

102 學年四技二專第一次聯合模擬考試 電機與電子群 專業科目 (一) 詳解

102-1-03-4
102-1-04-4

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
D	B	B	D	A	C	A	A	C	D	B	C	A	A	D	B	B	D	B	A	D	C	C	D	C
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
A	C	B	B	D	B	A	D	C	B	A	A	B	B	A	C	A	B	D	C	C	D	D	D	C

第一部份：基本電學

1. (1) $Q = \frac{W}{V} = \frac{20}{2} = 10$ 庫

(2) $10 \times 6.25 \times 10^{18} = 6.25 \times 10^{19}$

3. $W = Q \times V = \text{負} \times \text{負} = \text{正}$

∴ 增加能量

4. $I = \frac{E}{R}$, $v = \frac{I}{neA}$

v 與 I 成正比, ∴ v 和 E 成正比

∴ E 變成 3 倍, ∴ 速率變成 3 倍

6. $P = \frac{(1.1V)^2}{R} = 1.21 \frac{V^2}{R}$, $1.21 - 1 = 0.21 = 21\%$

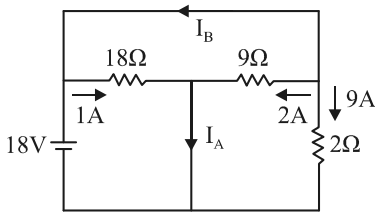
7. (A) 金屬溫度 ↓, R ↓, α ↑, ∴ $\alpha = \frac{1}{T_0 + t}$

8. R₁ 短路, 使電流無法流經 R₂

9. ∴ 三燈泡外加電壓皆同

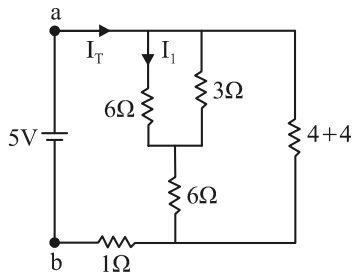
∴ 80 W 較亮, ∴ $P = \frac{V^2}{R}$, 80 W 內阻最小

10. I_A = 1 + 2 = 3



11. I_B + 2 + 9 = 0, I_B = -11 A

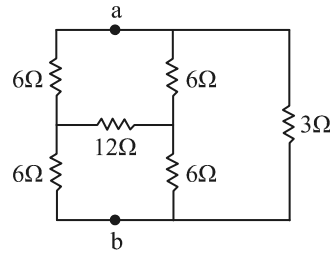
12. R_{ab} = [(6//3)+6]//8+1=5



13. $I = I_T - I_1 = \frac{5V}{5\Omega} - \frac{1}{2} \times \frac{3}{6+3} = 1 - \frac{1}{6} = \frac{5}{6}$ A

14. 拿掉 12 Ω

∴ R_{ab} = 12//12//3 = 2 Ω



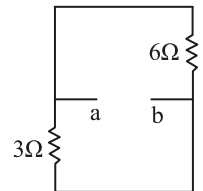
15. ∴ I₁ = I₂

16. 將 R_x 拿掉

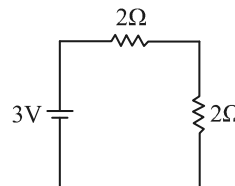
R_{th} = 3//6 = 2 Ω

V_{th} = V_a - V_b

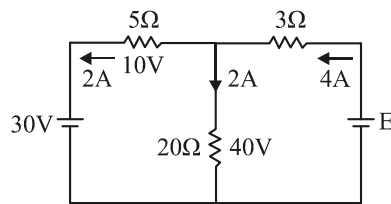
= (4 A + $\frac{3}{3} + \frac{6}{6}$)(3//6) - 3 - 6 = 3



17. P_{max} = $\frac{(\frac{3}{2})^2}{2} = \frac{9}{8}$ W



18. E = 4 × 3 + 40 = 52 V



19. 若 R_甲 = 0 Ω, 則 $\frac{5V}{6\Omega} < 1A$

∴ R_甲 適合歐姆定律, R_甲 = $\frac{4V}{1\Omega} = 4\Omega$

∴ V_甲 = $5 \times \frac{4}{6+4} = 2V$

20. ∴ 為平衡電橋

21. R_{th} = 2//2 = 1, V_{th} = $3 \times \frac{2}{2+2} = 1.5$

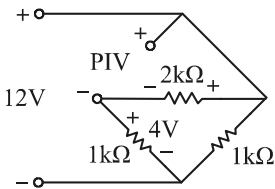
∴ I = $\frac{1.5-1.5}{1} = 0$

22. $R = 0$, $\eta = 100\%$; $R_L = R$, $\eta = 50\%$
 23. 因為計算功率為 I^2R 或 $\frac{V^2}{R}$ 皆為非線性
 24. \therefore 為平衡電橋
 25. 對折長度少一半, 截面積變為 2 倍, $\therefore R$ 變為 $\frac{1}{4}$ 倍

$$P = \frac{V^2}{R} , \therefore P \text{ 變成 4 倍, } 4 \times 20 = 80 \text{ W}$$

第二部份：電子學

26. CB 式的 $I_o = I_{CBO}$ 最小
 27. (1) $10 = I_B \times 10 \text{ k} + (I_B + I_{C(S)}) \times 1 \text{ k}$
 (2) $10.7 = I_{C(S)} \times 1 \text{ k} + 0.2 + (I_{C(S)} + I_B) \times 1 \text{ k}$
 $\Rightarrow I_B = 0.45 \text{ mA} , I_{C(S)} = 5.025 \text{ mA}$
 29. R_C 不變, 斜率不變, V_{CC} \uparrow , \therefore 變為 L_2
 30. $V_{CE} = 4 \text{ V}$ 時, $I_C = 0$, $\therefore V_{CC} = V_{CE} = 4$
 31. \therefore CB 電路無米勒電容放大效應
 32. \therefore 固定偏壓 $S = 1 + \beta$ 最大
 33. 此為 2 倍全波倍壓, $\therefore PIV = 2V_m = 50\sqrt{2} \times 2 = 100\sqrt{2}$
 34. $1\% = \frac{4.8}{R_L C} = \frac{4.8}{4.8 \times C}$, $C = 100 \mu\text{F}$
 35. (A) 愈小 (C) I 愈大 (D) 不變
 36. \therefore 稽納摻雜濃度高, \therefore 用 BE 代替
 37. CC 式集極接直流電源
 38. 適合做小功率電晶體
 39. 只會少量增加
 40. 逆向偏壓下, 二極體的反向電阻甚大, \therefore 和 I_o 無關
 41. 漣波頻率為 0 Hz, \therefore 電容無法放電
 42. $\therefore V_{i(P)} = 5 < V_R$, \therefore 不是截波器
 43. 直流時, $f = 0$ 、 $x_L = 0$, 使電感不消耗直流電壓
 44. 溫度上升, 電子脫離軌道形成空缺(電洞), 使電洞濃度上升
 45. $r\% = 121\%$ 為一定值
 46. $V_o = \frac{2}{\pi} \times 12 \times \frac{2 \text{ k}}{1 \text{ k} + 2 \text{ k}} = \frac{2}{\pi} \times 8 = 5.1 \text{ V}$
 47. $12 = PIV + 4$, $PIV = 8$



48. 稽納無法崩潰, $\therefore V_{th} = 10 \times \frac{2 \text{ k}}{2 \text{ k} + 2 \text{ k}} = 5 < 8$

$\therefore P_z = 0 \text{ W}$

49. (1) $I_{o1} = \frac{3 \text{ mV}}{3 \text{ M}} = 1 \text{ nA}$

(2) $I_{o2} = 1 \text{ nA} \times 2^{\frac{65-25}{10}} = 16 \text{ nA}$

- (3) $V_o = 16 \text{ n} \times 3 \text{ M} = 48 \text{ mV}$
 50. 設 D_2 ON
 (1) $V_p = (\frac{6 \text{ V}}{3 \text{ k}} + \frac{-9}{12 \text{ k}})(3 \text{ k} // 12 \text{ k}) > 0$
 (2) $\therefore D_1$ 、 D_2 ON, $V_o = 0$

