

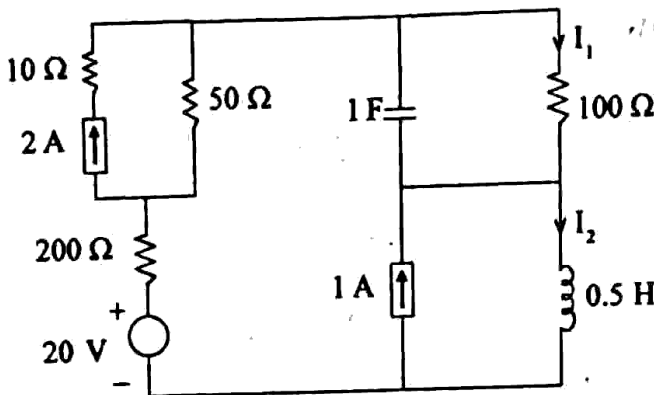
Faculty of Engineering & Technology
Third Semester B.E. (Electronics Engg./ET/EC)
(C.B.S.) Examination
NETWORK ANALYSIS AND SYNTHESIS

Time—Three Hours]

[Maximum Marks—80

INSTRUCTIONS TO CANDIDATES

- (1) All questions carry marks as indicated.
 - (2) Assume suitable data wherever necessary.
 - (3) Illustrate your answers wherever necessary with the help of neat sketches.
 - (4) Use of Non-Programmable calculator is permitted.
1. (a) Find the current J_1 and J_2 due to d.c. source in the network shown below in 'Fig. 1(a)'.

**Fig. 1(a)**

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- (b) Write the set of independent mesh equations for the network shown below in Fig. 1(b) :

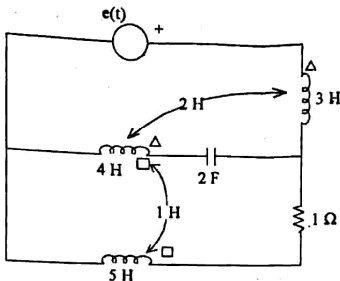


Fig. 1 (b)

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OR

2. (a) In the network shown in 'Fig. 2(a)', determine the voltage \bar{V}_b which results in zero current through $(2 + j3) \Omega$ impedance. Use Nodal analysis.

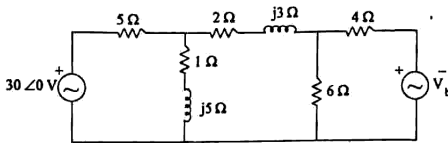


Fig. 2 (a)

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- (b) Define duality. What are the conditions for duality ?
Obtain the dual of the network shown in 'Fig. 2(b)'.

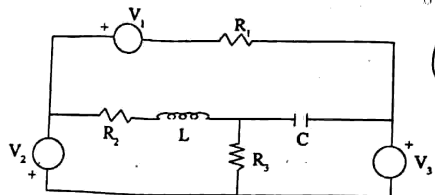


Fig. 2 (b)

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3. (a) What should be the value of ' Z_L ', connected across A and B in 'fig. 3(a)' so that it will draw the maximum power. Also calculate the maximum power.

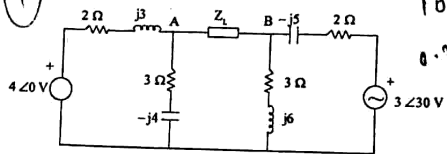


Fig. 3 (a)

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- (b) In the network shown in 'Fig. 3(b)', if resistance ' R_1 ' is decreased by 10%, find the change in current

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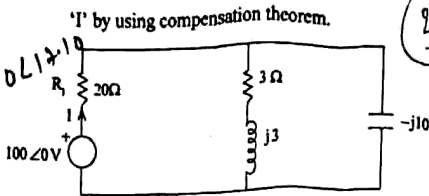


Fig. 3 (b)

OR

4. (a) In the network shown in 'Fig. 4(a)' find 'I' and verify reciprocity theorem.

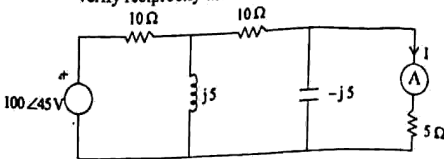


Fig. 4 (a)

- (b) Obtain Thevenin's and Norton's equivalent across the terminals A and B of the network shown in 'Fig. 4(b)'.

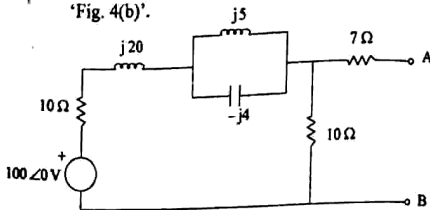


Fig. 4 (b)

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- (a) For R-L-C series circuit derive the expression for resonant frequency and show the variation of R , X_L , X_C , $(X_L - X_C)$, Z and I on the same graph.

- (b) Series RLC circuit is resonant at 1 Mega Cycles/sec. Its bandwidth is 5000 cycles/sec. and impedance at resonance is 50 Ω. Determine the values of R , L and C .

OR

6. (a) Compare series and parallel resonance in A.C. circuit.

- (b) Explain the meaning of half power frequencies for series RLC circuit. Also calculate the half power frequencies, resonant frequency, bandwidth and Q-factor for RLC series circuit with $R = 0.2 \Omega$, $L = 100 \text{ mH}$, and $C = 50 \mu\text{F}$.

- (a) Design constant K low pass 'T' and 'π' sections of filter having cut-off frequency 3000 Hz and nominal characteristic impedance of 600 Ω. Also find the frequency at which filter offers attenuation of 16 db.

$L = 0.063$
 $C = 1.26 \times 10^{-3}$
 $f_c = 0.46$

- (b) Explain the meaning of band pass and band stop filter. Also design a prototype band pass filter having cut-off frequency of 2000 Hz and 5000 Hz. The nominal characteristic impedance is 600 Ω.

$C = 3.98 \times 10^{-3}$
 $L = 1.21 \times 10^{-3}$

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0.065
 0.01

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8. (a) Draw the equivalent circuit of transmission line and write the equations for voltage and current. 7
(b) Explain the design procedure for high pass filters. 7
9. (a) Find the continuous solution for $i_1(t)$ and $i_2(t)$ of Fig. 9(a), if the switch 'K' is closed at $t = 0$. Assume the networks to be initially relaxed.

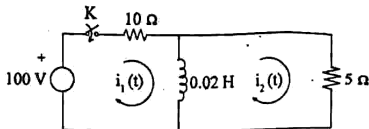


Fig. 9 (a)

- (b) Synthesize the waveform of 'Fig. 9(b)' and obtain its Laplace Transform :

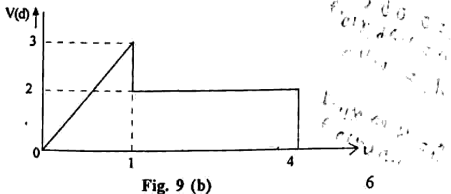


Fig. 9 (b)

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OR

10. (a) Find the Laplace transform of periodic waveform shown in Fig. 10(a).

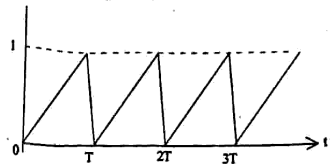


Fig. 10 (a)

- (b) Find the particular solution for the current $i(t)$, of Fig. 10 (b), when the switch is moved from 'x' to 'y' at time $t = 0$; steady state is being previously established in the circuit.

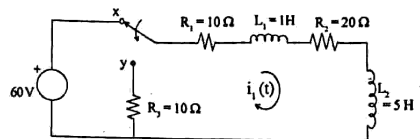


Fig. 10 (b)

11. (a) Express Z-parameters in terms of :
(i) ABCD parameters
(ii) h-parameters.

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- (b) For the network shown 'Fig. 11(b)', find $Y_{12}(S)$ and plot its poles and zeros.

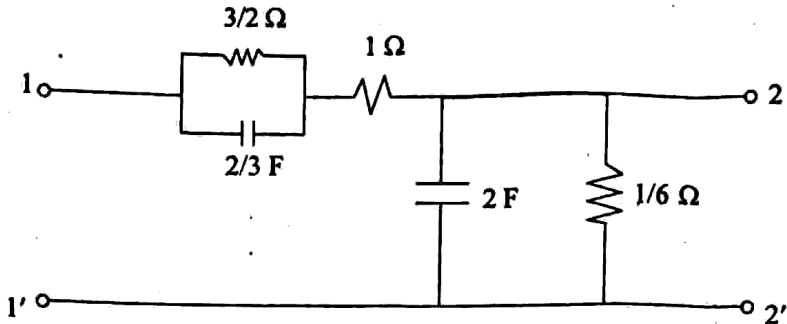


Fig. 11(b)

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OR

12. (a) Define ABCD parameters and obtain the condition for reciprocity in terms of ABCD parameters. 7
- (b) Find the voltage transfer function $G_{12}(S)$ for the network shown in Fig. '12(b)'.

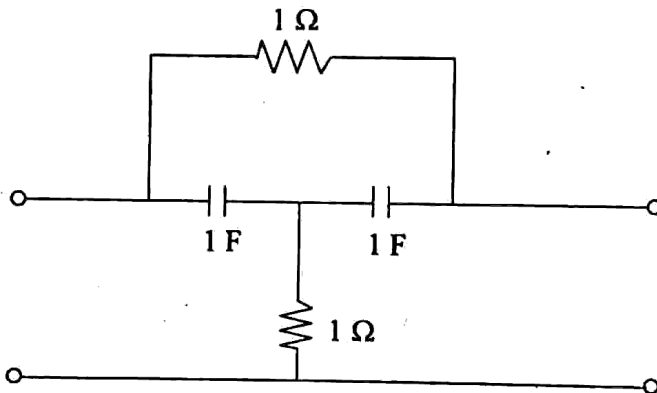


Fig. 12(b)

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