此科考試可攜帶簡易型計算機

一、　選擇題共 5 題，每題 4 分(20％)

(一)　RLC 串聯諧振時，下列何者正確？(A)阻抗最大；(B)導納最小；(C) 電流最小；(D)阻抗最小。

(二)　下列敘述何者正確？(A)理想電壓表其內阻應為零；(B)理想電流源其內阻應為零；(C)理想電壓源其內阻應為零；(D)理想電流表其內阻應為無窮大。

(三)　有一導線其電阻值為 50Ω，現將其拉長(導線不斷裂)，使其線徑為原來的一半，則其電阻值變為多少？　(A)50Ω；(B)100Ω；(C)400Ω；(D)800Ω。

(四)　下列何者不是理想運算放大器的特性？(A)電壓增益無限大；(B)輸入阻抗無限大；(C)共模拒斥比(CMRR)無限大；(D)輸出阻抗無限大。

(五)　下列運算放大器應用電路，何者沒有應用到負回授？(A)反向放大器；　(B)比較器；(C)積分器；(D)非反向加法器。

二、　如圖 1 所示電路中能供輸最大功率給 a、b 兩端，試求(a) R 值；(b)供輸給 R 的最大功率。(c)100V 電源供輸多少功率給電路？(d)相依電壓源供輸多少功率給電路？(e)這兩電壓源所產生的總功率當中，有多少百分率是給 R？(15％)
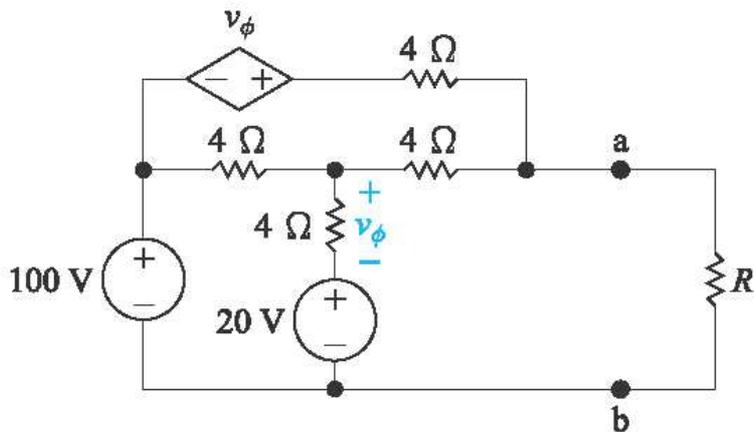

圖 1

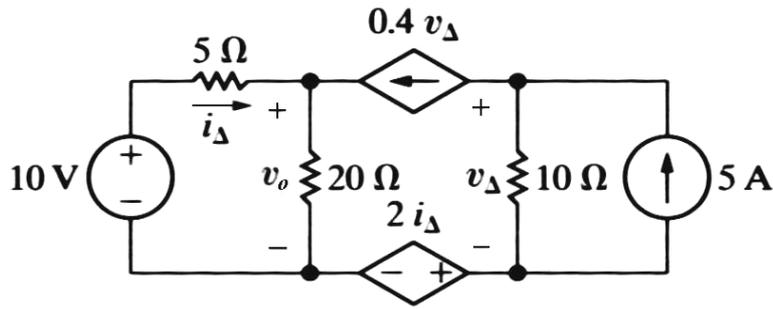三、 利用重疊定理，試求圖 2 所示電路中的電壓 v_o ？(15%)

圖 2

四. The current i_o in the circuit in Fig. 3 is 2A.

b) Find the power dissipated in each resistor. （5%）

c) Verify that the total power dissipated in the circuit equals the power developed by the 180 V source（5%）
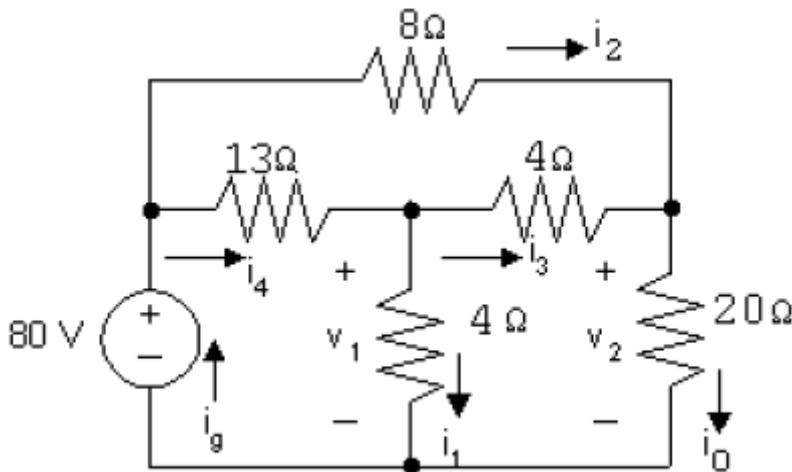

Fig.3

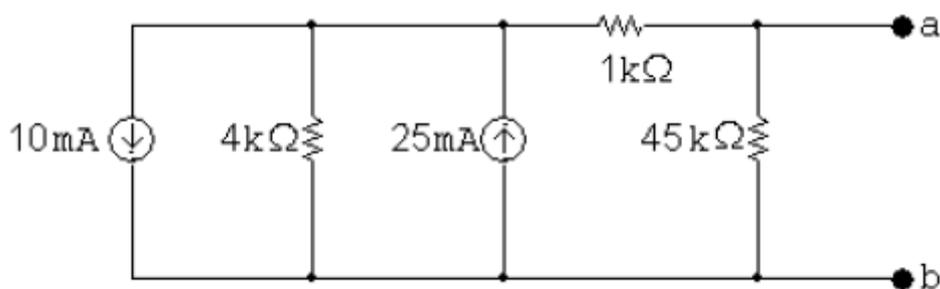五. Find the Thevenin equivalent with respect to a,b for the circuit in Fig. 4.

（10%）

Fig. 4

六. The OP amp in the adder-subtracter circuit shown in Fig. 5 is ideal.

a) Find v_O when v_a=0.5 V, v_b=0.3 V, v_c =0.6 V, and v_d=1.25 V. （5%）

b) If v_a, v_b, and v_d are held constant, what values of v_c will not saturate the op amp? （5%）
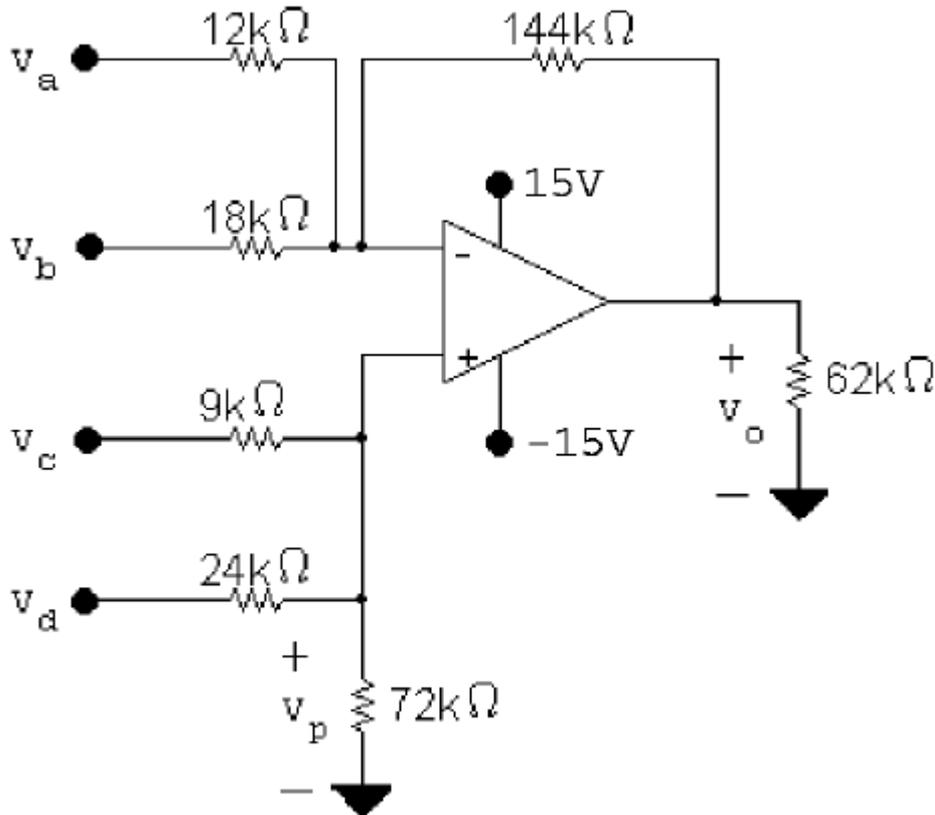

Fig. 5

七. When a car has a dead battery, it can often be started by connecting the battery from another car across its terminals. The positive terminals are connected together as are the negative terminals. The connection is illustrated in Fig.6. Assume the current i in Fig. 6 is measured and found to be 40 A.

a) Which car has the dead battery? （5%）

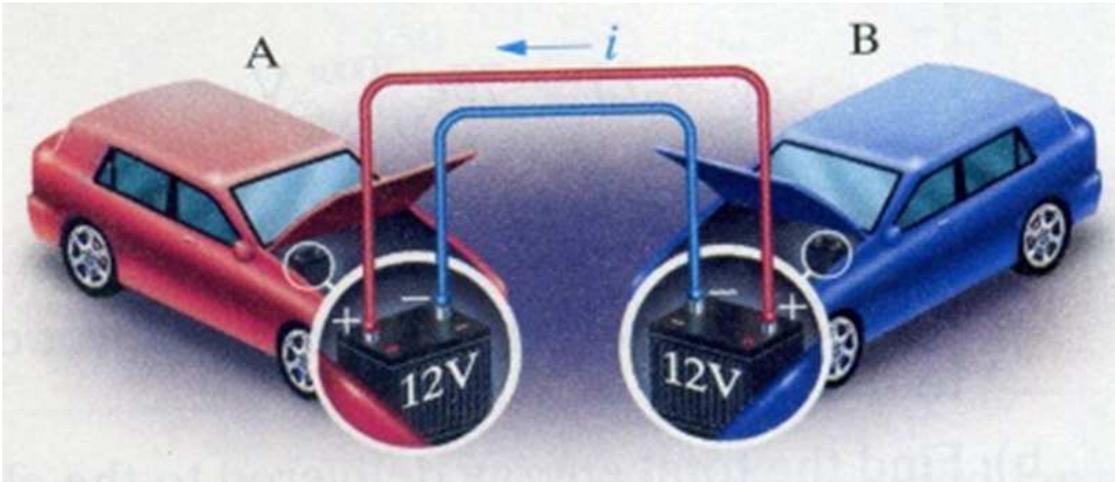b) If this connection is maintained for 1.5 min, how much energy is transferred to the dead battery? （5%）

Fig.6

八.

a) Find the average power delivered by the sinusoidal current source in the circuit of Fig. 7. （5%）

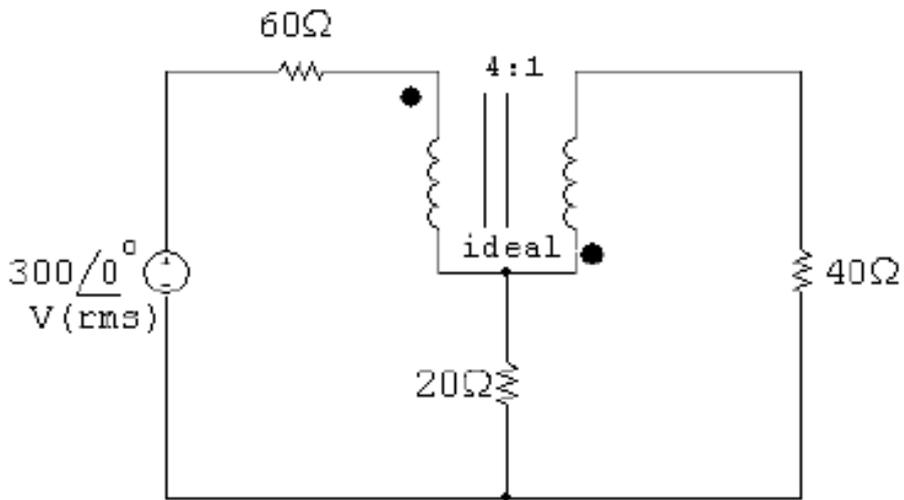b) Find the average power delivered to the 20 Ω resistor. （5%）

Fig.7