

100 學年四技二專第五次聯合模擬考試 電機與電子群 專業科目 (一) 詳解

100-5-03-4

100-5-04-4

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

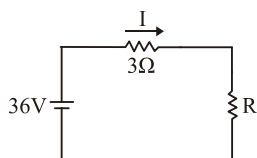
第一部份：基本電學

1. (1) $V_{th} = 24\text{ V} + 4 \times 3 = 36\text{ V}$

$R_{th} = 3\ \Omega$

(2) $I > 4$ ，才會輸出電流

$\therefore \frac{36\text{ V}}{3+R} > 4, 3+R < 9, R < 6$



2. $V_A = (\frac{24\text{ V}}{3\ \Omega} + 4\text{ A}) \times (3//3) = 18\text{ V}, 18\text{ V} \div 3\ \Omega = 6\text{ A}$

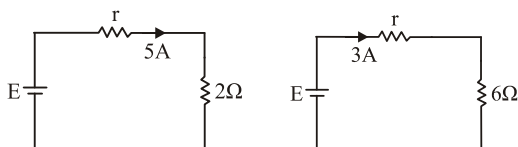
3. $V_a = 60\text{ V} \times \frac{4}{2+4} = 40\text{ V}$

$V_b = 10 + 40 = 50\text{ V}$

4. $V_C = -30 \times \frac{3}{6+3} + 50 = 40\text{ V}$

5. (1) $E = 5r + 10\text{ V}, E = 3r + 18\text{ V}$

$r = 4\ \Omega, E = 30\text{ V}$



(2) $I = 30\text{ V} \div (4 + 8) = 2.5\text{ A}$

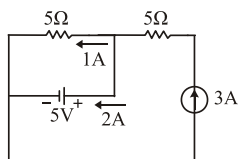
6. $R_{ab} = r = 4\ \Omega$

7. $R = 10\text{ G} = 10 \times 10^9 = 10^{10} = 10^{13}\text{ m}\Omega$

8. $V_A = (\frac{120}{6} + \frac{120}{4} + \frac{120}{12})(12//6//3//4) = 72$

$I_1 = \frac{120 - 72}{6\ \Omega} = 8\text{ A}$

9. $P = -5 \times 2 = -10\text{ W}$



10. 金屬 溫度↑電阻↑， $\therefore R_1 > R_2$

溫度↑ α ↓， $\therefore \alpha_1 < \alpha_2$

11. 串聯互消 $6 + 4 - 2 \times 2 = 6\text{ H}$

12. $I = \frac{24\text{ V}}{6\ \Omega} = 4\text{ A}, W = \frac{1}{2} \times 5\text{ m} \times 4^2 = 40\text{ m} = 0.04\text{ J}$

13. $\frac{c}{n} \div nc = \frac{1}{n^2}$

15. $I_L = 100\text{ V} \div (10 + 40) = 2\text{ A}$

16. $V_L = -2 \times 40 = -80\text{ V}$

17. 正弦波一週平均值 = 0

18. 同頻率之弦波相加，頻率不變

19. $\sqrt{110^2 + 60^2} = 125.3$

20. $Z = j + \frac{1(j)}{1-j} = \frac{1+j}{2}$

21. $C \uparrow X_C \downarrow, Z \downarrow, I \uparrow, \tan \theta = \frac{R}{X_C}, X_C \downarrow$

$\tan \theta \uparrow, \theta \uparrow \cos \theta \downarrow$

22. $P_{max} = P + S = I^2 R + I^2 Z = (\frac{10}{\sqrt{2}})^2 \times 3 + (\frac{10}{\sqrt{2}})^2 \times 5 = 400\text{ W}$

23. $\cos \theta = \frac{I_R}{I} = \frac{8}{10} = 0.8$

24. $P = \frac{V^2}{R} = \frac{(\frac{300}{\sqrt{3}})^2}{20\ \Omega} = 1500\text{ W}$

25. Y型：線電壓超前相電壓 30° 且 $V_L = \sqrt{3}V_p$

第二部份：電子學

26. 空乏區形成障壁電位會制止擴散電流

27. $r_z = \frac{100\text{ mV}}{2\text{ mA}} = 50\ \Omega, V_Z = 6.8 + 50\ \Omega \times 8\text{ m} = 7.2$

28. 設 D_2 ON， D_1 ON 的條件為

$V_i \geq (\frac{2\text{ V}}{2\text{ k}} + \frac{5\text{ V}}{1\text{ k}})(2\text{ k} // 1\text{ k}), V_i \geq 4$

29. $I = \frac{3 - (-5)}{1\text{ k}} = 8\text{ mA}$

31. $I_m = \frac{200\sqrt{2}}{40} = 7.07\text{ A}$

32. $\therefore D_1$ OFF， $\therefore V_o = -5 \sim 5$

33. $V_{r(p-p)} \times 80\ \mu = 40\text{ m} \times \frac{1}{120}, V_{r(p-p)} = 4.2\text{ V}$
 $\therefore V_{dc} = 50 - 2.1 \cong 48\text{ V}$

34. 基極寬度變窄， $I_B \downarrow, \beta = \frac{I_C}{I_B}, \beta \uparrow$

35. \therefore 斜率 = $-\frac{1}{\text{負載電阻}}$ ， \therefore 斜率和 V_{CC} 無關

36. $V_B - V_E > 0, V_B - V_C > 0$

37. $I_E = I_B + I_C = 10.2\text{ mA}$

38. P 閘接逆向, $\therefore V_{GS} < 0$

$$39. 9 \text{ mA} = I_{DSS} \left(1 - \frac{-1.5}{V_P}\right)^2, 1 \text{ mA} = I_{DSS} \left(1 - \frac{-4.5}{V_P}\right)^2$$

$$\Rightarrow V_P = -6, I_{DSS} = 16 \text{ mA}$$

40. 因 V_o 沒接 R_L , 無法放電, 故 $f = 0$

41. (1) $V_s = 1.3 \text{ V}$ (直流), $I_B = 0.1 \text{ mA}$, $V_{o(dc)} = 4 \text{ V}$

$$(2) A_V = \frac{\beta \times 0.4 \text{ k}}{6 \text{ k} + 1 \text{ k}} = -\frac{40}{7}, V_{o(ac)} = -\frac{40}{7} \times (\pm 0.35) = \pm 2$$

$$\therefore V_o = 4 \pm 2 = 2 \sim 6$$

42. 直接交連, 低頻響應好

43. $\therefore I_{CBO}$ 、 V_{BE} 、 β 會受溫度影響

44. N 閘極加逆向, $\therefore V_{GS} > 0$, 故在第一象限

$$45. V_H^+ = \left(\frac{12}{4 \text{ k}} + \frac{3 \text{ V}}{2 \text{ k}}\right)(4 \text{ k} // 2 \text{ k}) = 6 \text{ V}$$

$$V_H^- = \left(\frac{-12 \text{ V}}{4 \text{ k}} + \frac{3 \text{ V}}{2 \text{ k}}\right)(4 \text{ k} // 2 \text{ k}) = -2 \text{ V}$$

46. $V_i = -3 < V_H^-$, $\therefore V_o = +12$

47. 巴克豪森準則 $AB = 1$ 為正弦波振盪器

48. 矽的障壁電壓為 0 V (電中性)

49. $A_v = 1$, $20 \log 1 = 0 \text{ dB}$

50. $V_o = 9 \text{ V} - 3 \text{ mA} \times 2 \text{ k} + 1 \text{ V} = 4 \text{ V}$