F/E/TX

Reg. No:

VIT®
Vellore Institute of Technology

Final Assessment Test – May 2024

Course: BECE203L - Circuit Theory
Class NBR(s):0552 / 0554 / 0556 / 0558 / 0560
Time: Three Hours

Slot: A1+TA1+TAA1
Max. Marks: 100

- KEEPING MOBILE PHONE/ELECTRONIC DEVICES EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE
- DON'T WRITE ANYTHING ON THE QUESTION PAPER

Answer ALL Questions
(10 X 10 = 100 Marks)

1. Using nodal analysis, find the voltage at nodes 1 and 2 for the circuit shown in Figure 1.

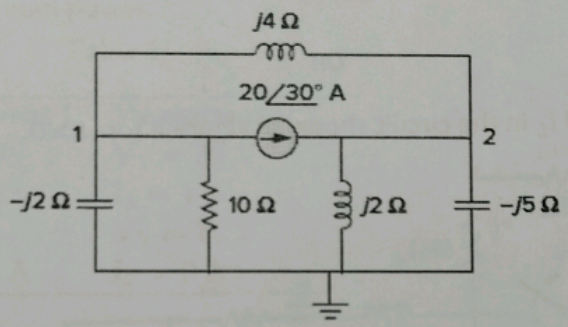


Figure 1

2. Find the current through the 5Ω resistor in the network of Figure 2 using Thevenin's theorem.

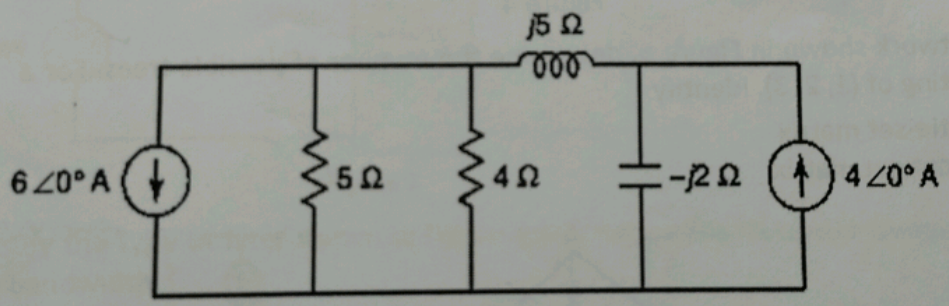


Figure 2

3.(a) Find an expression for $v_c(t)$ valid for t > 0 in the circuit of Figure 3.

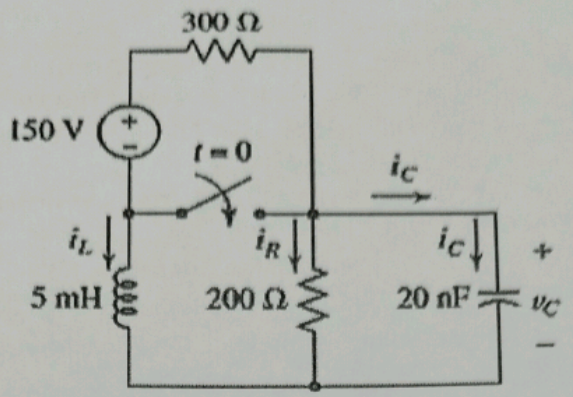


Figure 3

OR

3.(b) Determine both i_1 and i_L in the circuit shown in Figure 4 for $t > 0$.

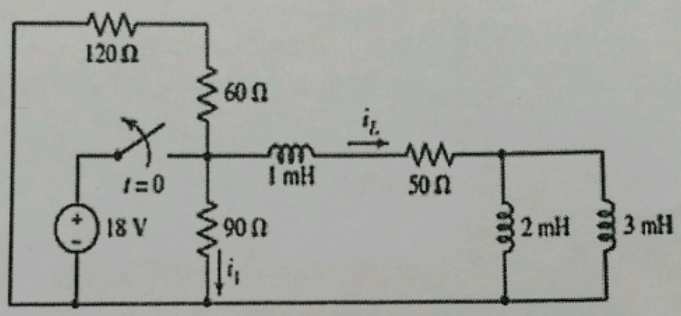
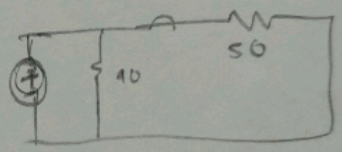


Figure 4

4. For the network shown in Figure 5, determine the number of possible trees. For a tree consisting of (1, 2, 3), identify

(i) tie-set matrix

(ii) cut-set matrix



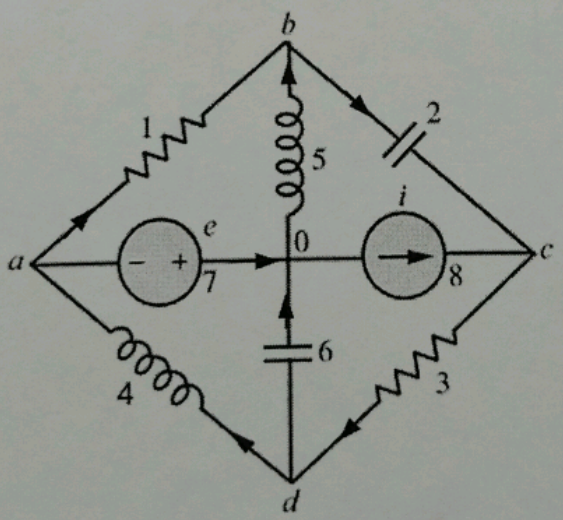


Figure 5

5. Obtain the z, h and y parameters for the network in Figure 6.

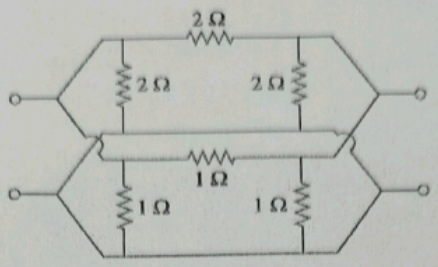


Figure 6

6. The following dc measurements shown in Table 1 were done on the resistive network shown in Figure 7. Evaluate the value of R_o for maximum power transfer. Calculate the maximum power.

Table 1

Measurement 1	Measurement 2
$V_1 = 20$ V	$V_1 = 35$ V
$I_1 = 0.8$ A	$I_1 = 1$ A
$V_2 = 0$ V	$V_2 = 15$ V
$I_2 = -0.4$ A	$I_2 = 0$ A

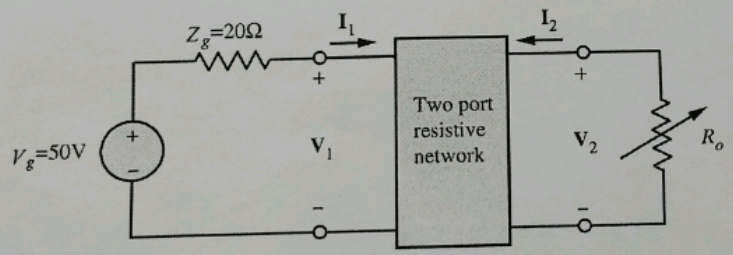


Figure 7

7. Identify the type of filter shown in Figure 8 and determine its center frequency and bandwidth.

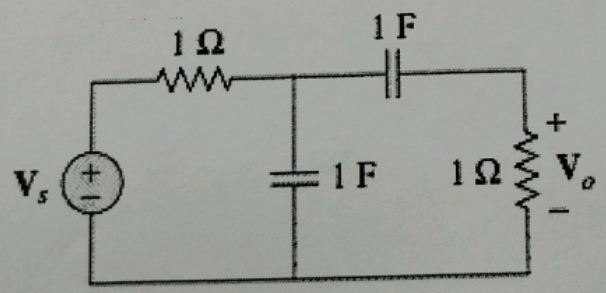


Figure 8

8. Find $i_o\ (t)$ in the circuit shown in Figure 9 using Laplace transform.

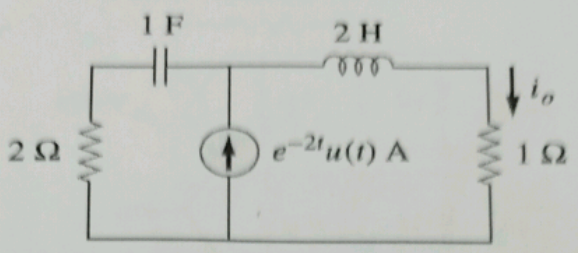


Figure 9

9. In the network of Figure 10, the switch is moved from a to b, at $t = 0$. Find $v(t)$ using Laplace transform.

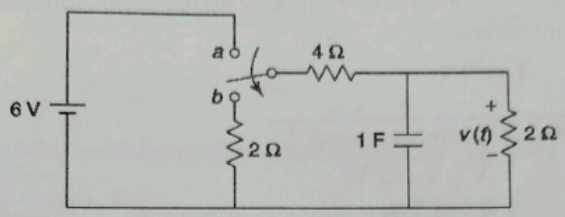


Figure 10

10.(a) Find $i(t)$ in the circuit of Figure 11, using Fourier series approach given that

$$i_s(t) = 6 + \sum_{n=1}^{\infty} \frac{1}{n^2} \cos 6nt$$

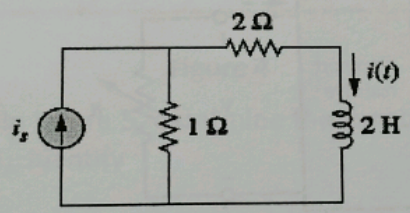


Figure 11

OR

10.(b) Use the Fourier transform to find $i_o(t)$ in the circuit shown in Figure 12. The current source $i_g(t)$ is the signum function $20\ sgn\ (t)\ A$.

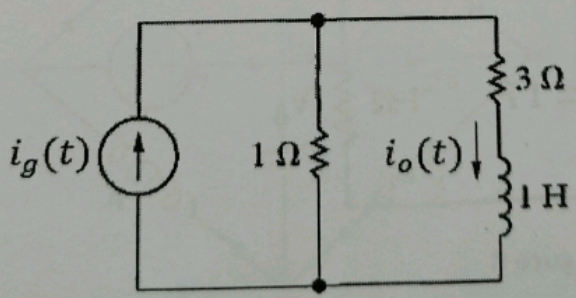


Figure 12

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