} \neq \frac{5000}{100}$

19. $n_s = \frac{120 \times 60}{6} = 1200 \text{ rpm}$

$$S = \frac{1200 - 1170}{1200} = \frac{30}{1200} = 0.025 = 2.5\%$$

20. Δ 形接法之線電壓 = 相電壓 = 200 V

$$\text{線電流} = \sqrt{3} \times \text{相電流} = 1.732 \times 5 = 8.66 \text{ A}$$

第二部分：電子概論與實習

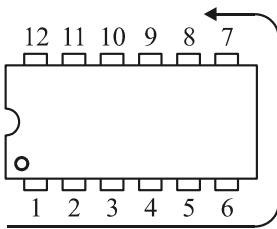
21. 60/40 是 60% 的錫，40% 的鉛

22. SCR 之 GK 間觸發電壓約 0.7 V，導通後 AK 間的電壓降約為 1 V

$$23. V = 30 \text{ V} \times \frac{(4 \text{ k}\Omega // 4 \text{ k}\Omega)}{1 \text{ k}\Omega + (4 \text{ k}\Omega // 4 \text{ k}\Omega)} = 20 \text{ V}$$

24. (A) 溫度上升時，逆向飽和電流隨之上升

28. 將缺口朝左由左下角逆時針算或將缺口朝上由左上角逆時針算，故 A 為第 12 接腳



29. 功率增益最大的是共射極組態，同時兼有電流放大與電壓放大的作用

30. XOR

A	0	0	1	0
B	1	1	0	0
Y	1	1	1	0

註： $0 \oplus 0 = 0$ ， $0 \oplus 1 = 1$ ， $1 \oplus 0 = 1$ ， $0 \oplus 1 = 1$

31. (C) A_c 為共模增益， A_d 為差模增益

32. 電阻 10Ω 兩端之電壓降為 $1 \text{ A} \times 10 \Omega = 5 \text{ V} - V_o$ (應用虛接地觀念)， $10 \text{ V} = 5 \text{ V} - V_o$ ， $V_o = 5 \text{ V} - 10 \text{ V} = -5 \text{ V}$

$$33. A_{V(\text{dB})} = 20 \log |A_v| = 20 \log |100| = +40 \text{ dB}$$

$$34. (1) V_{CE} = \frac{1}{2}(V_{CC} + V_{CE(\text{sat})}) = \frac{1}{2}(20 + 0.4 \text{ V}) = 10.2 \text{ V}$$

$$(2) I_C = \frac{V_{CC} - V_{CE}}{R_C} = \frac{9.8 \text{ V}}{2 \text{ k}\Omega} = 4.9 \text{ mA}$$

$$(3) I_B = \frac{4.9 \text{ mA}}{100} = 49 \mu\text{A}$$

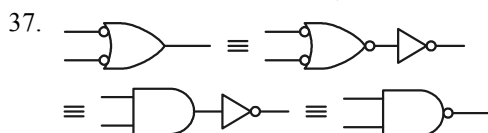
$$(4) R_B = \frac{V_{CC} - V_{BE}}{I_B} = \frac{20 - 0.7 \text{ V}}{49 \mu\text{A}} = 393.8 \text{ k}\Omega$$

35. (C) $V_{av} = 0.636(30 - 1.4) = 18.19 \text{ V}$

36. 週期 $T = 4 \text{ 格} \times 1 \text{ ms} = 4 \text{ ms}$ ，頻率 $f = \frac{1}{T} = 250 \text{ Hz}$

$$\text{峰對峰值 } V_{p-p} = 4 \text{ 格} \times 2 \text{ V} = 8 \text{ V}$$

$$\text{電壓的有效值 } V_{\text{rms}} = \frac{2 \text{ 格} \times 2 \text{ V}}{\sqrt{2}} = 2.82 \text{ V}$$



$$38. (1) I_C = \frac{1 \text{ 伏特} \times 4 \text{ 格}}{R_C} = \frac{4 \text{ V}}{100 \Omega} = 40 \text{ mA}$$

$$(2) I_B = \frac{1 \text{ 伏特} \times 5 \text{ 格}}{R_B} = \frac{5 \text{ V}}{10 \text{ k}\Omega} = 0.5 \text{ mA}$$

$$(3) \beta = \frac{I_C}{I_B} = \frac{40 \text{ mA}}{0.5 \text{ mA}} = 80$$

39. 只要 A 或 B 有一為 0 (低電位)，即會有二極體導通，而 Y 便為 0 (遇 0 即 0)，故為及閘

40. 當 R_1 斷路時， I_B 無電流

故 $I_C = 0$ ，則 $V_C = V_{CC} = 12 \text{ V}$