

## 100 學年四技二專第五次聯合模擬考試 電機電子群電機類 專業科目 (二) 詳解

100-5-03-5

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

### 第一部份：電工機械

1.  $Z_{eq1} = \frac{V_1}{I_1} = \frac{10}{10} = 1 \Omega$  ,  $R_{eq1} = \frac{P_{sc}}{I_1^2} = \frac{80}{10^2} = 0.8 \Omega$   
 $\therefore X_{eq1} = \sqrt{Z_{eq1}^2 - R_{eq1}^2} = 0.6 \Omega$
2.  $VR\% = P\% \times \cos\theta + Q\% \times \sin\theta$   
 $= \frac{10 \times 0.8}{200} \times 0.8 + \frac{10 \times 0.6}{200} \times 0.6 = 0.05$
3.  $Q_T = \sqrt{3}(900 - 780) = 208 \text{ VAR}$
6.  $X_c = \frac{3 \times 8 + 4 \times 3}{4} = 9 \Omega$  ,  $C_s = \frac{1}{2\pi \times 60 \times 9} = 295 \mu\text{F}$
8.  $V_{bc} = \sqrt{3} \times 200 = 346 \text{ V}$
9.  $\eta = \frac{P_o}{P_o + P_i + P_c}$   
 $= \frac{\frac{1}{2} \times 10 \text{ k}}{\frac{1}{2} \times 10 \text{ k} + 0.35 \text{ k} + 5^2 \times 50 + 25^2 \times 0.4} = 0.73$
14.  $F = 0.05 \times 2 \times 10 = 1 \text{ NT}$   
 根據佛萊明左手定則得知，方向為向下
16.  $X_s = 3 \times \frac{220 \times 200}{6 \text{ k}} \times \sin 30^\circ = 11 \Omega$
18.  $\theta = \frac{360^\circ}{4 \times 25} = 3.6^\circ$

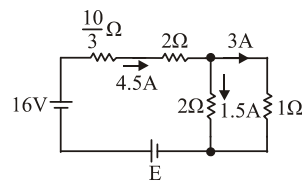
### 第二部份：電子學實習

19. 3 價元素所扮演的角色為受體
20.  $I = \frac{8-1}{1 \text{ k}} = 7 \text{ mA}$
21.  $V_{dc} = 110\sqrt{2} \times \frac{1}{10} \times 0.636 = 9.9 \text{ V}$
22. 正半週時：  $V_i > 5 \text{ V}$  ,  $V_{z1}$  穩壓  $5 \text{ V}$   
 負半週時：  $D_{Z2}$  off ,  $V_o = V_i$
24. 基極越厚， $\beta$  越小
25.  $A_1 < 1$
26.  $V_B = 22 \times \frac{9}{90+9} = 2 \text{ V} \Rightarrow V_E = 2 - 0.7 = 1.5 \text{ V}$   
 $I_E = \frac{1.5}{1.5 \text{ k}} = 1 \text{ mA} \Rightarrow r_e = \frac{25 \text{ mV}}{1 \text{ mA}} = 25 \Omega$

- $Z_b = (1+99) \times 25 = 2.5 \text{ k}\Omega$  ,  $A_v = \frac{-99i_b \times 9 \text{ k}}{100i_b \times 25} = -360$
27.  $A_{VT} = 60 \text{ dB} - 20 \text{ dB} = 40 \text{ dB} = 100$   
 $V_o = 10 \mu \times 100 = 1 \text{ mV}$
28. MOSFET 為電壓控制元件
29.  $g_m = 2 \text{ k}(V_{GS} - V_T) \Rightarrow 2 \text{ m} = 2 \times 0.5 \text{ m}(V_{GS} - 1)$   
 $V_{GS} = 3 \text{ V}$  ,  $I = 0.5 \text{ m}(3-1)^2 = 2 \text{ mA}$
30.  $A_v = \frac{V_o}{V_i} = \frac{g_m V_{gs} \times (10 \text{ k} // 10 \text{ k})}{V_{gs} + g_m V_{gs} \times (10 \text{ k} // 10 \text{ k})} \times \frac{10 \text{ k}}{10 \text{ k} + 5 \text{ k}}$   
 $= \frac{3}{1+3} \times \frac{2}{3} = \frac{1}{2}$
31.  $A_{vo} = \infty$
32. 當  $V_i = 2 \text{ V}$  時，輸出達飽和電壓  $-15 \text{ V}$   
 根據 KCL :  $\frac{2 - V_b}{2 \text{ k}} = \frac{V_b - (-15)}{18 \text{ k}}$   
 $20V_b = 6 \Rightarrow V_b = 0.3 \text{ V}$
33.  $V_{UT} = 15 \times \frac{1 \text{ k}}{1 \text{ k} + 1 \text{ k}} = 7.5 \text{ V}$   
 $V_{LT} = (-15) \times \frac{1 \text{ k}}{1 \text{ k} + 1 \text{ k}} = -7.5 \text{ V}$   
 $\therefore V_a = \pm 3 \times (-\frac{2 \text{ k}}{1 \text{ k}}) = \pm 6 \text{ V}$   
 $\therefore$  樞密特觸發電路沒有動作
34.  $\frac{R_3}{R_4} = 2 \Rightarrow R_4 = 5 \text{ k}\Omega$

### 第三部份：基本電學實習

36.  $4.5 = \frac{(16+E)-3}{\frac{10}{3} + 2} \Rightarrow E = 11 \text{ V}$



37.  $R_{TH} = 12 // 6 = 4 \Omega$  ,  $E_{TH} = (3 \times \frac{12}{12+6}) \times 6 + 8 = 20 \text{ V}$   
 $P_{max} = \frac{20^2}{4 \times 4} = 25 \text{ W}$

$$43. Z_T = \frac{50 \angle 30^\circ}{2 \angle 30^\circ} = 25 \angle 0^\circ, R' = \frac{10^2 // 20^2}{10} = 8 \Omega$$

$$X'_C = \frac{10^2 // 20^2}{20} = 4 \Omega, Z = 17 + j4$$

44. RLC 並聯諧振阻抗為最大，電路電流最小

$$45. X'_L = \frac{8^2 + 8^2}{8} = 16 \Omega, f_o = f \sqrt{\frac{X_C}{X_L}} = 60 \times \sqrt{\frac{4}{16}} = 30 \text{ Hz}$$

$$46. Q = 6 \text{ k}(\tan \theta_1 - \tan \theta_2) = 6 \text{ k} \left( \frac{0.8}{0.6} - \frac{0.6}{0.8} \right) = 3.5 \text{ kVAR}$$

47. 電流線圈匝數少、線徑粗