Final Examination

Notice: Please **turn off any types of handheld devices**, and leave them far from reach. Use only standalone calculators for calculation if it is needed. The examination takes **100 minutes**.只需繳回答案紙，題目紙請同學保留。

1. (11%) Derive a second-order differential equation that shows how the output $v_2(t)$ of the circuit shown in Fig. 1 is related to its input $v_s(t)$.

2. (11%) Find $v_c(t)$ for $t > 0$ for the circuit shown in Fig. 2.

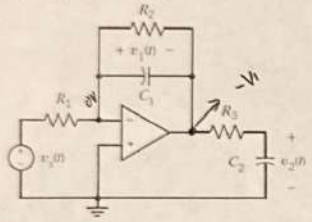

Fig. 1

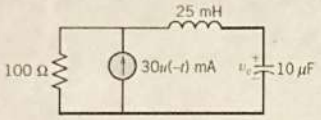

Fig. 2

3. (11%) Find $i_L(t)$ when $t > 0$ for the circuit of Fig. 3. Assume a steady-state condition exists before $t = 0^-$.

4. (11%) The circuit shown in Fig. 4 is at steady state before the switch closes. Determine the capacitor voltage $v(t)$, a complete response, for $t > 0$.

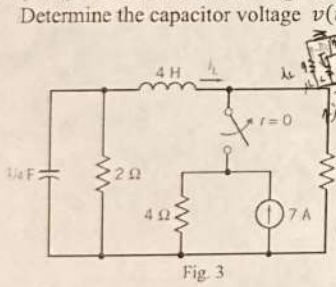

Fig. 3

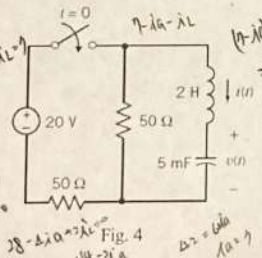

Fig. 4

5. (10%) Determine the output voltage $v_a(t)$ for the circuit shown in Fig. 5.

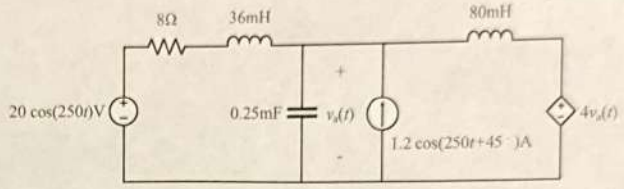

Fig. 5

6. (11%) Determine the output voltage $v_o(t)$ when the circuit shown in Fig. 6 is at steady state and its input is $v_s(t) = 25\cos(100t - 15^\circ)$V.

7. (11%) Find the Thevenin equivalent circuit for the circuit in Fig. 7.

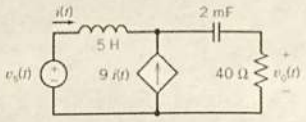

Fig. 6

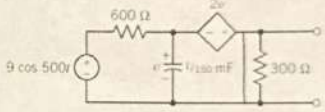

Fig. 7

8. (11%) Determine the output voltage $v_o(t)$ of the circuit shown in Fig. 8 when its input is: $v_s(t) = 1.2\cos(400t + 20^\circ)$V.

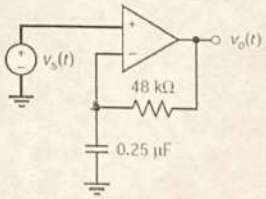

Fig. 8

9. (13%) Determine the complete response of $i_o(t)$ in the circuit shown in Fig. 9. Assume the switch will open at $t = 0$. Your solution has to show both the cases: $t \leq 0$ and $t > 0$.

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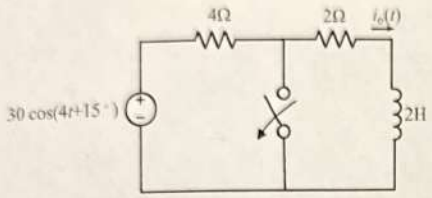

Fig.9