Assignment -3

Basic Electronics (BE): ECE113

Winter-2023

Release: 9-May-2023 (7:00 PM) **Submission:** 16-May-2023 (7:00 PM)

Instructions

- **Institute Plagiarism Policy Applicable.** This will be subjected to strict plagiarism check.
- This assignment should be attempted individually.
- A maximum point for this assignment is 40. All questions are compulsory.
- **File Submission:** Only a *.pdf* file are acceptable, which you have to submit on Google Classroom. Use A4 size sheets only (ruled or blank) to solve your assignment and scan it to create a *.pdf* file. Attempt each question on a different sheet. Do not start a new question at the back of the previous one. Do not forget to mention Page Number (bottom canter) clearly on each sheet of the assignment. Submit a *.pdf* file named *A1_ RollNo.pdf* (e.g., *A1_PhD22100.pdf*), which containing the quality scan copy of your solved assignment.
- **Submission Policy:** Turn-in your submission as early as possible to avoid late submissions. In case of multiple submissions, the latest submission will be evaluated. Expect **No Extensions**. Late submissions will not be evaluated and hence will be awarded zero marks strictly.
- **Clarifications:** Symbols have their usual meaning. Assume the missing information & mention it in the report. Use Google Classroom for any queries. In order to keep it fair for all, no email queries will be entertained.
- There could be multiple ways to approach a question. Please justify your answers. Questions without justification will get zero marks.

Question-1: In the given following circuit (Figure-1), the switch is opened initially and it is closed at time t=0 sec then find the values of following things- **(1)** $I_1(0^+)$ **(2)** $I_2(0^+)$ **(3)** $I_1(\infty)$ **(4)** $I_2(\infty)$ **(5)** $V_C(0^+)$ **(6)** $[d/dt]I_1(0^+)$ **(7)** $[d/dt]I_2(0^+)$ **(8)** $[d^2/dt^2]I_1(0^+)$ **(9)** $[d^2/dt^2]I_2(0^+)$. **[5 Points]**

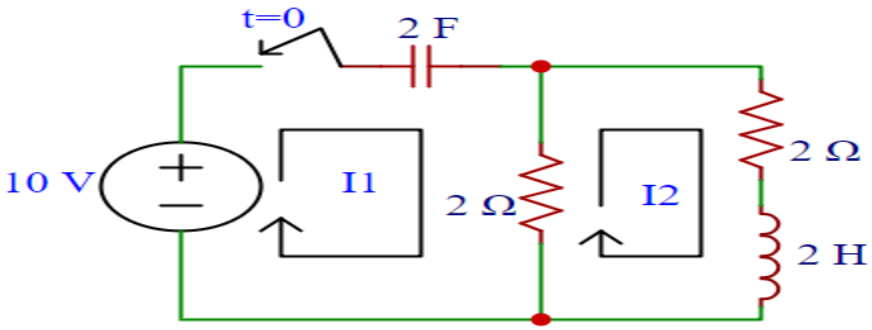

Figure 1

Question-2: In the given following circuit (Figure-2), the initial voltage and current across capacitor and inductor are zero. The switch is closed at time t=0 sec and remain with that position then find out the value of following things- **(1)** $I_C(0^+)$ **(2)** $V_L(0^+)$ **(3)** $[d/dt]I_L(0^+)$ **(4)** $[d/dt]V_C(0^+)$. **[5 Points]**

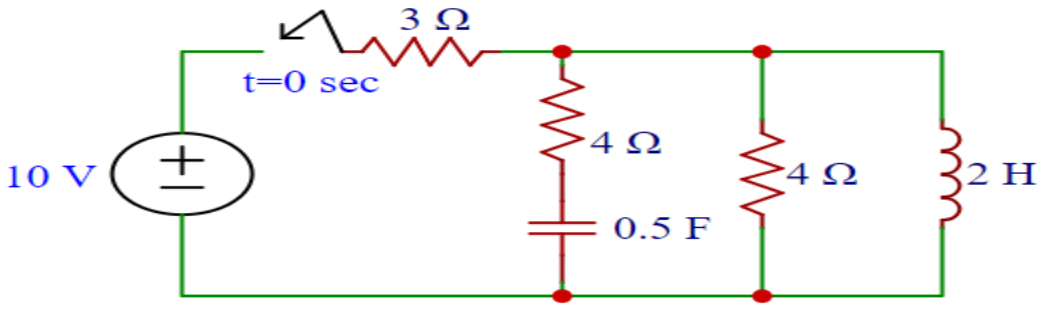

Figure 2

Question-3: In the given following circuit (Figure-3), the input voltage is given by $\mathbf{V_i(t) = [e^{-j200t} + 2e^{-j(500t-\pi/2)} + e^{j200t} - 2e^{j(500t+\pi/2)}]}$ **volt** then find out the value of $\mathbf{V_o(t)}$ (in polar form). **[5 Points]**

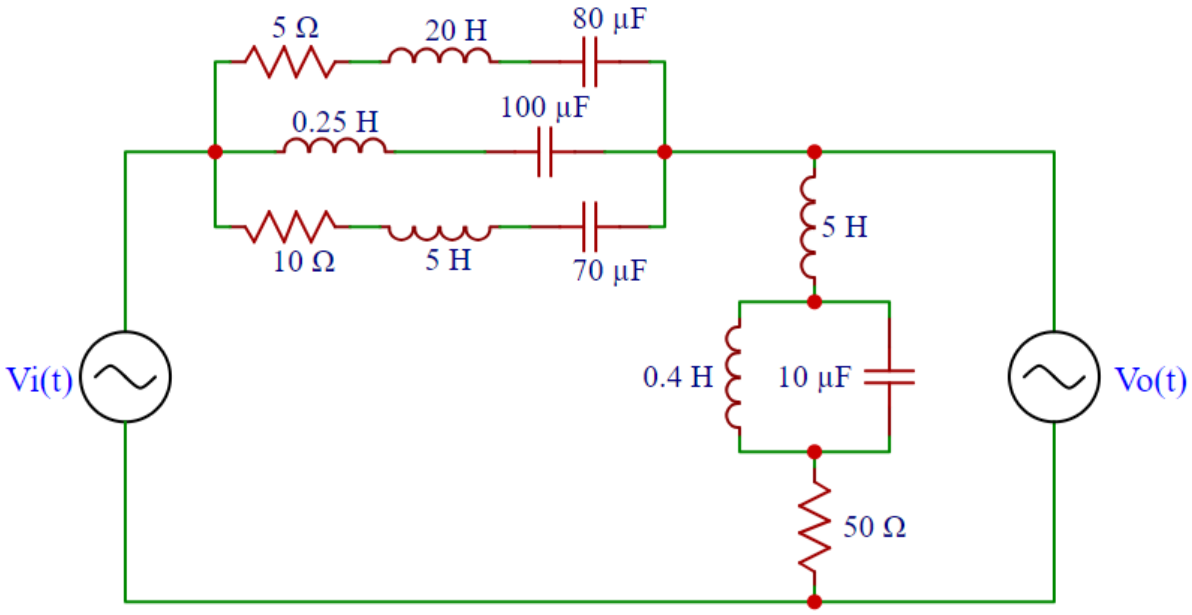

Figure 3

Question-4: In the given following circuit (Figure-4), it is given that the current (**I**) flowing through 100 Ω resistor is zero. Then the find out the value of unknown capacitor 'C' (in μF), where all the symbol have their usual meaning.

[5 Points]

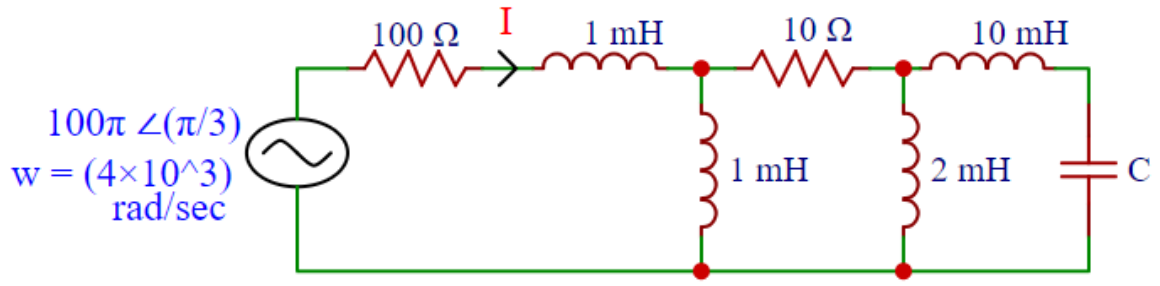

Figure 4

Question-5: In the given following circuit (Figure-5), if the value of source voltage V_S = 80 $\angle 60^0$ volt then find out the of Thevenin's equivalent voltage (V_{th}), Norton equivalent current (I_N) and Thevenin's equivalent resistor (R_{th}) as seen by the load inductive reactance X_0 = 6 Ω. **[5 Points]**

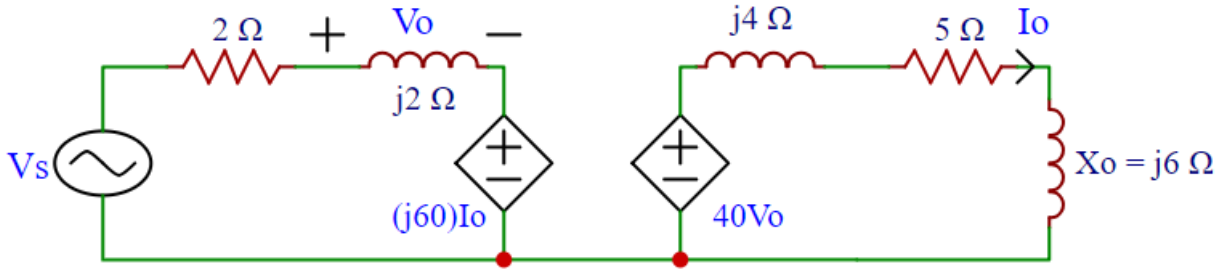

Figure 5

Question-6: In the given following circuit (Figure-6), if value of V_a = 100$\angle 60^0$ volt, V_b = 80 $\angle 40^0$ volt and V_c = 40 $\angle 20^0$ volt then find the value of load impedance Z_L (=R_L+jX_L), so that maximum power dissipation in the load impedance occurs. **[2.5 points]**

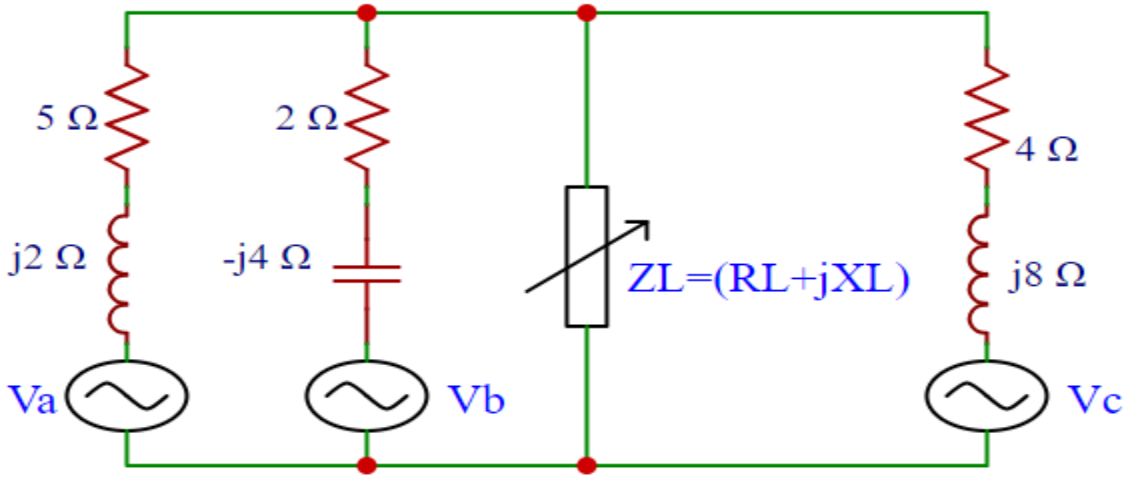

Figure 6

Question-7: In the given following circuit (Figure-7), find the value of resonance frequency (f_0) (in Hz) of the circuit- **[5 Points]**

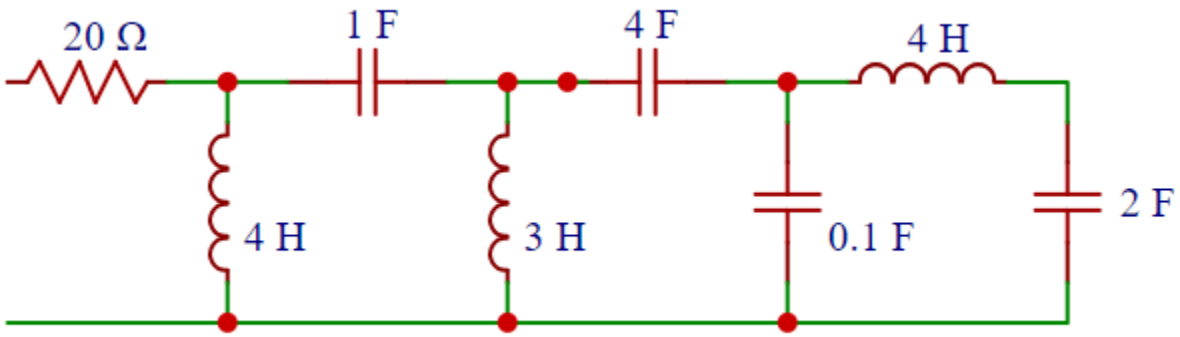

Figure 7

Question-8: In the given following circuit (Figure-8), if V_c = 40 Sin (1000t+60^0) volt and V_d = 60 Sin (1000t-40^0) volt then find out the value of- (a) V_a and V_b by using nodal analysis only (b) I_a, I_b and I_c by using mesh analysis only. Represent the answers in Polar form, Time domain form & rectangular form. **[7.5 Points]**

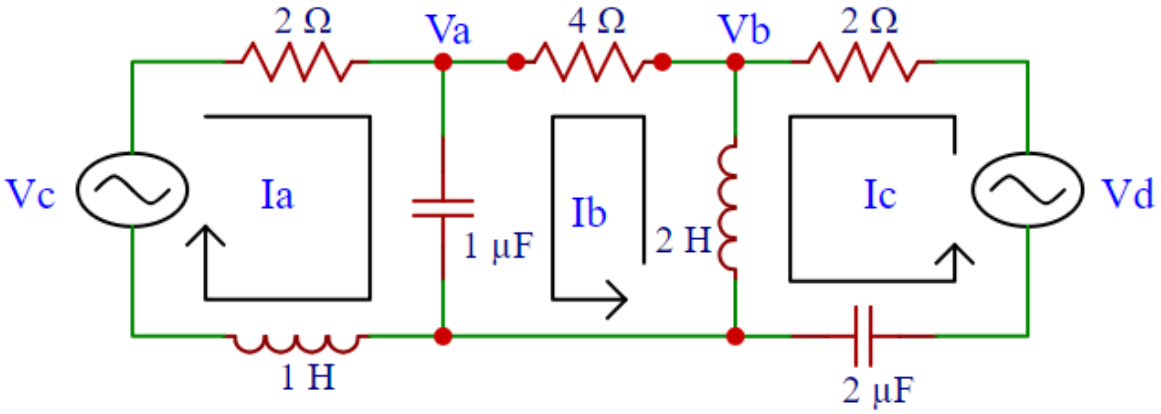

Figure 8