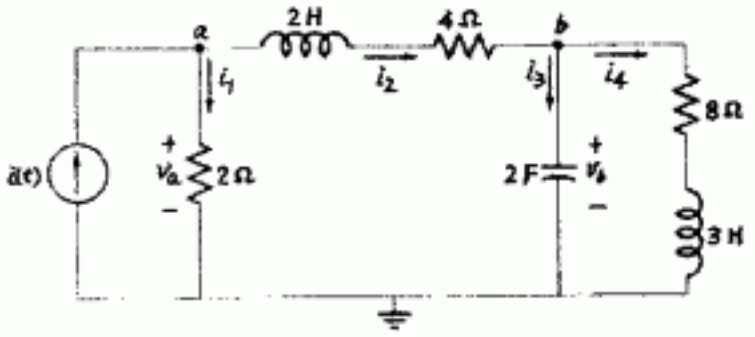
國 立 清 華 大 學 命 題 紙

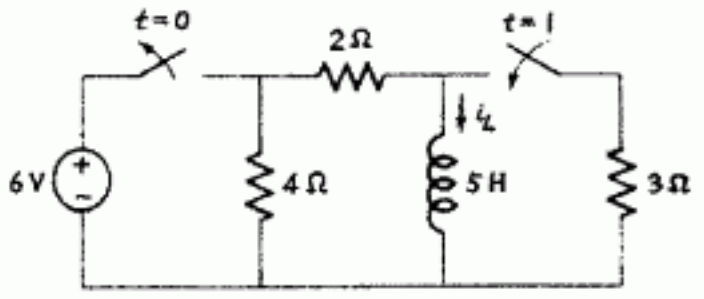
九十一學年度 電机工程學 系(所) 甲 組碩士班研究生招生考試

科目 電 路 學 科號 2304 共 3 頁第 1 頁 *請在試卷【答案卷】內作答

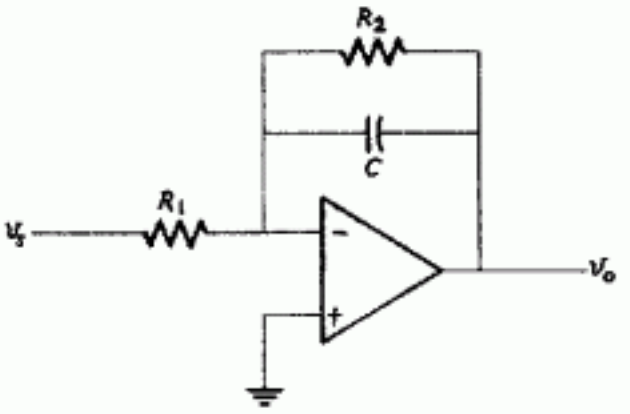
1. Assume that all voltages and currents in the following circuit are zero-valued before $t = 0$. Please find the expression of relation between $i(t)$ and $v_a(t)$. (10%)



2. In the following circuit, please find the current $i_L(t)$ for all t. (Note: The circuit is in steady state before $t = 0$.) (10%)



3. Find zero-state response of a lossy integrator to the input signal $v_s(t) = V_a[u(t) - u(t - t_a)]$. (10%)



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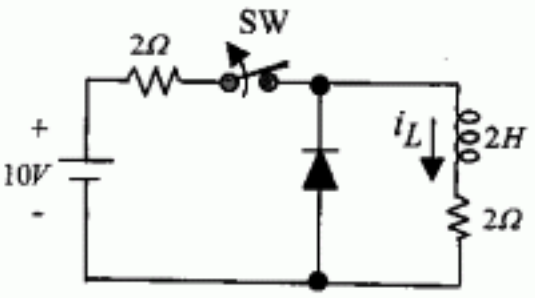
4. (15%)

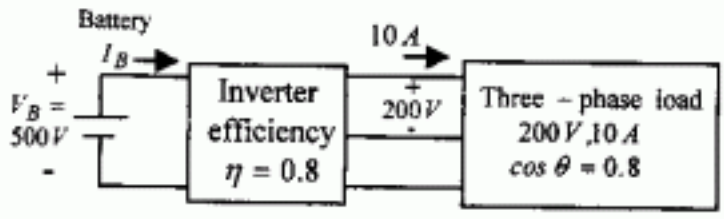
(1) Suppose that the diode is ideal and the switch SW is initially closed. Find the steady-state value of inductor current.

(2) The switch is opened at $t=0$, find the inductor current $i_L(t), t \geq 0$.



5. (20%)

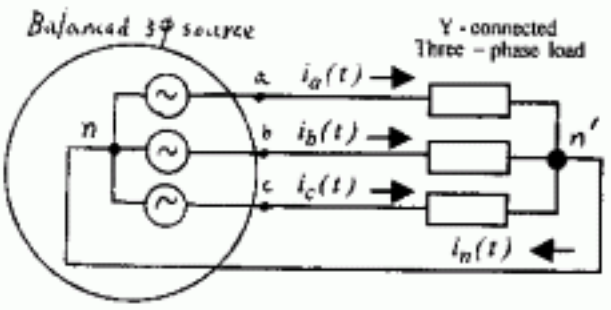
(1) A three-phase load is powered by an inverter (DC-to-AC converter) as shown. If the power of three-phase load is $200V, 10A, \cos\theta = 0.8$, and the efficiency of the inverter is 0.8. Find: (a) the real power and reactive power of the load; (b) the battery current I_B.



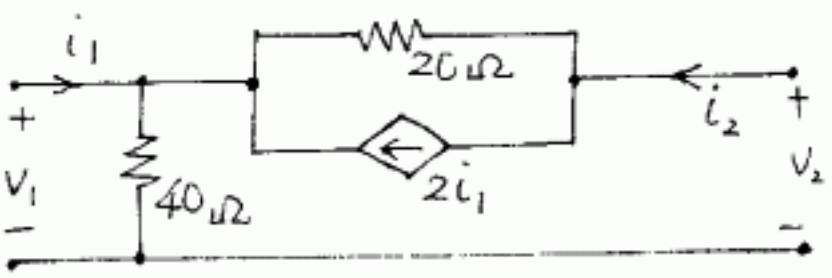
(2) Three identical nonlinear loads are connected in Y as shown and draw power from a three-phase AC source. If the line current of line a is:

$$i_a(t) = 10\sin(377t) + 5\sin(3\times377t) + 3\sin(5\times377t)$$

Find the currents $i_b(t), i_c(t)$ and $i_n(t)$.



6. Find the hybrid parameter, [h], of the following circuit. (15%)



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7. The following circuit has been under steady state for a long time. At t=0, the switch, S, is open; Find v(t) for t greater and equal to zero. (20%)