B.E. Electrical (Electronics & Power) Engineering / Electronics Engineering / Electronics & Telecommunication / Communication Engineering (CBCS Pattern) Third Semester CBCS+Old

3BEEE02/3BEEN04/3BEET05/EP 302/EN 303/ET 303

Network Analysis / Network Theory

P. Pages : 4 **GUG/W/18/11487**

Time : Three Hours * 3 5 7 2 * Max. Marks : 80

Notes : 1. All questions carry equal marks.
2. Assume suitable data wherever necessary.
3. Illustrate your answers wherever necessary with the help of neat sketches.
4. Use of non-programmable electronic calculator is permitted.

1. a) In the network of fig. Q. 1, Find the value of source voltage V_1, which results in zero current through $j5\Omega$ reactance use mesh analysis. **8**

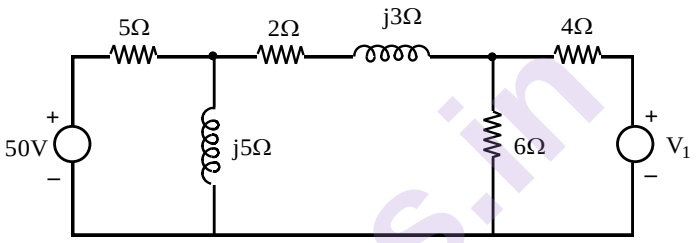


Fig. Q. 1

b) In the network of Fig. Q. 1, find the value of source voltage V_1, which results in current of 1A through $j5\Omega$ reactance. Use nodal analysis. **8**

OR

2. a) In the network of Fig. Q. 2(a), find the value of current through 4Ω resistance using mesh analysis. **8**

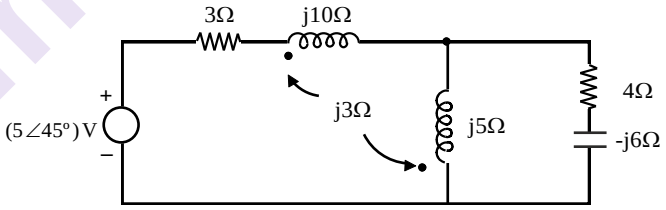


Fig. Q. 2 (a)

b) Using nodal analysis, find the value of current through 3Ω resistance in the network of fig. Q. 2(b). **8**

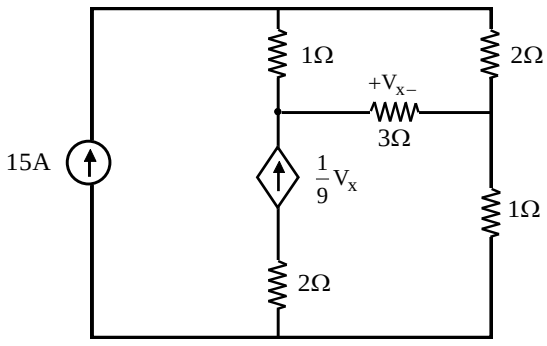


Fig. Q. 2 (b)

3. a) In the network of fig. Q.3 (a), find the value of current through 2Ω resistance using superposition theorem. **6**

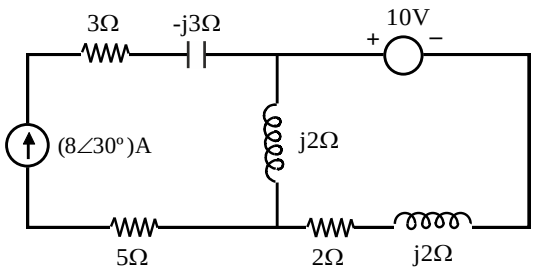


Fig. Q. 3 (a)

b) In the network of fig. Q.3(b), find the value of resistance R, which will draw maximum power from the network. Also find the value of maximum power. **10**

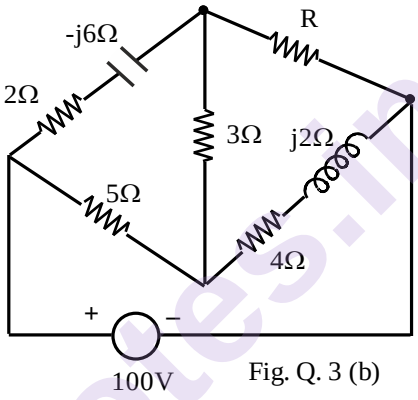


Fig. Q. 3 (b)

OR

4. a) Using Thevenin's theorem determine current through 6Ω resistance in the network of fig. Q. 4. **6**

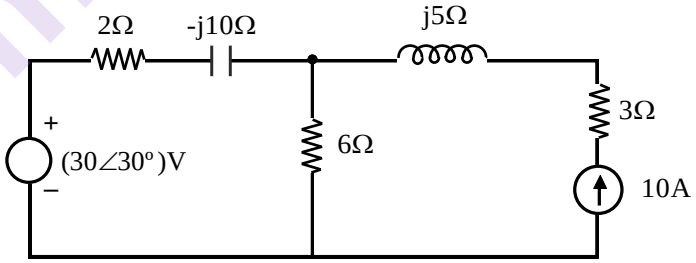


Fig. Q. 4 (a)

b) In the network of fig. Q.4, determine current through 6Ω resistance using Norton's theorem. **6**

c) State and prove Millman's theorem. **4**

5. a) With the help of example explain. **8**

i) Tree
ii) Basic cut-set
iii) Tie-set.

b) For the network shown in fig. Q.5(b) **8**

i) Draw oriented graph & select a tree ii) Write incidence matrix

iii) Write basic cut-set matrix iv) Write tie set matrix.

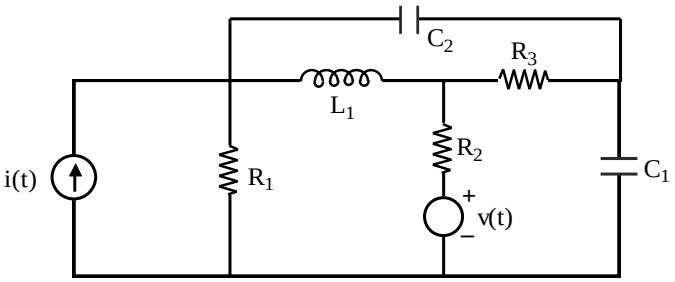


Fig. Q. 5(b)

OR

6. a) Find the trigonometric Fourier series for the triangular even waveform shown in fig. Q. 6. **8**

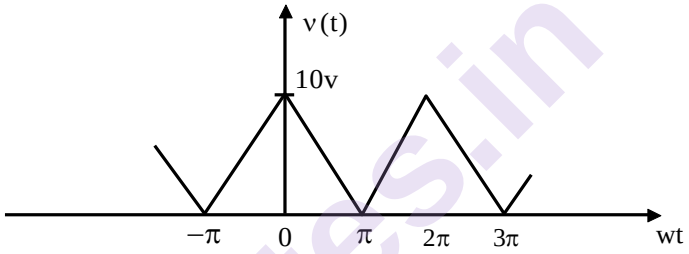


Fig. Q. 6

b) Determine the exponential form of Fourier series expansion for the periodic waveform shown in fig. Q. 6. **8**

7. a) For the network function given below, draw the pole-zero diagram and using the pole-zero diagram obtain the time domain response **8**

$$I(s) = \frac{4(s+2)s}{(s+1)(s+3)}$$

b) State the prove final value theorem prove final value theorem for the following functions- **8**

i) $6 \cdot \left(1 - e^{-t}\right)$ ii) $2 + e^{-3t} \cdot \cos 2t$

OR

8. a) Find the Laplace Transform of a periodic waveform shown in fig. Q. 8 (a). **8**

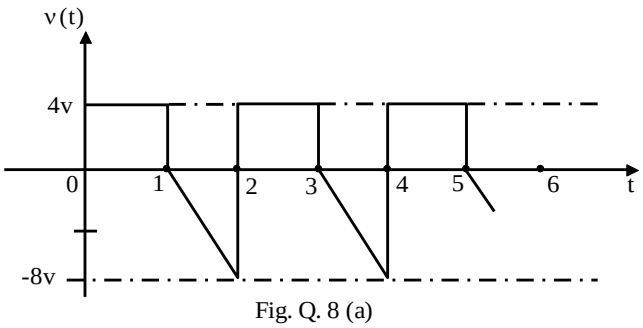


Fig. Q. 8 (a)

b) In the network shown in fig. Q8(b), switch S is closed and steady state is reached. Now at t = 0, switch S is opened obtain the expression for current through the inductor at t > 0. Use Laplase transform method. **8**

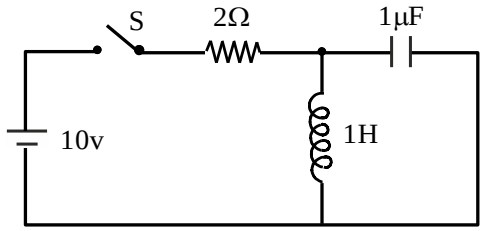


Fig. Q. 8 (b)

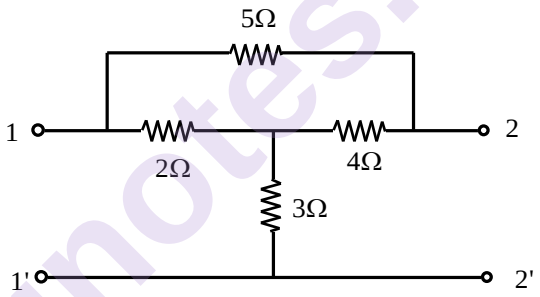
9. a) A network is characterized by the following equations. **8**

$I_1 = 0.5\ V_1 - 0.25\ V_2$

$I_2 = -0.25V_1 + 0.625\,V_2$

Determine Z-parameters and ABCD parameters of the network.

b) Find short circuit admittance parameters of the Network given in fig. Q.9 (b). Comment on reciprocity and symmetry of the network. **8**



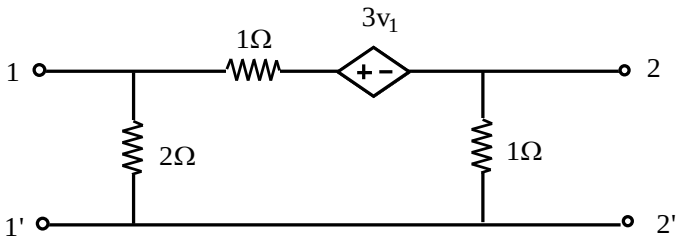
OR

10. a) A 400V, three phase star connected system has phase sequence RBY. The load connected in star has impedances **8**

$Z_R = (30 + J40)\Omega,\ Z_Y = (6 - j10)\Omega,\ Z_B = 100\Omega.$

Find line currents. Also calculate the total power consumed by the load.

b) Find hybrid parameters of the network given in fig. 10(b) and hence find Z parameters. Comment on reciprocity and symmetry. **8**



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