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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Third Semester, B.E. - Electronics and Communication Engineering

Semester End Examination; March / April - 2022

Network Analysis and Synthesis

Time: 3 hrs *Max. Marks: 100*

Course Outcomes

The Students will be able to:

CO1: Ability to apply the fundamental concepts in solving and analyzing different Electrical networks.

CO2: Ability to solve circuits using appropriate technique.

CO3: Ability to apply mathematics in analyzing and synthesizing the networks in time and frequency domain.

CO4: Ability to analyze the performance of a particular network.

CO5: Ability to formulate various synthesis methods for different one-port networks.

Note: *I) **PART - A** is compulsory. **Two** marks for each question.*

*II) **PART - B**: Answer any **Two** sub questions (from a, b, c) for Maximum of **18 marks** from each unit.*

Q. No.		Questions	Marks	BLs	COs	POs
		I : PART - A	**10**			
I	a.	State Super-Position theorem.	2	L1	CO1	PO1,2
	b.	Define Bandwidth and Selectivity of a series RLC circuit.	2	L1	CO1	PO1,2
	c.	State Initial value theorem.	2	L1	CO1	PO1,2
	d.	Draw the dual of the network shown.	2	L1	CO1	PO1,2
	e.	State Hurwitz Polynomial.	2	L2	CO1	PO1,2
		II : PART - B	**90**			
		UNIT - I	**18**			
1	a.	Find V_a, V_b and V_c using node analysis in the circuit shown in Fig.1.	9	L3	CO2	PO2,3

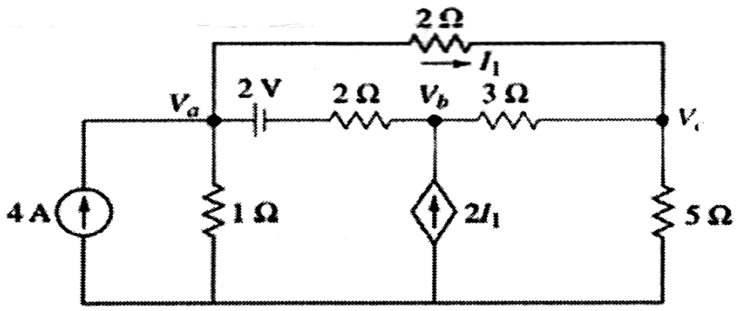

Fig.1

b. Using source transformation, find the power delivered by the 50 V source for the circuit shown in Fig. 2

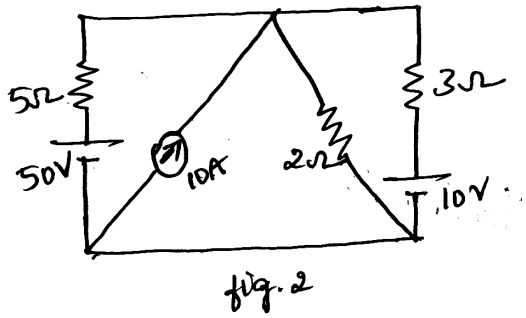

fig. 2

9 L3 CO2 PO2,3

Contd... 2

c. Obtain the Thevenin's equivalent network for the network shown in Fig.3 at terminal *A* and *B*.

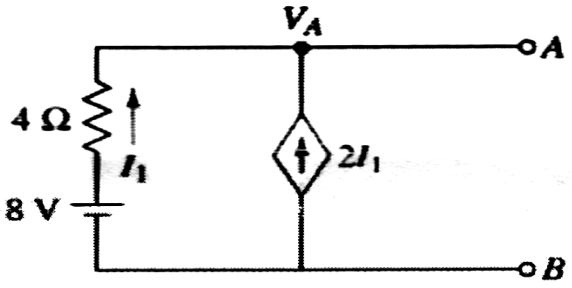

Fig.3

9 L3 CO3 PO3,4

UNIT - II **18**

2 a. What is Resonance? Show that resonant frequency of series resonance circuit is equal to the geometric mean of two half power frequencies. 9 L1 CO1 PO1,2

b. For the network shown in Fig. 4, determine;

i) Resonant frequency ii) Input admittance iii) Quality Factor

iv) BW v) Half Power frequencies

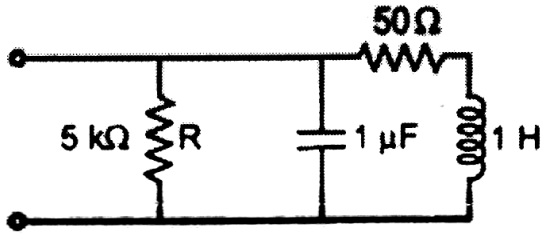

Fig.4.

9 L3 CO4 PO2

c. In the network shown in the Fig. 5, the switch is changed from the position 1 to position 2 at t = 0, steady condition having reached before switching. Find the values of i, $\frac{di}{dt}, \frac{d^2i}{dt^2}$ at $t = 0+$

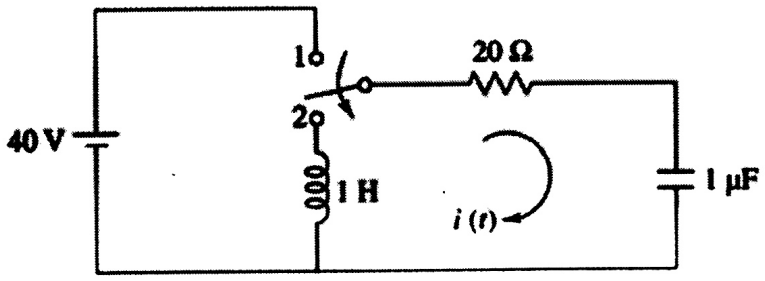

Fig.5

9 L3 CO3 PO3,4

UNIT - III **18**

3 a. Find the inverse Laplace transform of $F(s) = \frac{s^2+3}{(s^2+2s+5)(s+2)}$. 9 L3 CO3 PO2,4

Contd... 3

b. The network shown in Fig. 6 was in steady state before $t = 0$. The switch is opened at $t > 0$. Find $i(t)$ for $t > 0$ using Laplace transform.

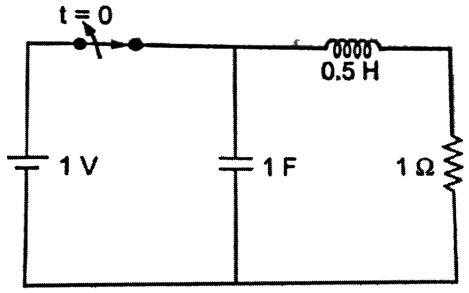

Fig.6

9 L3 CO4 PO2,4

c. Find the Laplace transform of,

i) $f(t) = t\,e^{-at}$

ii) $f(t) = t\,e^{-at}\cos\omega t$

iii) $f(t) = \sinh(\omega t)$

9 L3 CO3 PO2,4

UNIT - IV **18**

4 a. Find the H parameter for the two port network shown in the following Fig. 7.

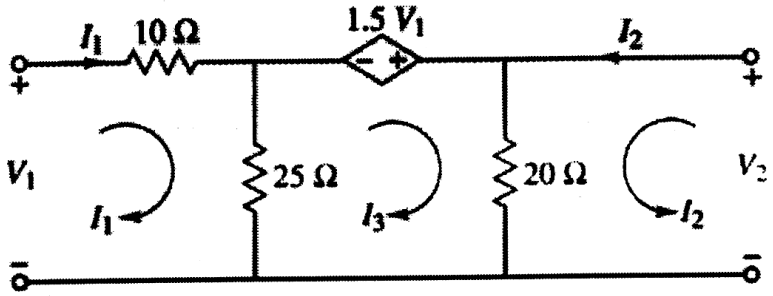

Fig.7

9 L3 CO5 PO3

b. Explain the following terms:

i) Duality ii) Tree iii) Oriented graph

iv) Branch v) Link vi) Rank of graph

9 L3 CO5 PO3

c. For the network shown in Fig. 8, write down the F-cutset matrix and obtain the network equilibrium equation on node basis and calculate 'v'.

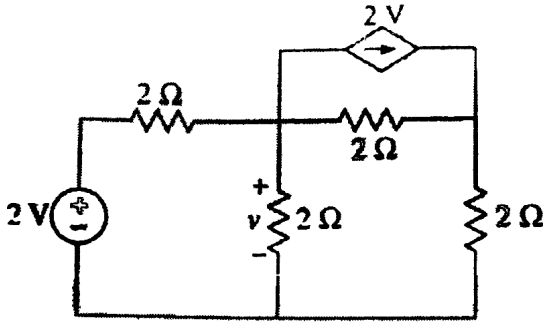

Fig. 8

9 L3 CO5 PO3

Contd... 4

UNIT - V **18**

5 a.	Test whether $F(s)=\frac{s^2+1}{s^3+4s}$ is positive real function.	9	L3	CO5	PO3
b.	Realize the foster form-I for the following RC impedance function: $Z(s)=\frac{(s+1)(s+3)}{s(s+2)(s+4)}$	9	L3	CO5	PO3
c.	Realize the faster form-II for the following LC impedance function: $Z(s)=\frac{(s+1)(s+4)}{(s+5)(s+3)}$	9	L3	CO5	PO3

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