Y/D/TY

Reg. No:

Final Assessment Test – April 2025

VIT
Vellore Institute of Technology

Course: **BECE203L - Circuit Theory**

Class NBR(s): **0724 / 0727 / 0728 / 0731 / 0734 / 0736 / 0737 / 0739**

Slot: **C1+TC1+TCC1**

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 Instruction : Non programmable scientific calculator is permitted

Answer ALL Questions

(10 X 10 = 100 Marks)

1. Obtain I_O in the circuit of Fig. (a) using mesh analysis.

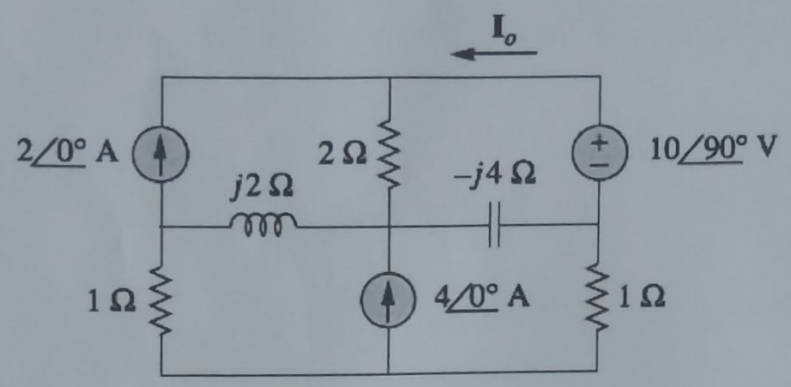

Fig. (a)

2. Apply superposition theorem to find i_x in the circuit of Fig. (b).

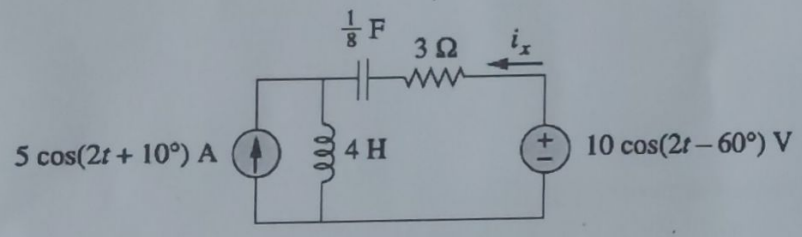

Fig. (b)

3.(a) Calculate $i(t)$ if $i(0) = 0$ in the circuit of Fig. (c) using transient analysis.

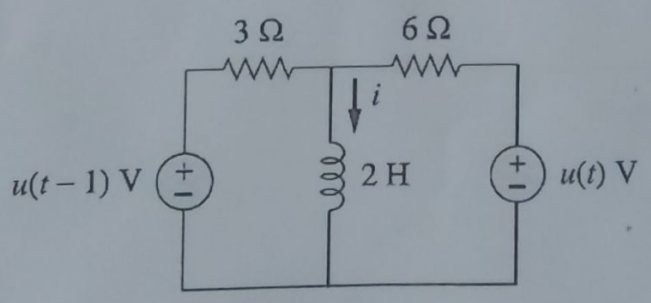

Fig. (c)

OR

3.(b) Determine v(t) for $t>0$ in the circuit of Fig. (d) using transient analysis.

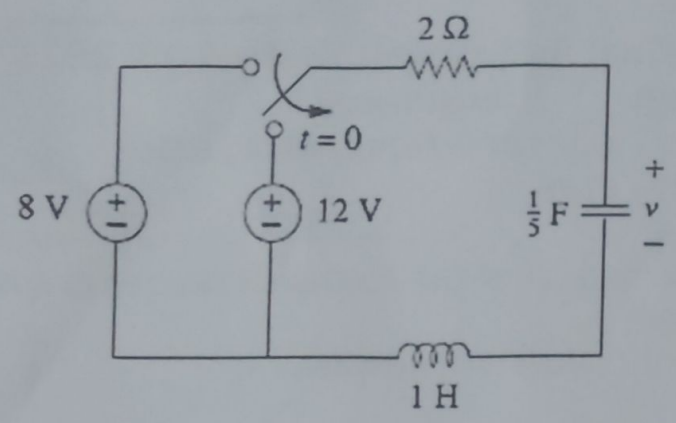

Fig. (d)

4. A network graph for a circuit diagram is shown in Fig. (e). Find the incidence matrix and for a tree consisting of (5, 6, 7, 8), develop tie set matrix and cut-set matrices.

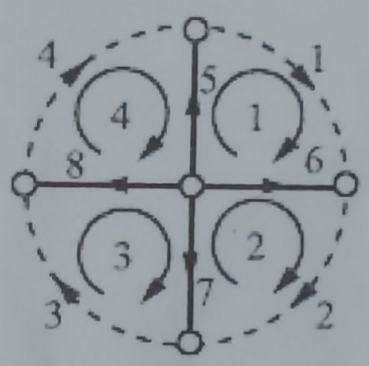

Fig. (e)

5.(a) Obtain Z and Y parameters for the circuit shown in Fig. (f).

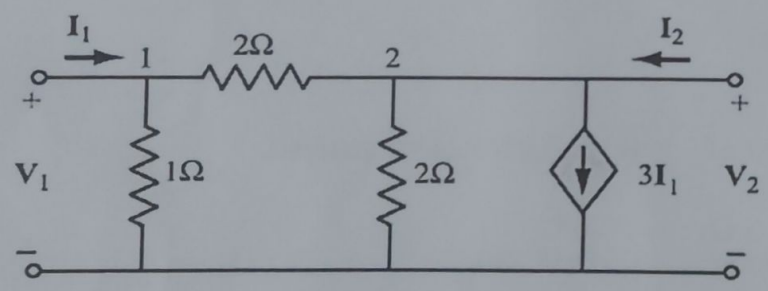

Fig. (f)

OR

5.(b) Obtain the ratio V_2/V_s of the circuit shown in Fig. (g).

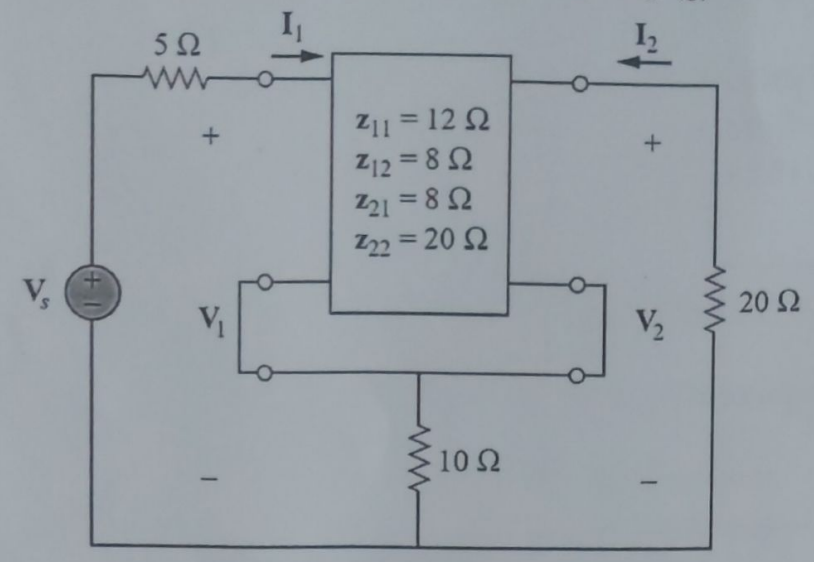

Fig. (g)

6. Determine the cutoff frequency of the lowpass filter described by

$$\mathbf{H}(\omega) = \frac{4}{2 + j\omega 10}$$

Find the gain in dB and phase of H(ω) at ω = 2 rad/s.

7. Consider the parallel RLC circuit in Fig. (h). Find v(t) and i(t) given that v(0) = 5 V and i(0) = -2A using Laplace transform.

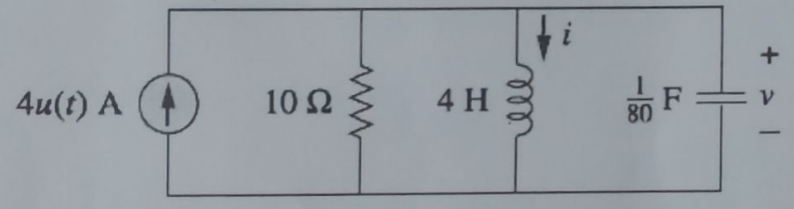

Fig. (h)

8. The transfer function of a system is $H(s) = (s+2) / (s^2 + 3s + 4)$. If the input is $4te^{-2t}\,u(t)$, find its output using Laplace transform.

9. Obtain $v_o(t)$ in the network of Fig. (i) for the given input Fourier series expansion.

$$v(t) = \sum_{n=1}^{\infty} \frac{10}{n^2} \cos\left(nt + \frac{n\pi}{4}\right) \text{ V}$$

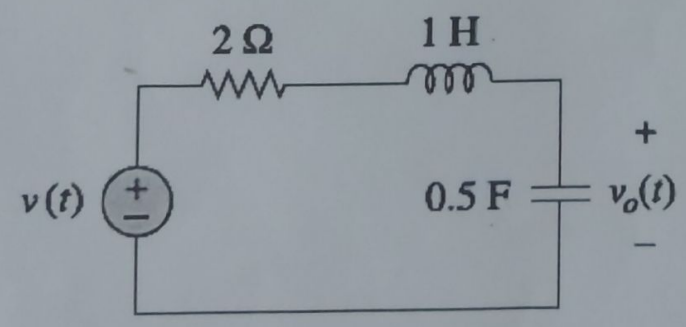

Fig. (i)

10. Find $v_o(t)$ in the circuit of Fig. (j) using Fourier transform for the given input $i_s(t) = 8e^{-t}\,u(t)\,A$.

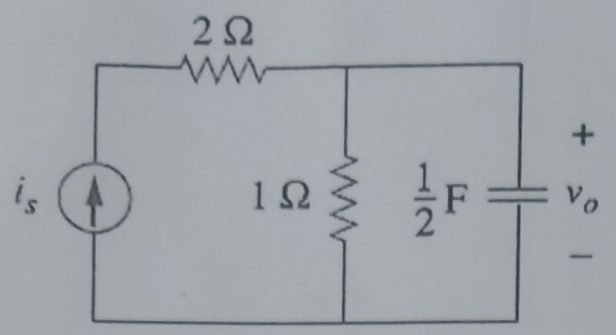

Fig. (j)

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