U.S.N

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

(An Autonomous Institution affiliated to VTU, Belagavi)

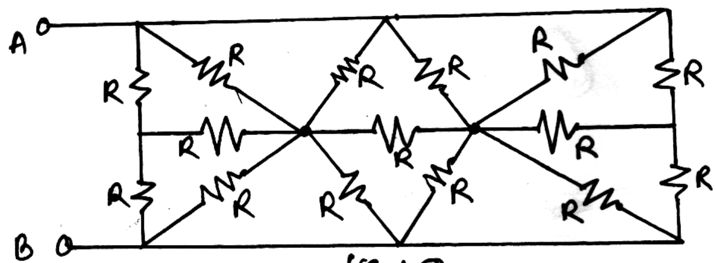
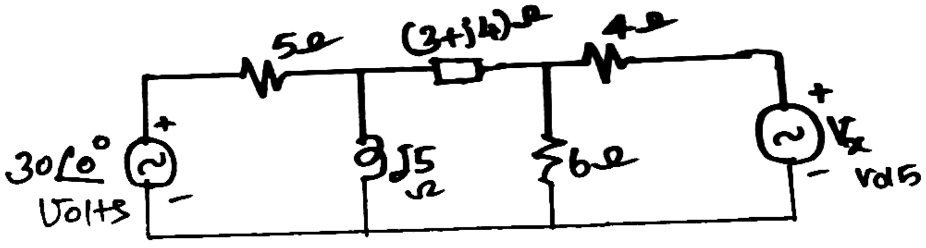
Third Semester, B.E. - Electronics and Communication Engineering
Semester End Examination; March - 2021
Network Analysis and Synthesis

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 superposition theorem applied to AC circuits.	2	L1	CO1	PO1
b.	Define quality factor and bandwidth of a series RLC circuits.	2	L1	CO1	PO1
c.	State initial value theorem.	2	L1	CO1	PO1
d.	Define two port network with an example.	2	L1	CO1	PO1
e.	Mention the properties of realization of RC functions.	2	L1	CO1	PO1
	II : PART - B	**90**			
	UNIT - I	**18**			
1 a.	Find an equivalent resistance at terminals *AB* in Fig. 1(a).  fig 1(a)	9	L3	CO2	PO2
b.	Find the source voltage V_x in the Fig. 1(b), using KVL method, if current through the impedance (*3+j4*) Ω is zero.  fig 1(b)	9	L3	CO2	PO2

c. Determine all the nodal voltages in the Fig.1(c) shown, using KCL. — 9 L4 CO2 PO2

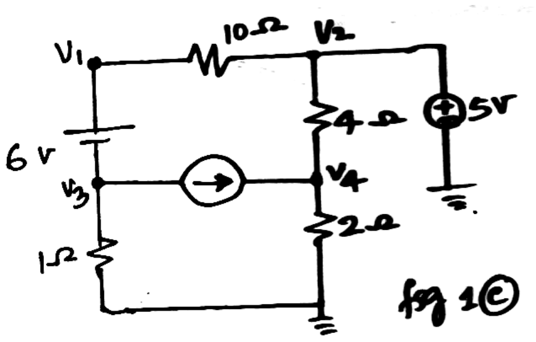


fig 1(c)

UNIT - II **18**

2 a. Show that a two branch parallel circuit is resonant at all frequencies, if $R_L = R_C = \sqrt{\frac{L}{C}}\ \Omega$. — 9 L2 CO2 PO1

b. Determine the RLC parallel circuit parameters whose response curve is as shown in Fig. 2(b). What are the new values of w_r and bandwidth if C is increased four times? — 9 L2 CO2 PO2

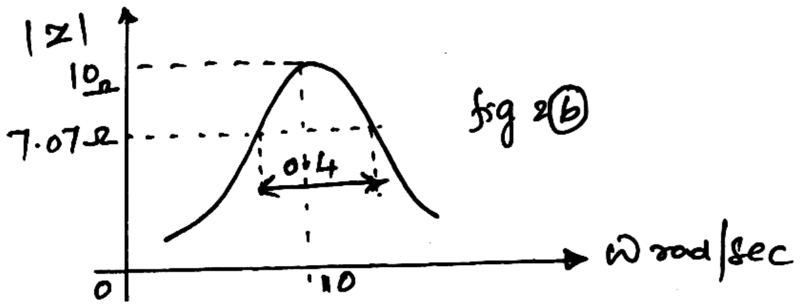


fig 2(b)

c. The network shown in the Fig. 2(c) is in steady state with the switch k closed. At t = 0, the switch is closed. Determine the voltage across the switch V_X and $\frac{dV_k}{dt}$ $at\ t = 0^+$ — 9 L3 CO2 PO2

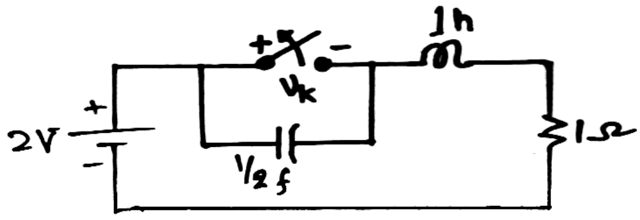


fig 2(c)

UNIT - III **18**

3 a. Deduce the Laplace transform of the following: — 9 L2 CO3 PO2

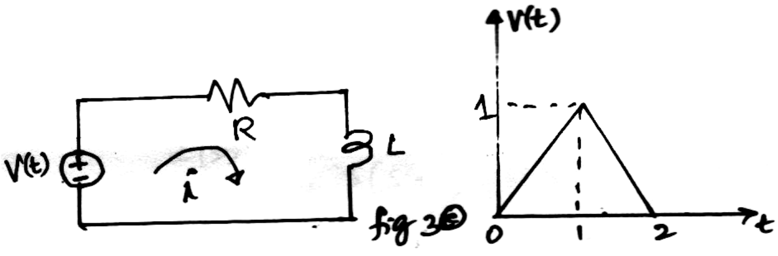
i) cosh(wt)

ii) sinwt

iii) e^{-at}.coswt

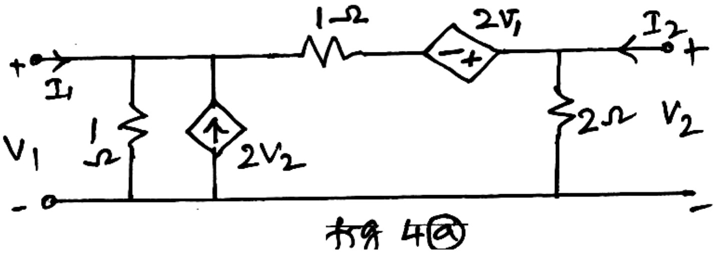
b. Find the inverse Laplace transform of $f(s) = \frac{1}{s(s^2 - 2s + s)}$. — 9 L2 CO3 PO2

c. A triangular wave is applied input to series RL circuit with $R = 2\ \Omega$, $L = 2$ H as shown in Fig. 3(c). Calculate the current $i(+)$ through the circuit. 9 L2 CO3 PO2

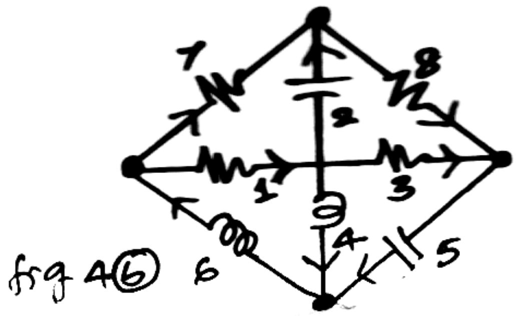


UNIT - IV **18**

4 a. Determine *ABCD* parameters for the network shown in Fig. 4(a). 9 L4 CO4 PO2



b. In the network shown in Fig. 4(b) consider the branches 1, 2, 3, 4 forming a tree. Determine the branch current in terms of the loop current. 9 L4 CO4 PO2



c. Define Z parameters and Y parameters of the two port network. Derive Y parameters in terms of Z parameters. What is reciprocal and symmetry condition of a passive network? 9 L3 CO4 PO3

UNIT - V **18**

5 a. Test whether, **9** L2 CO5 PO3

$$F(S) = \frac{2S^4 + 7S^3 + 11S^2 + 12S + 4}{S^4 + 5S^3 + 9S^2 + 11S + 6}$$ is positive real functions?

b. Realize / Synthesize Cauer second form of the LC driving point impedance function $Z(S) = \frac{(S^2+1)(S^2+16)}{S(S^2+4)}$. **9** L2 CO5 PO3

c. Realize the foster first form of the RC impedance function $Z(S) = \frac{(S+1)(S+3)(S+5)}{S(S+2)(S+4)(S+6)}$. **9** L2 CO5 PO3

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