B.E. Third Semester (Electronics / Electronics Tele Communication / Electronics Communication Engineering) (C.B.S.)

Network Analysis & Synthesis

P. Pages : 5 **NKT/KS/17/7216/7221**

Time : Three Hours Max. Marks : 80

* 0 2 7 0 *

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.

1. a) For the network shown in fig. 1 (a), find the current through 100Ω resistance due to DC source. Also find the current through inductor under steady state. **6**

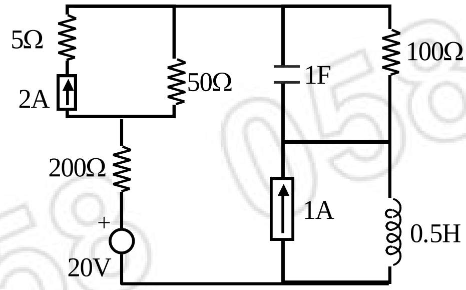
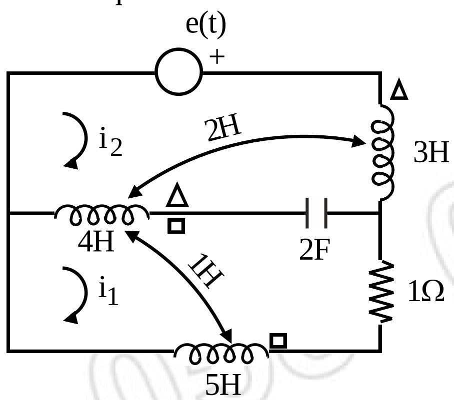


Fig. 1 (a)

b) Write the set of independent mesh equations for the network shown in fig.1 (b). **7**



[Fig 1 (b)]

OR

2. a) Explain the term duality. Draw dual of the network shown in fig. 2 (a). **6**

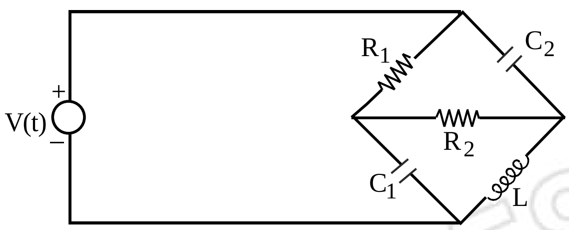
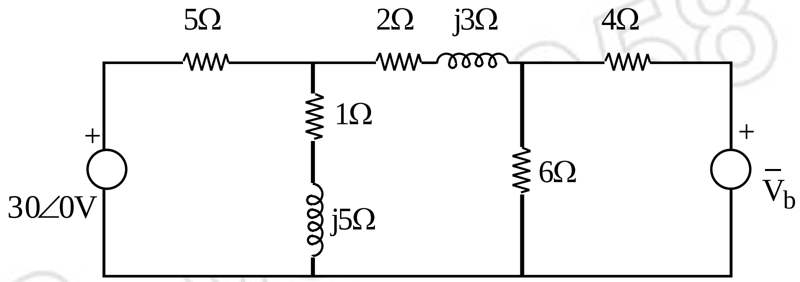


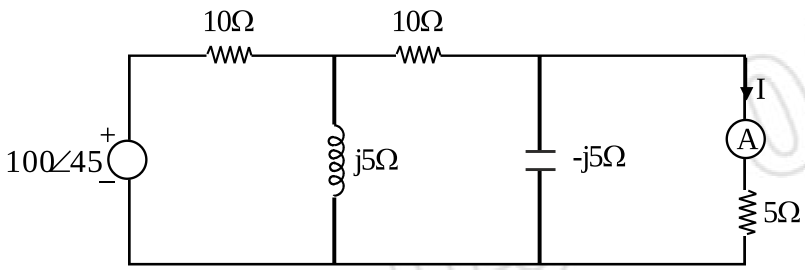
Fig. 2 (a)

b) In the network shown in fig. 2 (b), determine $\overline{V}_b$ which result in zero current through $(2+j3)\Omega$ impedance. Use Nodal Analysis. **7**



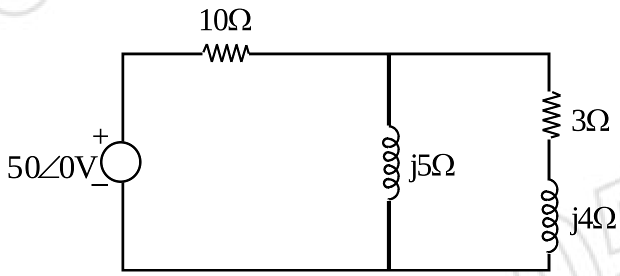
[Fig.2 (b)]

3. a) For the Network shown in fig. 3 (a), find 'I' hence Verify Reciprocity Theorem. **7**



[Fig.3 (a)]

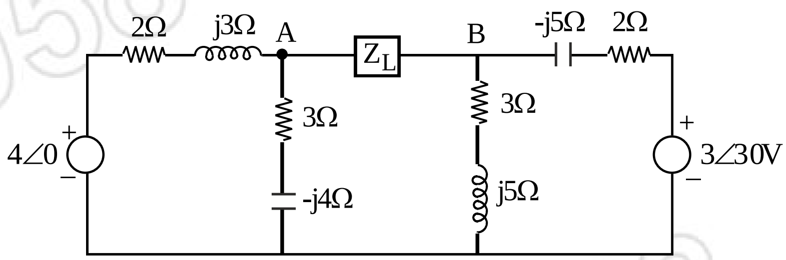
b) For the network shown in fig. 3 (b), find the change in current through 10Ω resistor if $(3+j4)\Omega$ impedance is changed to $(4+4j)\Omega$. Use Compensation Theorem. **7**



[Fig.3 (b)]

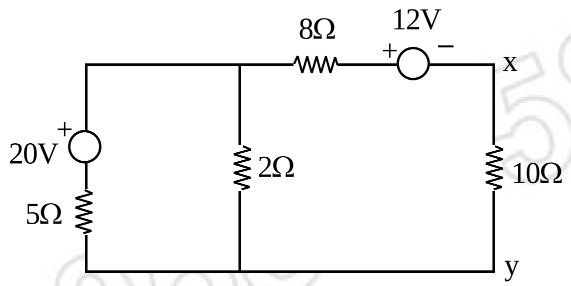
OR

4. a) What should be the value of Z_L connected across A & B of the network shown in fig. 4 (a), so that it will draw the maximum power. Also find the value of maximum power. **7**



[Fig.4 (a)]

b) Evaluate the current through 10Ω resistor of fig. 4 (b), Use Norton's theorem. **7**



[Fig.4 (b)]

5. a) Draw the variation of total impedance Z, inductive reactance X_L capacitive reactance X_e, and total current I with respect to frequency and mark resonance frequency. **5**

b) A $24\mu F$ capacitor is connected in series with a coil whose inductance is 5 mH. Determine : **8**

i) Resonance frequency.

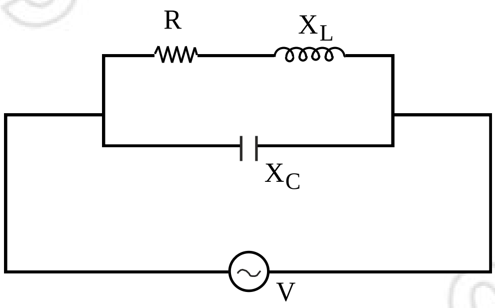
ii) Resistance of a coil if 40V voltage source operating at resonance frequency causes a circuit current of 3.6 mA.

iii) Q-factor of the coil.

iv) Bandwidth.

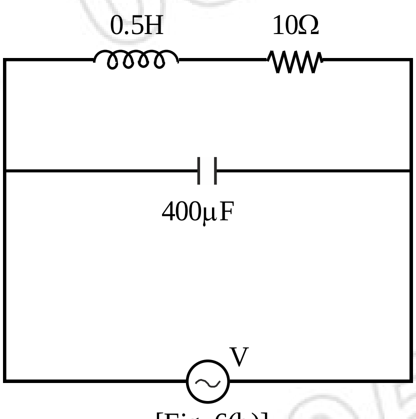
OR

6. a) Derive an expression for resonant frequency of the parallel circuit shown in fig. 6 (a). **6**



[Fig. 6 (a)]

b) In Parallel resonance circuit shown in fig. 6 (b), find the resonance frequency, dynamic resistance and Bandwidth. **7**



[Fig. 6(b)]

7. a) Discuss the design for constant K low pass filter. **7**

b) Design a prototype band pass filter section having cut-off frequencies of 2000 Hz and 5000 Hz. with nominal characteristic impedance of $600\,\Omega$. **6**

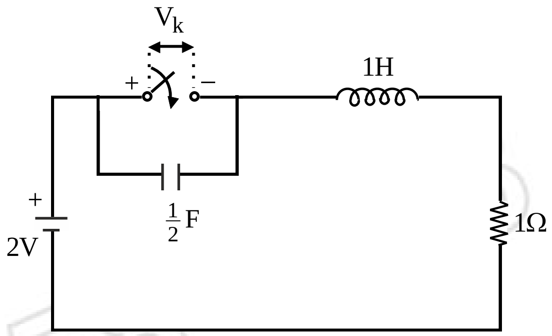
OR

8. a) Explain the design of T-type attenuator. **6**

b) Design a balanced and symmetrical π-type attenuator to give 15 decibal loss. The characteristic impedance of the attenuator is $600\,\Omega$. Draw the network designed and derive the equation used. **7**

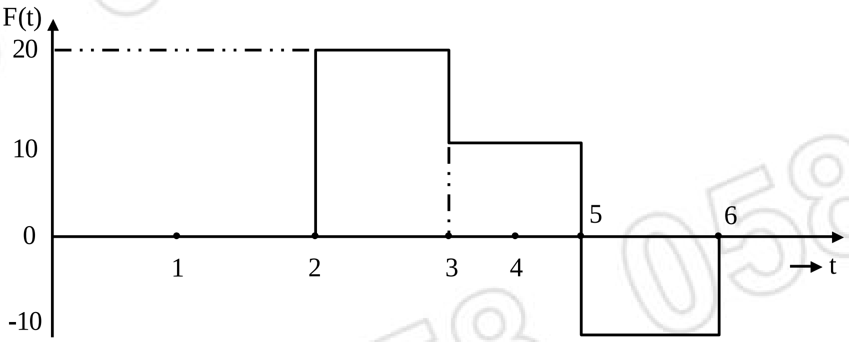
9. a) The network shown in fig. 9 (a), is in steady state with the switch 'K' is closed. At t = 0 the switch is opened. **7**

Determine $V_K, \frac{dV_K}{dt}$ at $t = 0^+$.



[Fig. 9 (a)]

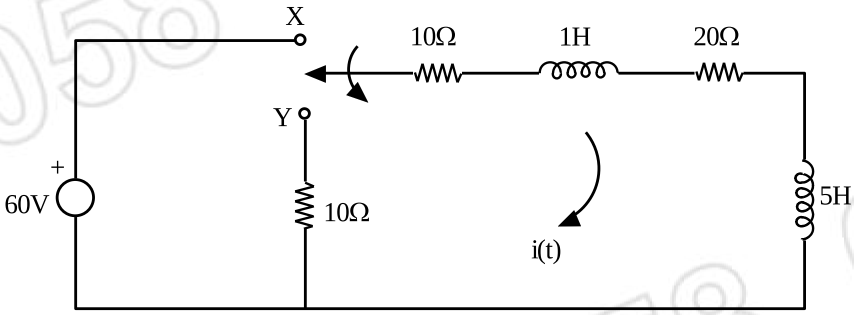
b) Express the function shown in fig. 9 (b) as a combination of step functions obtain it's Laplace transform. **7**



[Fig. 9(b)]

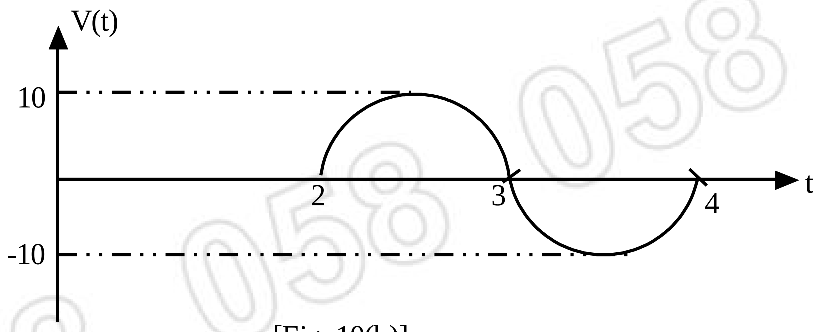
OR

10. a) Find the particular solution for the current i(t) in the network shown in Fig. 10 (a) when switch is moved from 'X' to 'Y' at t = 0. **7**



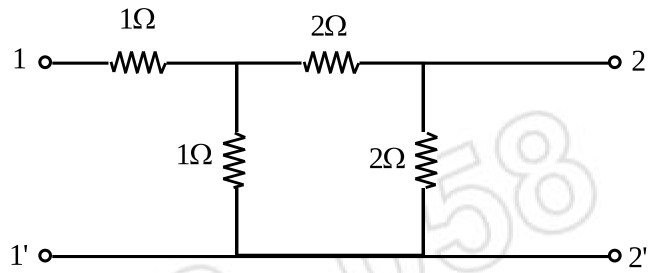
[Fig. 10 (a)]

b) Write the equation for following voltage waveform and find it's Laplace transform. Refer Fig. 10 (b). **7**



[Fig. 10(b)]

11. a) Obtain Z-parameters of a two-port network shown in fig. 11 (a). **7**



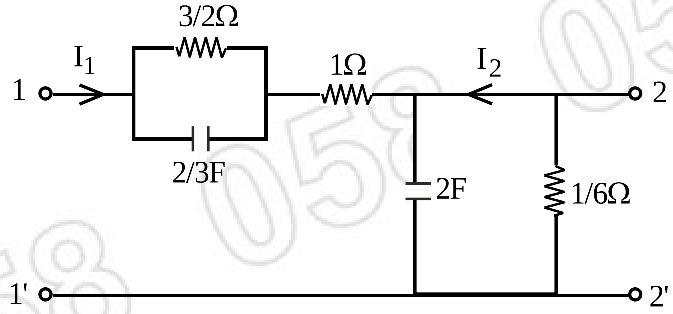
[Fig. 11 (a)]

b) Derive the condition for reciprocity interms of ABCD parameters for the two port network. **6**

OR

12. a) For the network shown in fig. 12 (a) show that, **7**

$$Y_{12} = \frac{K(S+1)}{(S+2)(S+4)}$$



[Fig. 12 (a)]

b) With the help of POLE - ZERO DIAGRAM, find f(t) if **6**

$$F(S) = \frac{10\,S}{(S+3)(S^2+2S+2)}$$

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