(3)

B.Sc. in CSE, 2nd Semester

Date: 08 May 2023

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)

ORGANISATION OF ISLAMIC COOPERATION (OIC)

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

Semester Final Examination
Course No.: PHY 4241
Course Title: Physics II

Summer Semester: 2021 - 2022
Full Marks: 150
Time: 3 hrs.

There are **06 (six)** questions. Answer all **06 (six)** questions. The symbols have their usual meanings. Marks of each question and corresponding CO and PO are written in brackets.

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1. i. Find I_s in the circuit in Fig. 1(a). Here, $V_0 = 8\angle 30°$. **8 (CO2) (PO1, PO2)**

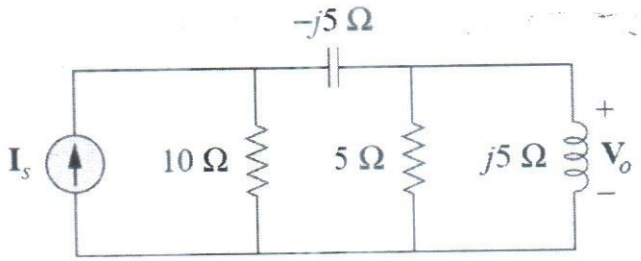

Fig. 1(a)

ii. Find V_s in the circuit in Fig. 1(b). Here, $I_0 = 2\angle 0°$. **8 (CO2) (PO1, PO2)**

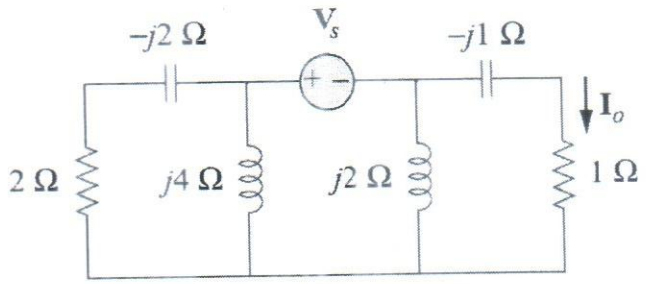

Fig. 1(b)

iii. For the circuit in Fig. 1(c), find Z_{eq}. **9 (CO2) (PO1, PO2)**

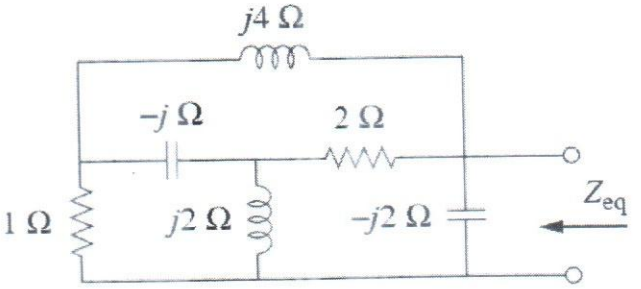

Fig. 1(c)

2. i. Find V_0 for the circuit in Fig. 2(a) using Nodal analysis. **12 (CO2) (PO1, PO2)**

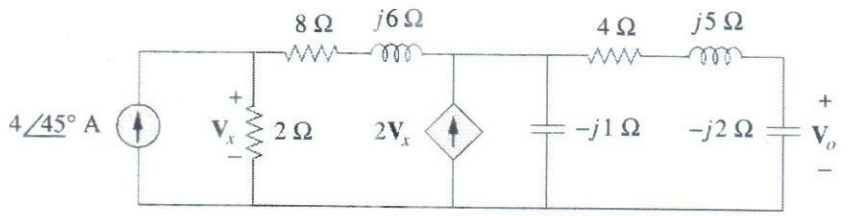

Fig. 2(a)

ii. Find I_0 for the circuit in Fig. 2(b) using Mesh analysis. **13 (CO2) (PO1, PO2)**

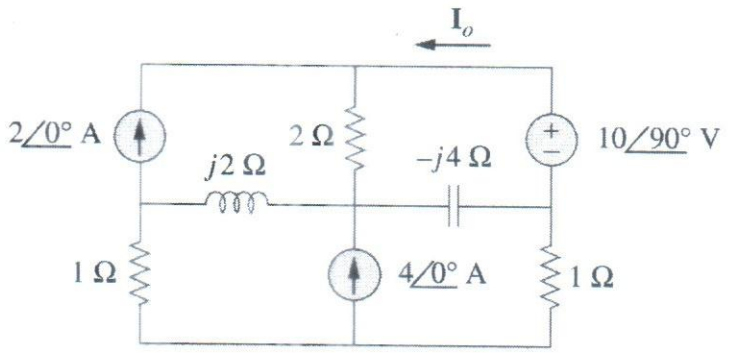

Fig. 2(b)

3. i. Find i_0 for the circuit in Fig. 3(a). **12 (CO2) (PO1, PO2)**

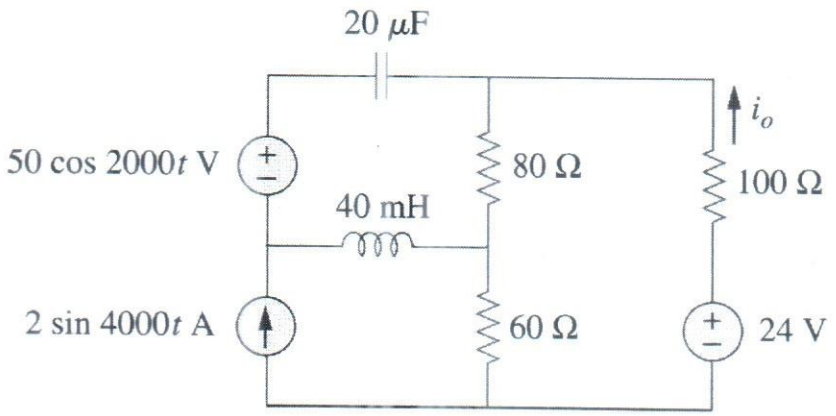

Fig. 3(a)

ii. Find the Thevenin equivalent at terminal a-b in the circuit of Fig. 3(b). **13 (CO2) (PO1, PO2)**

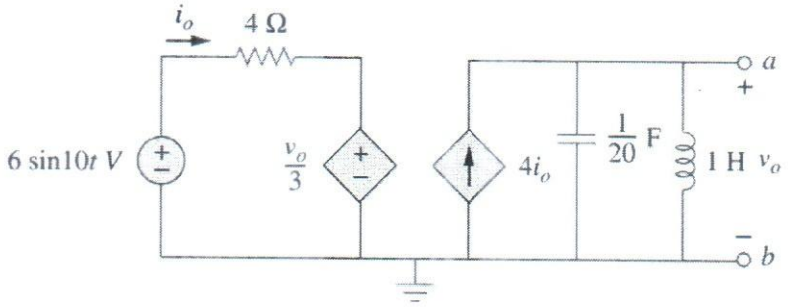

Fig. 3(b)

4. i. Find C_{eq} for the circuit in Fig. 4(a). All capacitors are 4 μF. **8 (CO2) (PO1, PO2)**

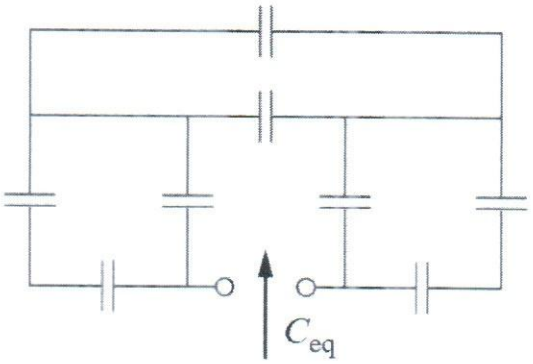

Fig. 4(a)

ii. Find voltages across the capacitors for the circuit in Fig. 4(b). **8 (CO2) (PO1, PO2)**

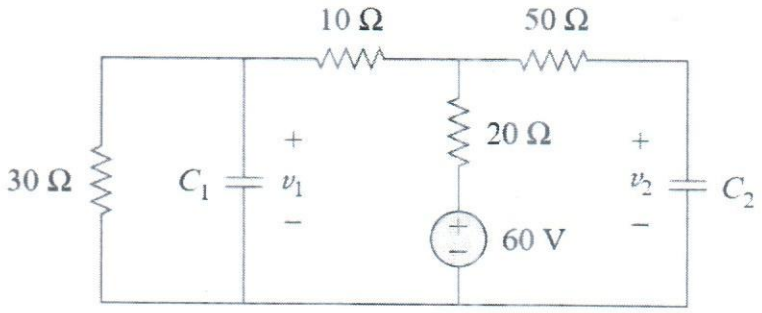

Fig. 4(b)

iii. For the circuit in Fig. 4(c), find L_{eq}, $i_1(t)$, $i_2(t)$, $v_0(t)$, and energy stored in the 20-mH inductor at 1s. Here, $i_s(t) = 3e^{-t}mA$. **9 (CO2) (PO1, PO2)**

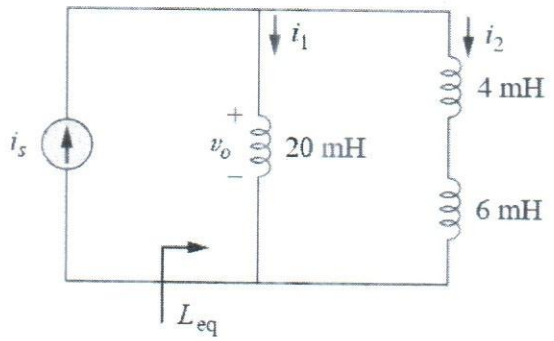

Fig. 4(c)

5. i. Determine the resonant frequency for the circuit in Fig. 5(a). **8 (CO2) (PO1, PO2)**

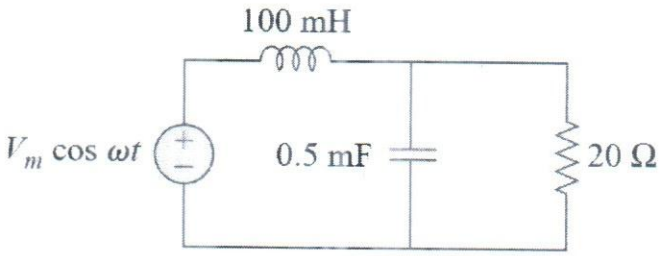

Fig. 5(a)

ii. Determine $w_0, Q, and\ B$ for the circuit in Fig. 5(b). Here, $v_o = 20\ cos\omega t$. **8 (CO2) (PO1, PO2)**

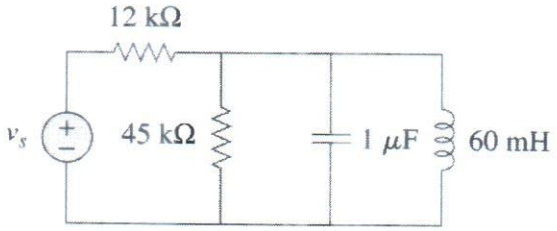

Fig. 5(b)

iii. Find the transfer function for the circuit in Fig. 5(c) and determine what type of filter it represents. **9 (CO2) (PO1, PO2)**

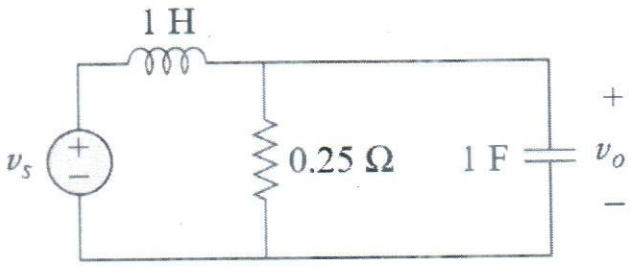

Fig. 5(c)

6. i. Design a BPF using a series RLC network that has a lower cut-off frequency of 20.1 KHz and an upper cut-off frequency of 20.3 KHz. Take R=20KΩ. Determine L, C and Q. **8 (CO2) (PO1, PO2)**

ii. Determine the load impedance that maximizes the average power drawn from the circuit in Fig. 6(b). Calculate the maximum average power. **8 (CO2) (PO1, PO2)**

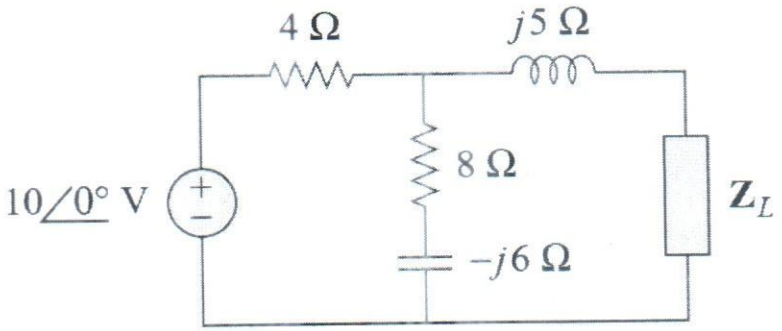

Fig. 6(b)

iii. Explain the concept of power flow in ac circuit and the significance of power factor. Draw the power triangle and explain complex power, real power and reactive power. **9 (CO2) (PO1, PO2)**