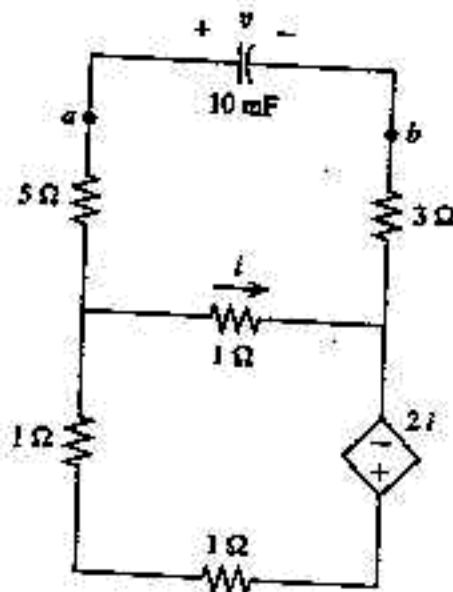


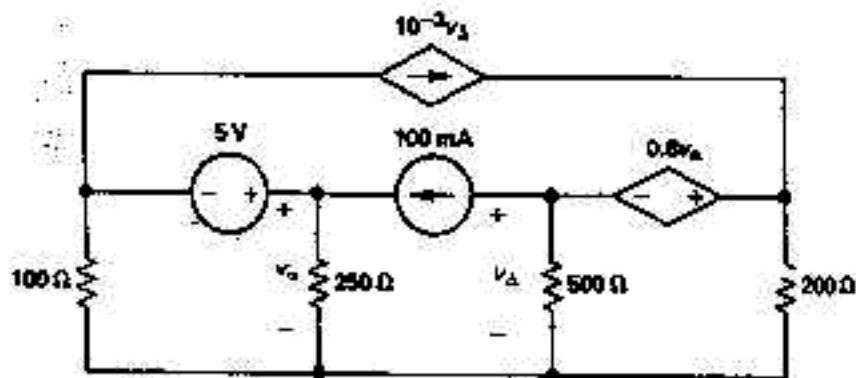
八十八學年度 電機工程學系(所) 甲 組碩士班研究生招生考試

科目 電路學 科號 4402 共 2 頁第 1 頁 \*請在試卷【答案卷】內作答

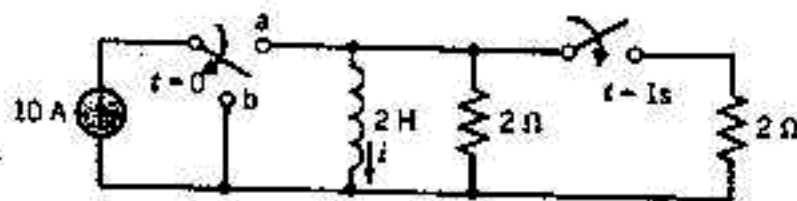
1. Find the equivalent resistance of the circuit below a-b; and  $v(t)$  for  $t > -1$  if  $v(-1) = 20V$ . (10%)



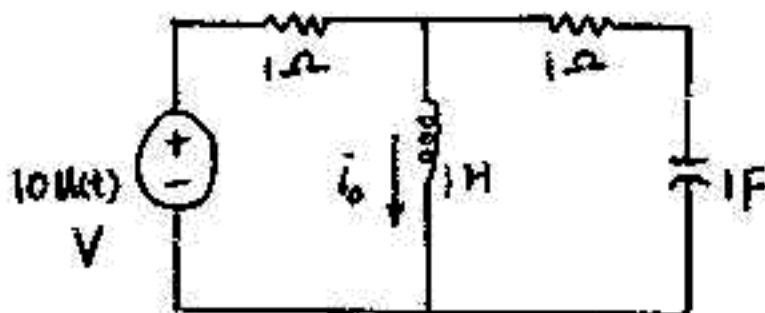
2. Find the power consumed in this circuit. (10%)



3. The first switch moves from a to b at  $t=0$  and the second switch closes at  $t=1$  second. Find the current  $i(t)$  for  $t \geq 0$ . (15%) Before  $t=0$ , the circuit has reached steady state.



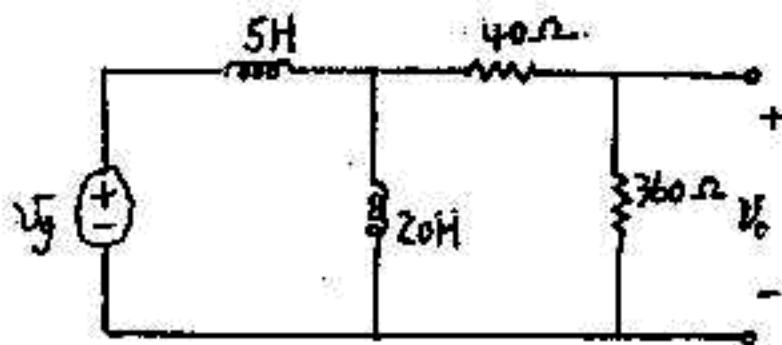
4. Assume that there is no initial energy stored in the following circuit. Please use node-voltage method to find  $i_o$ . (10%)



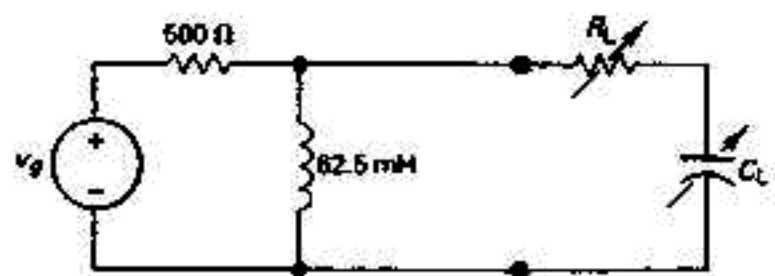
八十八學年度 電機工程學系(庚) 甲 組碩士班研究生招生考試

科目 電路學 科號 4402 共 2 頁第 2 頁 \*請在試卷【答案卷】內作答

5. What is the order of a low-pass Butterworth filter that has a cutoff frequency of 2 kHz and a gain of at least -30 dB at 7 kHz? (10%) And what is the actual gain at 7 kHz? (5%)
6. Use the Fourier transform method to calculate  $v_o$  in the following circuit with  $v_s = 125 \cos 75t$  V. (10%)



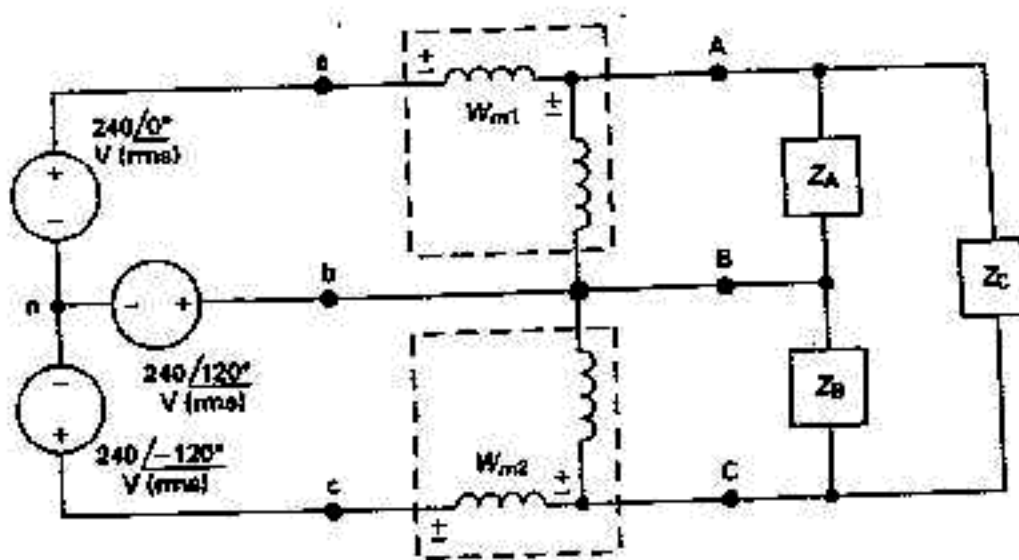
6. The peak amplitude of the sinusoidal voltage source in the circuit shown in the right is  $100\sqrt{2}$  V, and its period is  $250\pi \mu\text{s}$ . The load resistor can be varied from 0 to 200  $\Omega$ , and the load capacitor can be varied from 1 to 4  $\mu\text{F}$ . Determine the settings of  $R_L$  and  $C_L$  that will result in the most average power being transferred to  $R_L$ .



(15%)

7. Find the reading of each wattmeter in the circuit shown below, if  $Z_A = 20 \angle 30^\circ \Omega$ ,  $Z_B = 60 \angle 0^\circ \Omega$ , and  $Z_C = 40 \angle -30^\circ \Omega$ .

(15%)



Assume  $W_{m1}$  and  $W_{m2}$  are ideal wattmeters.