

112 學年度科技校院四年制與專科學校二年制

統一入學測驗公告參考答案

考科代碼：4-03-1、4-04-1

類 別：電機與電子群電機類、電機與電子群資電類

考 科：專業科目(一)基本電學、基本電學實習、電子學、

電子學實習

題號	答案	題號	答案	題號	答案	題號	答案	題號	答案	題號	答案
1	B	11	B	21	D	31	C	41	B	51	
2	A	12	A	22	D	32	A	42	C	52	
3	D	13	C	23	A	33	D	43	C	53	
4	C	14	B	24	A	34	A	44	C	54	
5	C	15	A	25	B	35	D	45	D	55	
6	A	16	C	26	B	36	B	46	C	56	
7	D	17	D	27	C	37	B	47	D	57	
8	D	18	C	28	A	38	D	48	D	58	
9	C	19	D	29	B	39	A	49	C	59	
10	C	20	A	30	D	40	B	50	B	60	

112 學年度技術校院四年制與專科學校二年制統一入學測驗 電機與電子群電機類、資電類（專一）解析

試題分析

基本電學：

本年度基本電學試題與去年相比較難度稍微簡單一些，嚴格說起來並無基本電學實習專屬試題，大部分題目均與授課講義題型相同或類似，本班生應該可以取得高分，預估提高 6~8 分。

電子學：

今年各章節考題難易適中，即便是較為特別的電路與計算方式，均在本班授課範圍內，本班生可輕鬆掌握；儀表實習題較去年多、難度不高；計算題與去年相較下，有幾題具有挑戰性，整體來看難度與以往相去不遠，唯去年題目過於簡單，故預估今年降低 6~8 分。

$$1. V_a - V_b = \frac{0.1}{2 \times 10^{-3}} \quad V_b = 10V$$

$$2. \rho \frac{2L}{4A} : \rho \frac{L}{A} = 1:2$$

$$3. V_{ac} = -1 - 2 = -3V; V_{ad} = -1 + 4 = 3V; V_{dn} = -4 - 3 = -7V; V_{cn} = 2 - 3 = -1V$$

$$4. \frac{2}{R_1+2} \times E = 10; \frac{8}{R_1+8} \times E = 16; \frac{18}{2+18} \times 20 = 18V$$

$$5. I = \frac{2}{2+4} \times 1 + \frac{4}{4+2} \times 2 = 1.67A$$

$$6. I_a = \frac{4}{2+4} \times 1 - \frac{4}{1+3+2} + \frac{3}{3+3} \times 2 = 1A; I_b = \frac{2}{2+4} \times 1 + \frac{4}{1+3+2} + \frac{3}{3+3} \times 2 = 2A$$

$$7. I_{1\Omega} = \frac{4}{1+4} \times 4 - \frac{4}{1+4} + \frac{4}{1+4} \times 2 = 4A; I = 4 - 4 = 0A$$

$$8. V_1 = \frac{20+30}{10+20+30} \times 120 = 100V; V_2 = 120 - 100 = 20V$$

$$9. \frac{1}{2} \times 12m \times 20^2 + \frac{1}{2} \times 8m \times 20^2 = 4J$$

$$10. 2k \times 25\mu = 50ms$$

$$11. \cos \theta = \sin(\theta + 90^\circ)$$

$$12. \frac{10 \angle 0^\circ}{j4 + (12 \parallel 4)} \times \frac{4}{12+4} = 0.5A$$

$$13. \text{最大瞬間功率} = P + S = 1600W$$

$$14. 3\Omega \text{ 電流} = \frac{10 \times 10}{5} = 20A;$$

$$P = 20^2 \times 3 + 10^2 \times 8 = 2000W; Q = 20^2 \times 4 - 10^2 \times 6 = 1000VAR$$

$$15. \frac{60\sqrt{2} \angle 60^\circ}{6+j6} = 10 \angle 15^\circ A$$

$$16. \text{諧振時電流最大 } C = \frac{1}{2000^2 \times 20m} = 12.5\mu F$$

17. RLC 並聯諧振電路，電感抗等於電容抗，電感與電容虛功率相同

$$18. R = \frac{12.4}{20m} = 620 \times 10^0 = \text{藍紅黑黑}$$

19. $I = -\frac{2}{2+2} \times 2 + \frac{8}{2+2} + \frac{2}{2+2} \times 4 = 3A$
20. $E_S = 10 \times 2 = 20V; 0.02 = \frac{L}{2}; L = 40mH$
21. 垂直刻度為 $\frac{20}{4} = 5 V/DIV$ 、水平刻度為 $\frac{1}{4} = 0.5 ms/DIV$
22. $P = 3 \times 100 \times \frac{100}{5} \times \cos 53^\circ = 3600W$
23. $P = (\frac{100}{5})^2 \times 3 + (\frac{100}{10})^2 \times 6 = 1800W$
24. $I_1 = \frac{12 \cancel{+} 6}{6+(12 \cancel{-} 6)} \times 60 = 24A; I_2 = \frac{6 \cancel{-} 6}{12+(6 \cancel{+} 6)} \times 60 = 12A$
25. $R_{TH} = (6 \cancel{+} 12) + 4 = 8\Omega; V_{TH} = 60 \times 4 = 240V; P_{max} = \frac{240^2}{4 \times 8} = 1800W$
26. $D = \frac{3m}{5m} \times 100\% = 60\% \quad V_{av} = \frac{10 \times 3m}{5m} = 6V$
28. $I_{z(\min)} = \frac{V_s - 20}{1k} - \frac{20}{2k} = 2mA \quad V_{s(\min)} = 32V$ $P_{z(\max)} = I_{z(\max)} \times V_z \quad 320m = \left(\frac{V_s - 20}{1k} - \frac{20}{2k} \right) \times 20 \quad V_{s(\max)} = 46V$
30. $I_B = \frac{0 - 0.7 - (-12)}{200k} = 56.5\mu A \quad I_C = \beta I_B = 5.65mA \quad \rightarrow V_C = -5.65V$
31. $A_v = -\frac{100 \times (42k // 3k)}{1k} = -280$
33. $g_m = \frac{20m}{1 - 31} \left(1 - \frac{-1}{-3} \right) = 4.44mS$
34. $I_D = 0.5m (V_{GS} - 2)^2 = \frac{15 - 10.6}{2.2k} = 2mA \quad V_{GS} = (15 \times \frac{1M}{3M}) - (2m \times R_S) = 4 \quad \text{故 } R_S = 0.5k\Omega$
35. $A_v = \frac{V_o}{V_i} = \frac{-2.4mV_{gs} \times (2.2k // 10k)}{V_{gs}} = -4.33$
36. $A_v = \frac{V_o}{V_i} = \frac{-25mV_{gs} \times \frac{1}{30m} \times \frac{-30mV_{gs} \times 2.7k}{-V_{gs}}}{V_{gs}} = -67.5$
37. $Y = \overline{A + B} = \overline{A} \cdot \overline{B}$
38. $V_R = 10V \quad I_o = \frac{V_R}{R} \times \frac{1}{1 + \beta} \quad 1m = \frac{10}{R} \times \frac{1}{100} \quad \rightarrow R = 100\Omega$
39. $V_{o1} = -1m \times \frac{4 - (-4)}{1m - 0} = -8V \quad V_{o2} = -1m \times \frac{-4 - (4)}{2m - 1m} = 8V$
40. $V_o = +4 + (-2m \times 1k) + 4 = 6V$
41. $V_{UT} = 10 \times \frac{10k}{10k + 40k} = 2V \quad V_H = V_{UT} - V_{LT} = 4V$
42. 至少要三節 RC 相移電路組成
44. 哈特萊振盪器產生弦波信號
45. $f_o = 2f_i = 100Hz \quad \rightarrow T_o = \frac{1}{f_o} = 10mS$
46. AC 模式可隔絕 DC 信號

$$47. V_i = 1.5 \times 50 \text{mV} \quad V_o = 2.2 \times 1 \text{V} \quad \frac{V_o}{V_i} = \frac{-2.2 \times 1}{1.5 \times 50 \text{m}} = -29$$

$$48. I_C = \frac{20 - 16}{2 \text{k}} = 2 \text{mA} \quad I_E = \frac{2.04}{1 \text{k}} = 2.04 \text{mA} \quad \alpha = \frac{I_C}{I_E} \cong 0.98 \quad \beta = \frac{\alpha}{1 - \alpha} \cong 49$$

$$49. I_{B2} = \frac{2 - 0.7}{15 \text{k} + 66.3 \text{k}} = 16 \mu\text{A} \quad \text{負載線中點 } V_{CE} = \frac{1}{2} \times 12 = 6 \text{V} \quad V_C = V_{CE} + I_E R_E = 6 + 1.06 = 7.06 \text{V}$$

$$R_{C2} = \frac{12 - 7.06}{1.6 \text{m}} \cong 3.12 \text{k}\Omega$$

$$50. I_{B1} = \frac{2 - 0.7}{15 \text{k} + 260 \text{k}} = 4.7 \mu\text{A} \quad r_{\pi 1} = \frac{26 \text{m}}{4.7 \mu} \cong 5.53 \text{k}\Omega \quad Z_{in} = 90 \text{k} // 18 \text{k} // 5.53 \text{k} \cong 4 \text{k}\Omega$$