

**Time: 3 hours**

**Max. Marks: 80**

**Answer any five questions**  
**All questions carry equal marks**

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- 1.a) Determine the node voltages and the current through the resistors using Mesh method for the following network shown in figure 1.

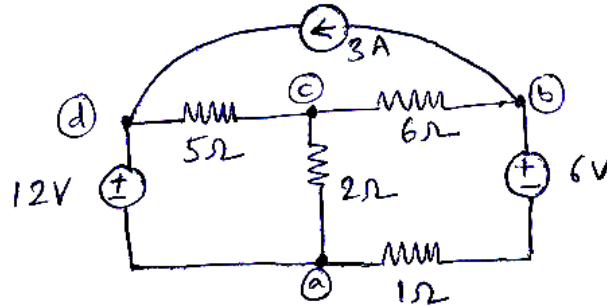


Figure: 1

- b) Draw the graph and write down the Tie-set matrix for the following network shown in figure 2.

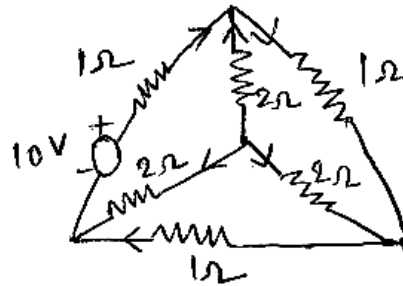


Figure: 2

- 2.a) Find the total inductance of the three series connected coupled coils shown in figure 3.

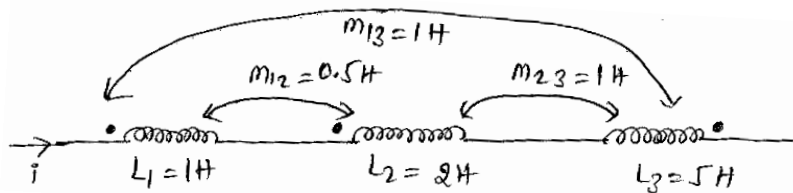


Figure: 3

- b) Two coupled coils have  $K=0.8$ ,  $N_1=500$  turns,  $N_2=1000$  turns and the mutual flux being  $0.9\text{wb}$ , find the primary coil flux. If the primary current be  $10\text{A}$ , find the Primary coil inductance. Also obtain the secondary inductance.

- 3.a) Find the resonance frequency  $f_0$ , Q-factor and Bandwidth(BW) for the following circuit shown in figure 4.

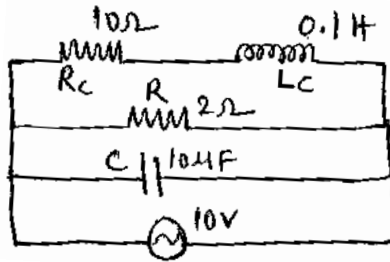


Figure: 4

- b) In the following figure 5 steady state condition is reached with 100V D.C source. At  $t=0$ , switch K is suddenly opened. Find the expression of current through the inductor after  $t=0.5$  sec.

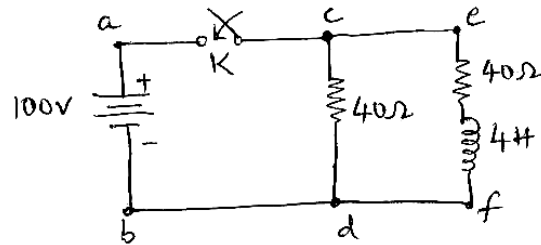


Figure: 5

- 4.a) Using Laplace transform technique find  $i_2(t)$  at  $t=0^+$  following switching at  $t=0$  of switch K in the figure 6. Assume the network is previously deenergized.

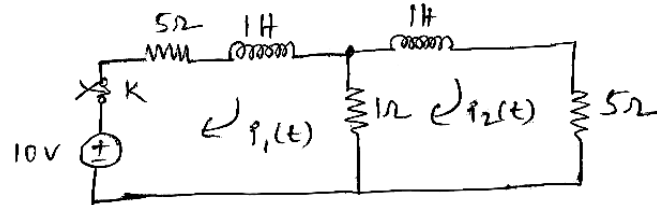


Figure: 6

- b) Obtain the Fourier analysis of the waveform shown in figure 7.



Figure: 7

- 5.a) Obtain the Thevenin's equivalent circuit across x-y terminals and find the current through the resistor connected across x-y terminals for the following circuit shown in figure 8.

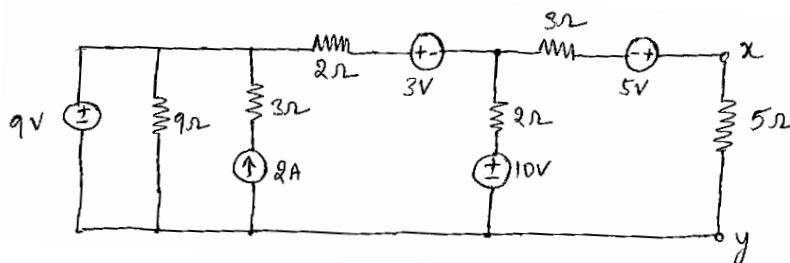


Figure: 8

- b) In the circuit shown in figure 9 find the power delivered by the source.

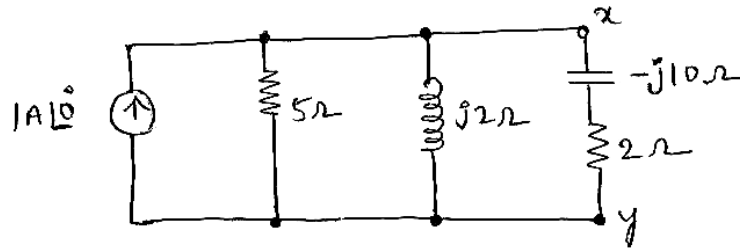


Figure: 9

- 6.a) Find the ABCD- parameters of the following lattice network shown in figure 10.

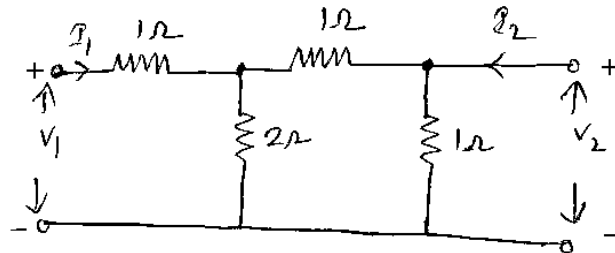


Figure: 10

- b) For the lattice 2-port network shown in figure 11 find the image impedance and Image transfer constant.

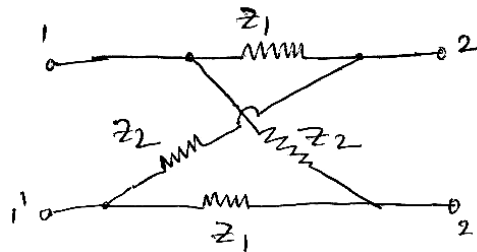


Figure: 11

7. Find the Z- parameters of the following network shown in figure 12.

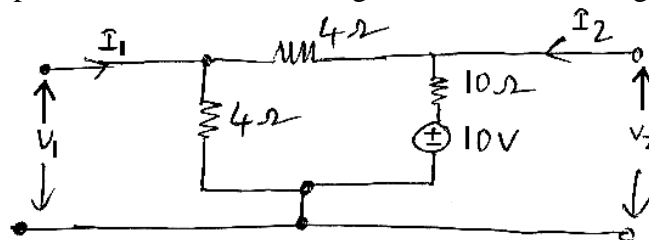


Figure: 12

8. Design a T and  $\pi$  section constant-K high pass filter having cut-off frequency  $f_c$  of 12 kHz and nominal impedance  $R_o=500$  ohms.  
Also find:  
a) Its characteristic impedance and phase constant at 24 kHz and  
b) Attenuation at 4 kHz.

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