BH/D/TY

Reg. No: 21BEC0336

Final Assessment Test – April 2025

VIT
Vellore Institute of Technology

Course: **BECE203L - Circuit Theory**

Class NBR(s): **0732 / 0735 / 0741 / 0742 / 0743 / 0744 / 0745**

Slot: **C2+TC2+TCC2**

Time: **Three Hours**

Max. Marks: **100**

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

General Instructions : 1. Assume suitable values for any missing information
2. Non programmable scientific calculator is permitted

Answer ALL Questions
(10 X 10 = 100 Marks)

1. Obtain V_o in the circuit of Figure 1 using nodal analysis.

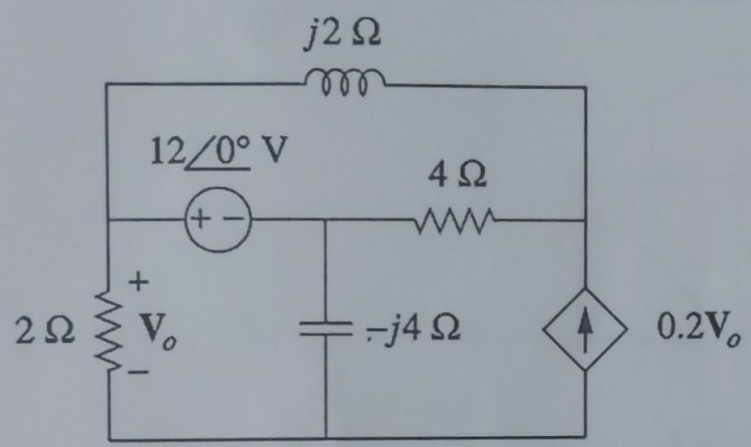

Figure 1

2. Find v_o in the circuit of Figure 2 using the source transformation theorem.

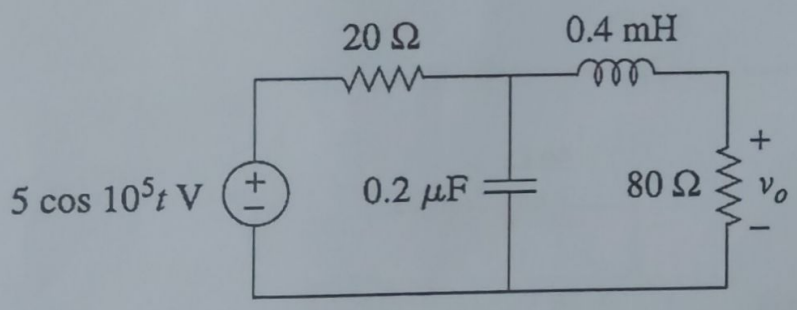

Figure 2

3.(a) Determine v(t) for t > 0 in the circuit of Figure 3A if $v(0) = 0$.

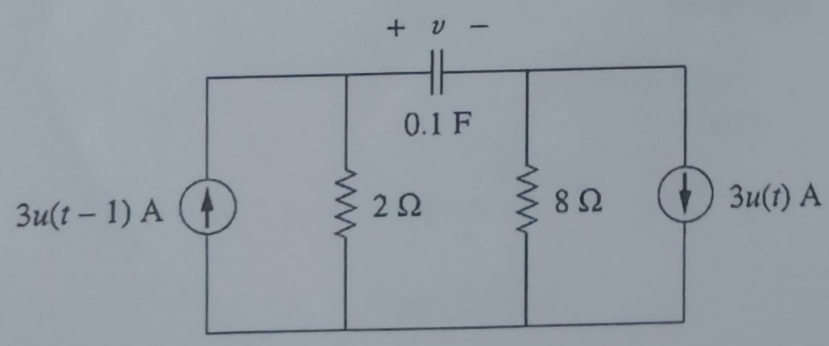

Figure 3A

OR

3.(b) The switch in Figure 3B moves from position A to position B at t=0 (please note that the switch must connect to point B before it breaks the connection at A, a make-before-break switch). Determine i(t) for t>0.

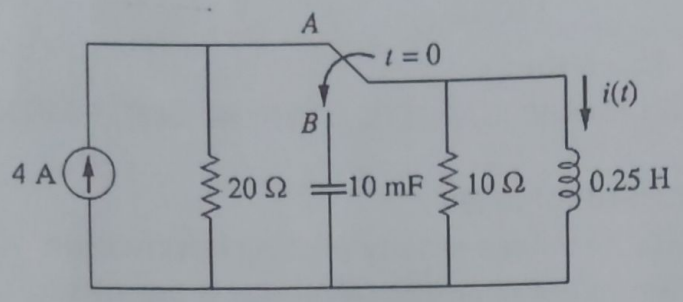

Figure 3B

4. A network graph is shown in Figure 4. Find the incidence matrix. For a tree consisting of (1, 2, 3, 4), find tie set and cut-set matrices.

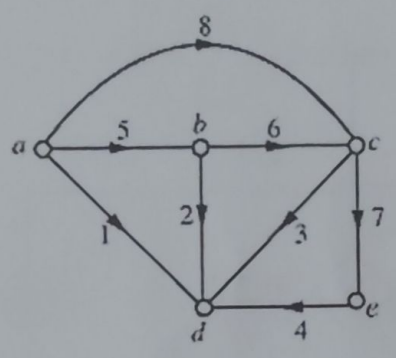

Figure 4

5.(a) Obtain the hybrid parameters for the network shown in Figure 5A.

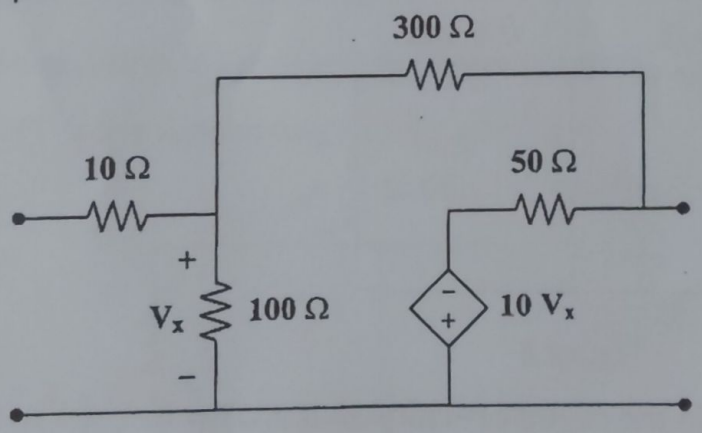

Figure 5A

OR

5.(b) Obtain the z, h and y parameters for the network in Figure 5B.

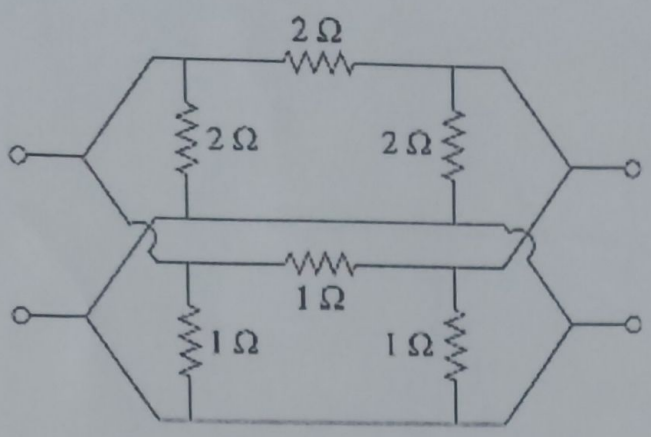

Figure 5B

6. Identify the type of filter shown in Figure 6 and determine its center frequency and bandwidth.

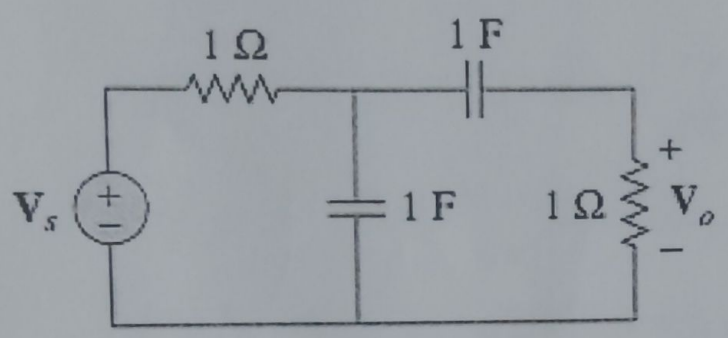

Figure 6

7. Consider the pulse in Figure 7(a), which is applied as the input for the circuit in Figure 7(b). Find the value of $v_0(t)$ using Laplace transform.

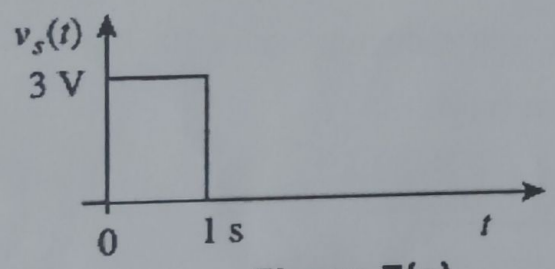

Figure 7(a)

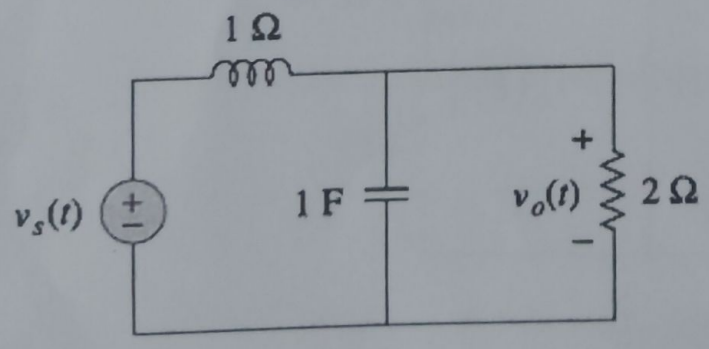

Figure 7(b)

8. In the network of Figure 8, the switch is moved from a to b, at $t = 0$. Find $v(t)$ using Laplace transform.

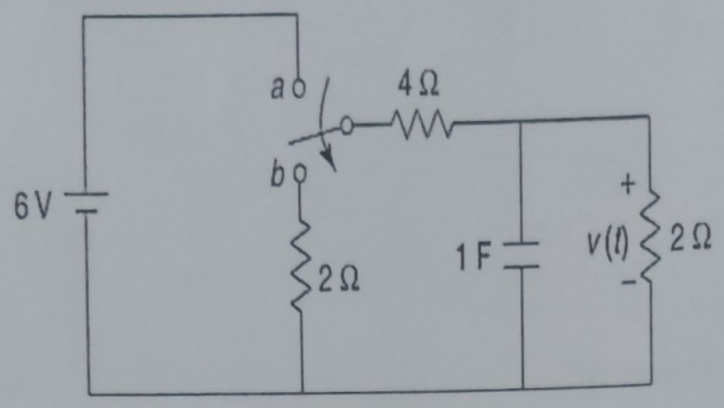

Figure 8

9. Find $i(t)$ in the circuit of Figure 9 using the Fourier series approach, given that

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

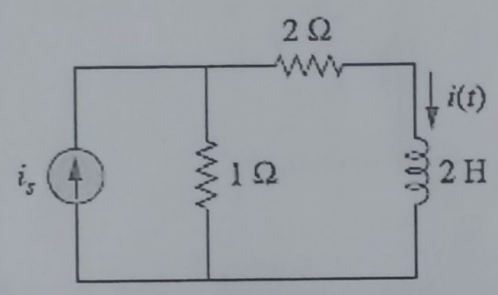

Figure 9

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

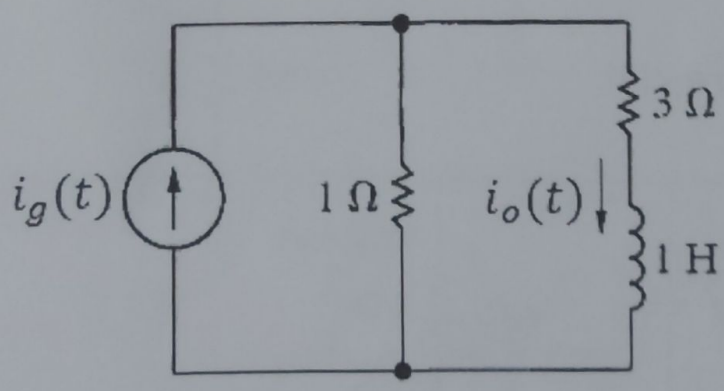

Figure 10

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