R/K/TY

Reg. No:

VIT
Vellore Institute of Technology

Final Assessment Test – November 2025

Course: **BEEE203L - Circuit Theory**

Class NBR(s): **1019 / 1020 / 1021** Slot: **A2+TA2+TAA2**

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**

COs	CO Statements
CO1	Understand the network topology and to apply the network theorems to estimate the steady state response for a given excitation.
CO2	Analyse three-phase unbalanced systems in star and delta configuration.
CO3	Infer and evaluate transient response, steady state response of RL, RC and RLC circuits and network functions.
CO4	Acquire knowledge about the application of Laplace transform, Fourier transform in the electrical network.
CO5	Evaluate two port network parameters to simplify the network computations.

BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)

Answer ALL Questions

(10 X 10 = 100 Marks)

1. For the network shown in Fig. 1, draw the oriented graph and write the a) incidence matrix, b) tieset matrix, and c) f-cutset matrix (consider twigs {1,3,5,6} **CO1 BL2**

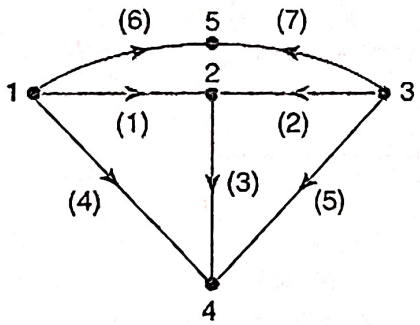

Fig. 1

2.a) Obtain Thevenin's equivalent network across terminals A and B in the circuit of Fig. 2 **CO1 BL3**

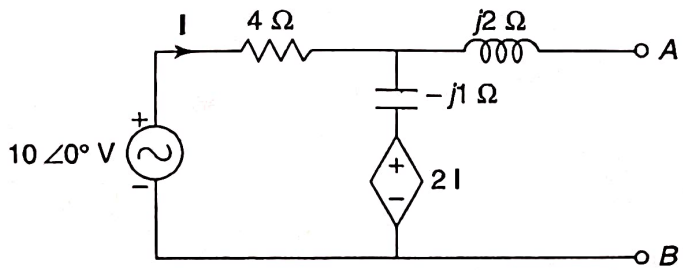

Fig. 2

OR

2.b) Find the current i_o in the given circuit of Fig. 3 using superposition theorem. **CO1 BL3**

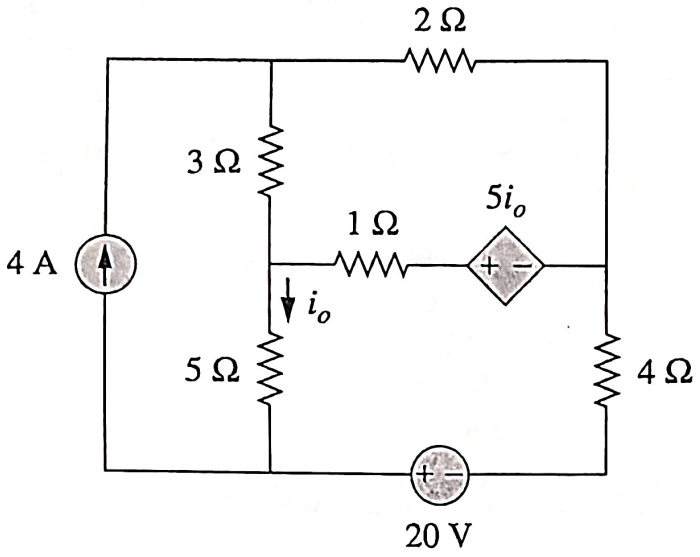

Fig. 3

3. A 400 V, 50 Hz, 3-phase supply has 100 ohms between R and Y, 318 mH between Y and B and 31.8 μF between B and R as shown in Fig. 4. Find the line currents for phase sequence RYB. **CO2 BL2**

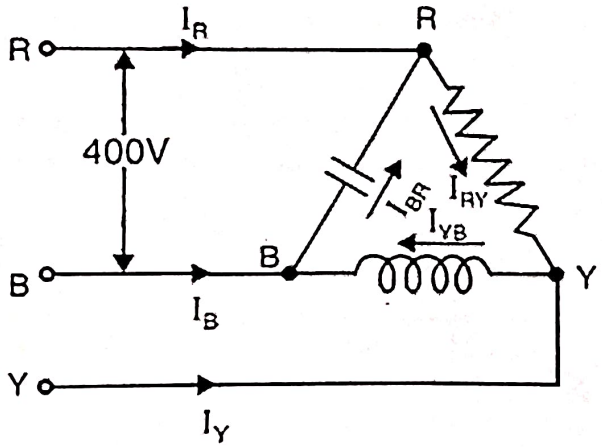

Fig. 4

4. Determine the phase voltages for the unbalanced star-connected load shown in Fig. 5 using Millman's theorem. Assume the phase sequence be RYB. Take line voltage as 440 V. **CO2 BL3**

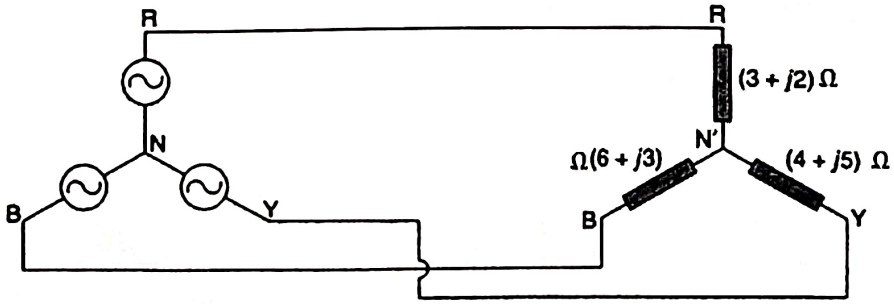

Fig. 5

5. In the network of Fig 6, the switch is closed at t=0. Determine the current i(t) using Laplace transform and assuming zero initial conditions in the network elements. **CO3 BL3**

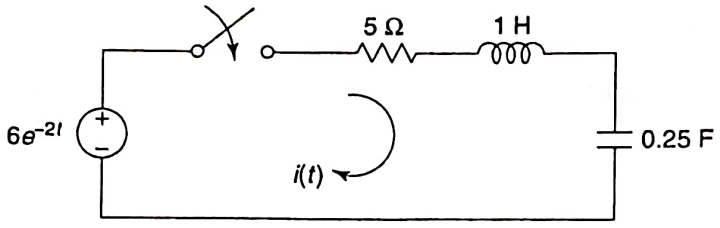

Fig. 6

6. Determine what type of filter is shown in Fig. 7. Calculate the corner or cutoff frequency. Take R= 2 kΩ, L = 2 H and C = 2 μF. **CO3 BL3**

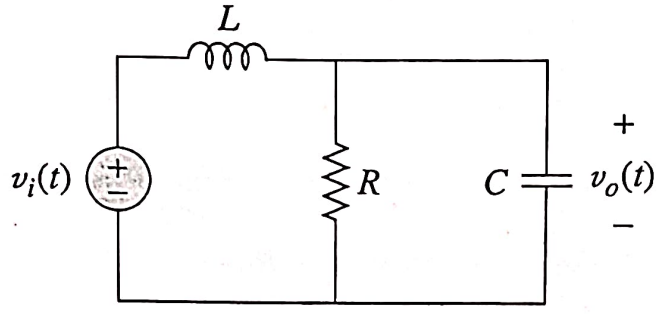

Fig. 7

7. Find $v_0(t)$ in the circuit of Fig. 8 shown below for $v_i(t) = 2e^{-3t}\,u(t)$ volts. **CO4 BL3**

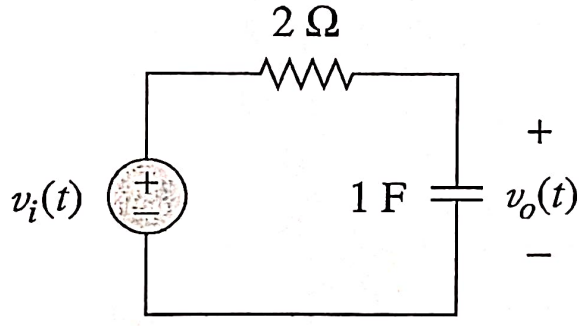

Fig. 8

8. Find the response $i_0(t)$ of the circuit of Fig. 9, if the input voltage v(t) has the Fourier series expansion **CO4 BL3**

$$v(t) = 1 + \sum_{n=1}^{\infty} \frac{2(-1)^n}{1+n^2}(\cos nt - n \sin nt)$$

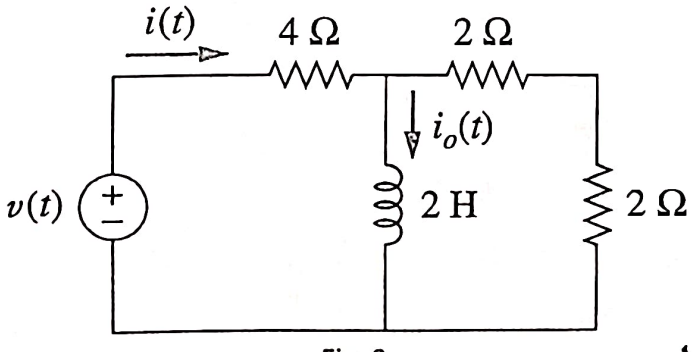

Fig. 9

9.a) The ABCD parameters of the two-port network in Fig. 10 are **CO5 BL3**

$$\begin{bmatrix} 4 & 20\,\Omega \\ 0.1\ \text{S} & 2 \end{bmatrix}$$

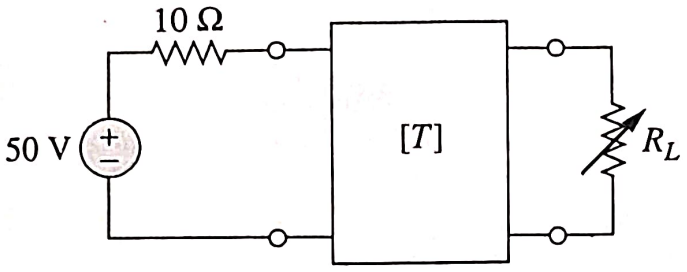

Fig. 10

The output port is connected to a variable load for maximum power transfer. Find R_L and the maximum power transferred.

OR

9.b) Determine the h-parameters for the given two port network shown in Fig. 11. **CO5 BL3**

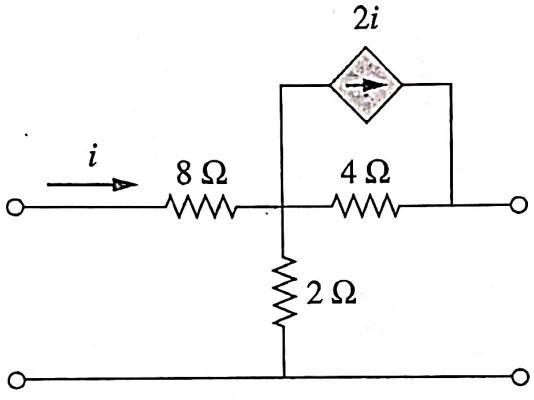

Fig. 11

10. Find y-parameters for the two port network. **CO5 BL3**

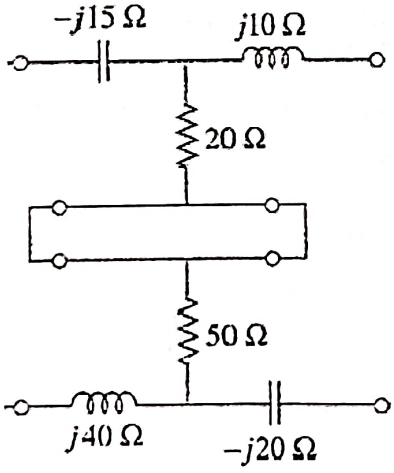

Fig. 12

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