

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)

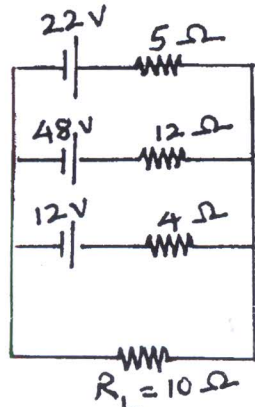


Fig. Q1(a)

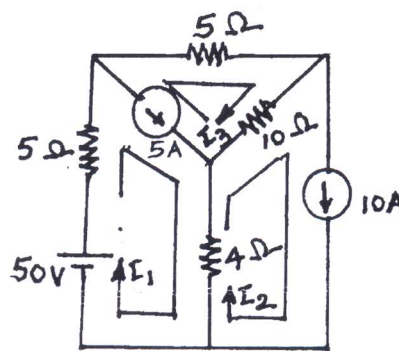


Fig. Q1(b)

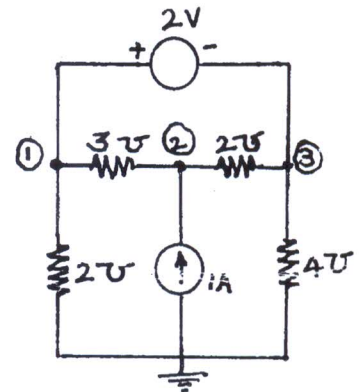


Fig. Q1(c)

- 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 branches 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)

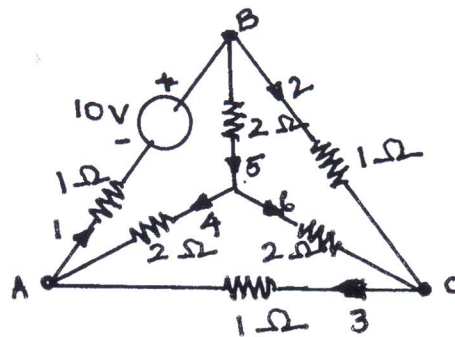


Fig. Q2(b)

- 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. (07 Marks)

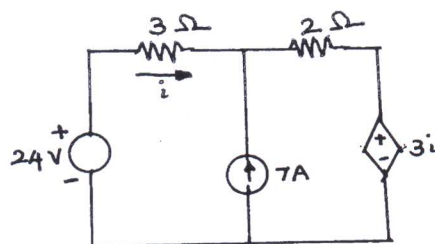


Fig. Q3(b)

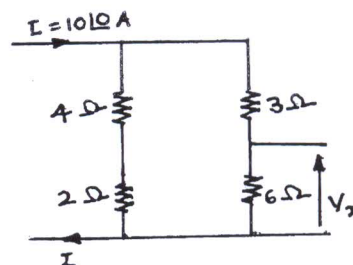


Fig. Q3(c)

- 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)

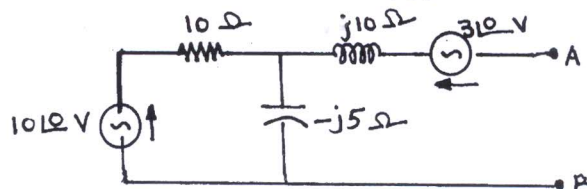


Fig. Q4(b)

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 $10\mu\text{F}$. 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 at $t = 0$. After having reached steady state in position A. Find i , $\frac{di}{dt}$, $\frac{d^2i}{dt^2}$ 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)

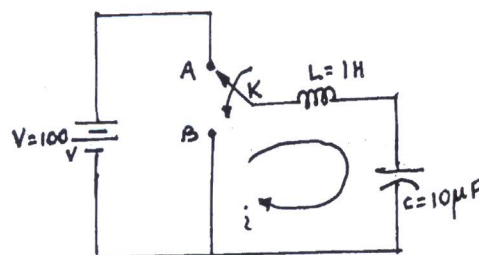


Fig. Q6(a)

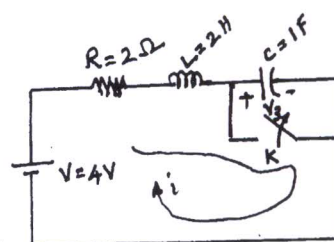


Fig. Q6(b)

- 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)

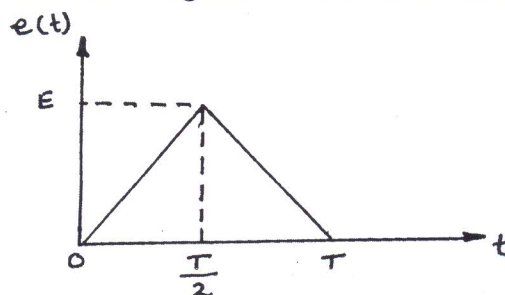


Fig. Q7(b)

- 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)

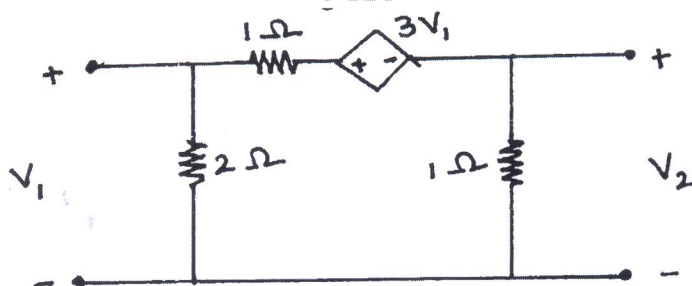


Fig. Q8(b)
