Department of Electronics and Communication Engineering

B. Tech First Semester End Semester Examinations – December 2024

EC1003E INTRODUCTION TO ELECTRONICS

Exam Date: 09-Dec-2024, 9.30 AM to 12.30 PM

Duration: 3 Hours

Max. Marks: 40

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1. Obtain the equivalent resistance $R_{a\text{-}b}$. **(2 M)**

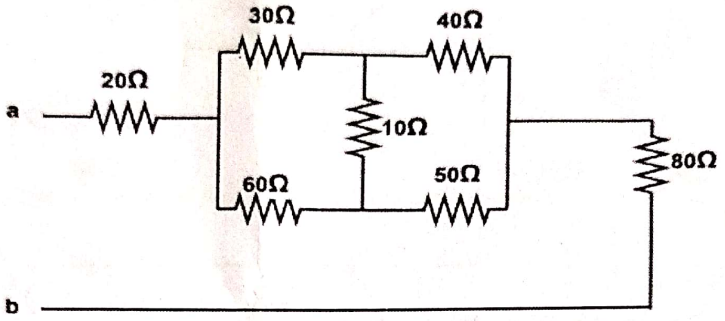

Figure 1

2. Find the equivalent resistance between a and b ($R_{a\text{-}b}$) for the network shown in Fig. 2 using star-delta transformation. Assume all resistors in Fig. 2 are equal to 1k Ω. **(3 M)**

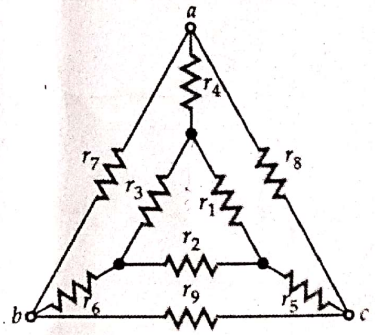

Figure 2

3. Find $\mathbf{V_L}$ in the circuit using the superposition theorem. **(3 M)**

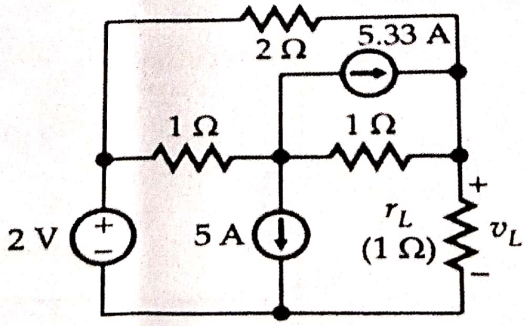

Figure 3

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4. Determine the RMS value for the waveform shown in the Fig 4. **(2 M)**

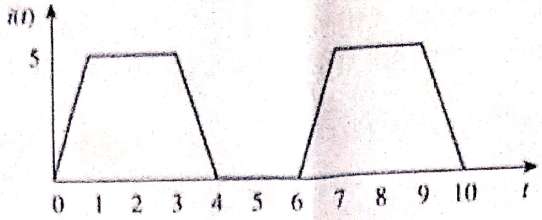

Figure 4

5. Find the currents I_1, I_2 and I_3 in the circuit shown in Fig. 5. **(4 M)**

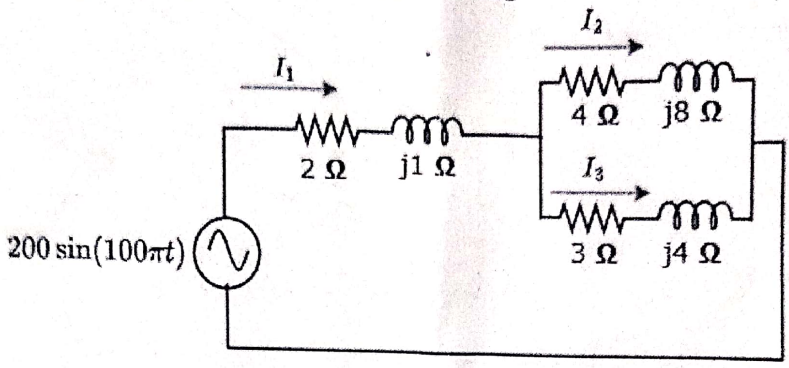

Figure 5

6. Find the Thevenin and Norton equivalent circuits of the following network across **a-b** terminals. **(4 M)**

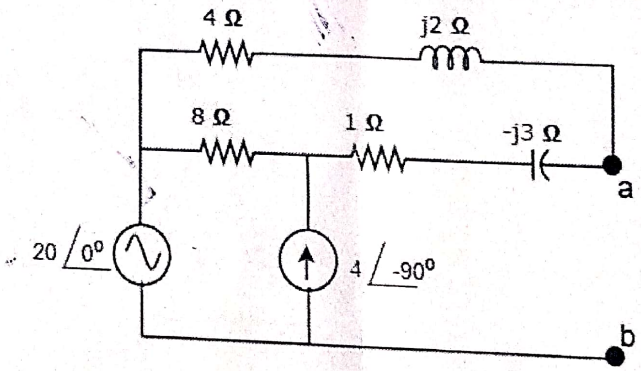

Figure 6

7. Find the load impedance Z_L that maximizes the average power drawn from the circuit shown in Fig. What is the maximum average power? **(3 M)**

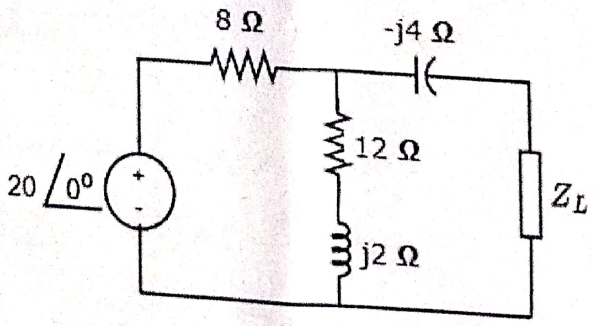

Figure 7

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(2 M)

8. The voltage across a load is $v(t) = 40\cos(\omega t + 10°)$ V and the current through the load in the direction of voltage drop is $i(t) = 1.5\sin(\omega t + 40°)$ A. Find the complex power, apparent power, real power, reactive power, power factor, and the load Impedance. **(3 M)**

9. Find the output voltage V_0 in the circuit shown in Fig. 8. Consider the Op Amp as an ideal. **(3 M)**

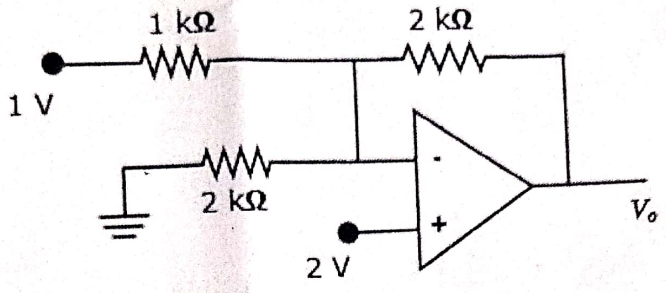

Figure 8

10. Sketch the output $V_o(t)$, and calculate the time, t, at which $V_o(t)$ becomes 20mV. **(3 M)**

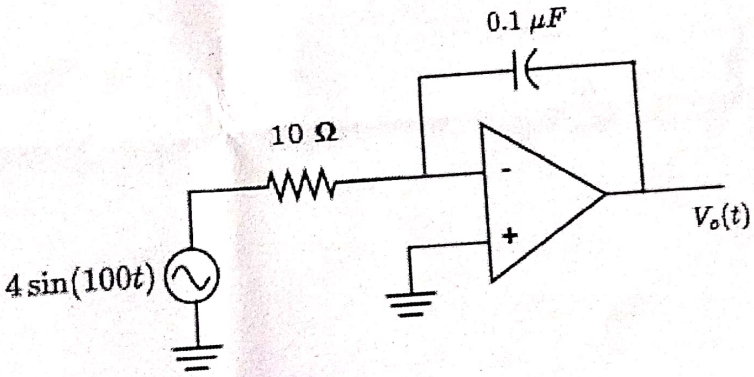

Figure 9

11. Sketch the output voltage $V_o(t)$ for the circuit shown in Fig. 10 **(2 M)**

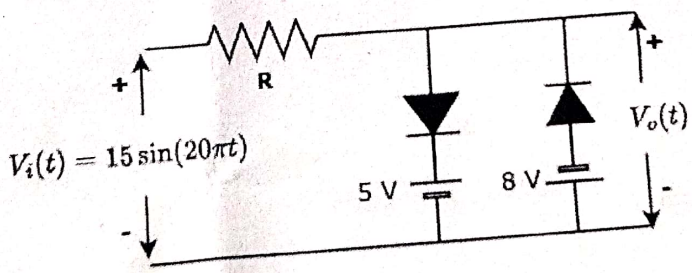

Figure 10

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12. Sketch the output voltage $V_o(t)$ for the circuit shown in Fig. 11 and find the time constant. **(3 M)**

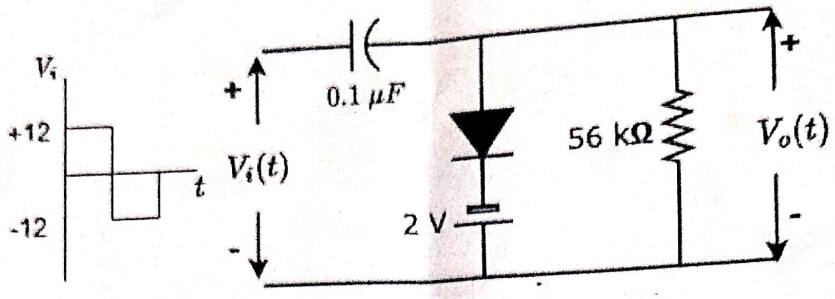

Figure 11

13. Plot the input and output characteristics of the common emitter configuration of BJT and derive the relationship between current gains α and β. **(3 M)**

14. Find the currents I_B, I_C, I_E, and the voltage V_{CE} of the circuit shown in Fig. 12. Consider β = 100. **(2M)**

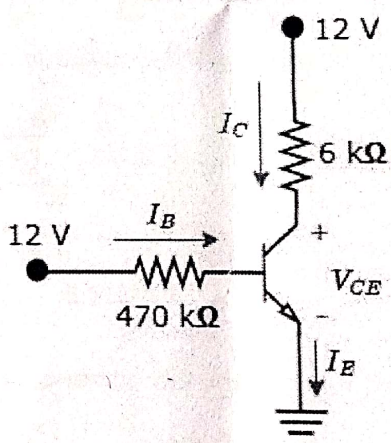

Figure 12

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