USN | | | | | | | | | | |

10ES34

Third Semester B.E. Degree Examination, June/July 2016
Network Analysis

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Using source transformation find current through R_L in the circuit shown in Fig. Q1(a). **(06 Marks)**

b. Using mesh current method find current through 10Ω resistor in the circuit shown in Fig. Q1(b). **(07 Marks)**

c. Find all the nodal voltages in the circuit shown in Fig Q1 (c). **(07 Marks)**

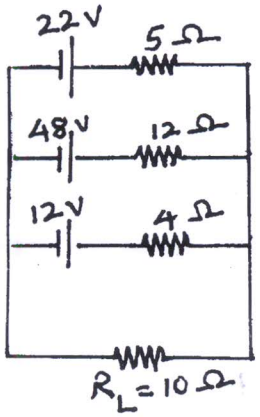


Fig. Q1(a)

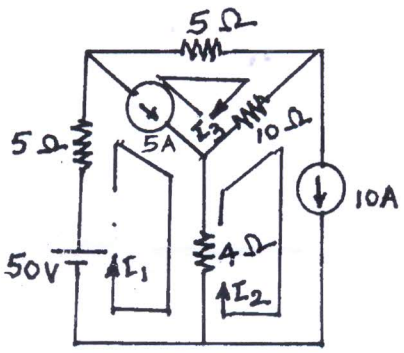


Fig. Q1(b)

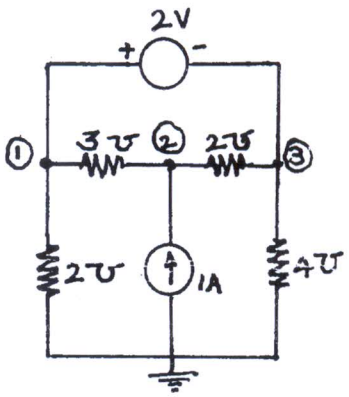


Fig. Q1(c)

2 a. With neat illustrations, distinguish between
i) Oriented and Non-oriented graphs
ii) Connected and un-connected graphs
iii) Tree and co-tree. **(06 Marks)**

b. For the network shown in Fig. Q2(b), draw the oriented graph. By selecting braches 4, 5 and 6 as twigs, write down tie-set schedule. Using this tie-set schedule, find all the branch currents and branch voltages. **(14 Marks)**

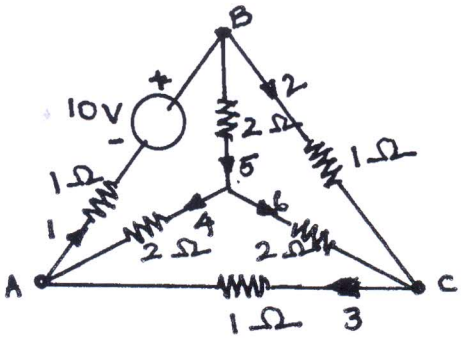


Fig. Q2(b)

3 a. State and illustrate superposition theorem. **(05 Marks)**

b. Using superposition theorem, find value of i in the circuit shown in Fig.Q3(b). **(08 Marks)**

c. Find the value of V_x in the circuit shown in Fig. Q3(c). Verify it using Reciprocity theorem. **(07Marks)**

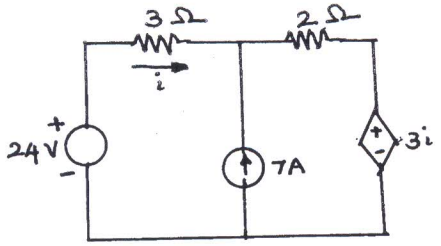


Fig.Q3(b)

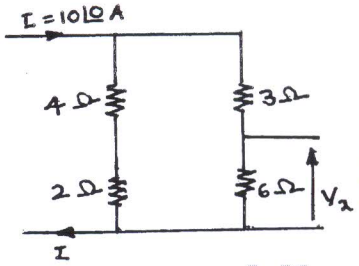
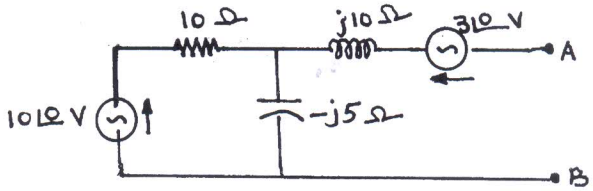


Fig. Q3(c)

4 a. Show that the power delivered to load, when the load impedance consists of variable resistance and variable reactance is maximum when the load impedance(Z_L) is equal to complex conjugate of source impedance (Z_g). **(10 Marks)**

b. Obtain Thevenin's equivalent network of the circuit shown in Fig. Q4(b) and thereby find current through 5Ω resistor connected between terminals A and B. **(10 Marks)**

Fig. Q4(b)



PART – B

5 a. With respect to series resonant circuit, define resonant frequency (f_r) and half power frequencies (f_1 and f_2). Also show that the resonant frequency is equal to the geometric mean of half power frequencies. **(10 Marks)**

b. A series circuit is energized by a constant voltage and constant frequency supply. Resonance takes place due to variation of inductance and the supply frequency is 300Hz. The capacitance in the circuit is 10μF. Determine the value of resistance in the circuit if the quality factor is 5. Also find the value of the inductance at half power frequencies. **(10 Marks)**

6 a. In the circuit shown in Fig. Q6(a), the switch K is changed from position A to B t = 0. After having reached steady state in position A. Find i, $\frac{di}{di}, \frac{d^2i}{dt^2}$ and $\frac{d^3i}{dt^3}$ at $t = 0^+$. **(10 Marks)**

b. In the circuit shown in Fig. Q6(b) switch K is opened at t = 0. Find i, $\frac{di}{dt}$, V_3 and $\frac{dV_3}{dt}$ at $t = 0^+$. **(10 Marks)**

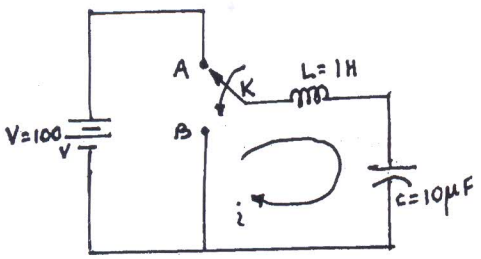


Fig. Q6(a)

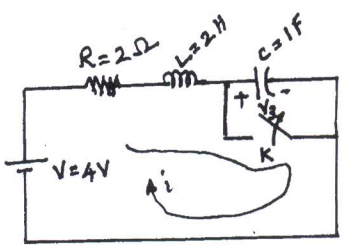


Fig. Q6(b)

7 a. Using convolution theorem find the inverse Laplace transform of following functions.

i) $F(s) = \frac{1}{(s-a)^2}$ and ii) $F(s) = \frac{1}{s(s+1)}$ **(10 Marks)**

b. Obtain the Laplace transform of the triangular waveform shown in Fig Q7(b). **(10 Marks)**

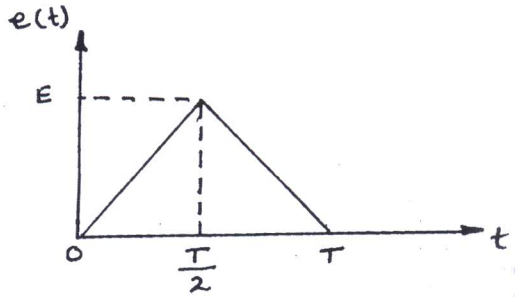


Fig. Q7(b)

8 a. Define h and T parameters of a two – port network. Also, derive the expressions for h parameters in terms of T parameters. **(10 Marks)**

b. Find Y and Z parameters for the network shown in Fig. Q8(b). **(10 Marks)**

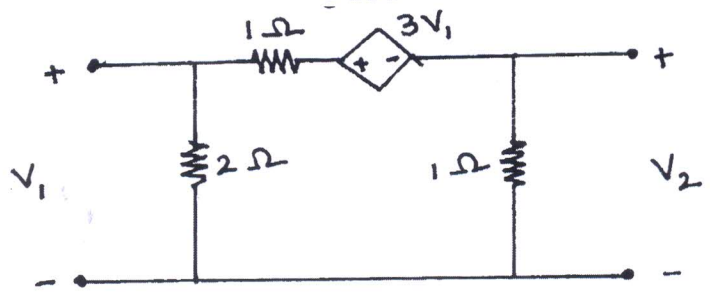


Fig. Q8(b)

* * * * *