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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  $10\Omega$  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)

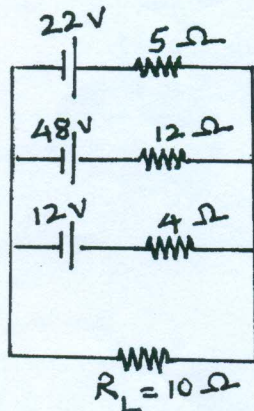


Fig. Q1(a)

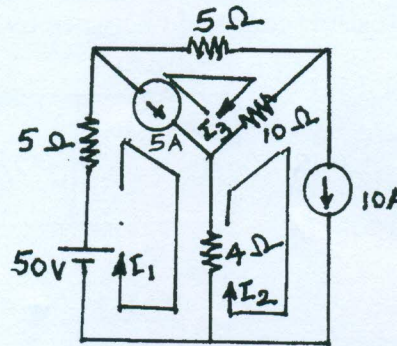


Fig. Q1(b)

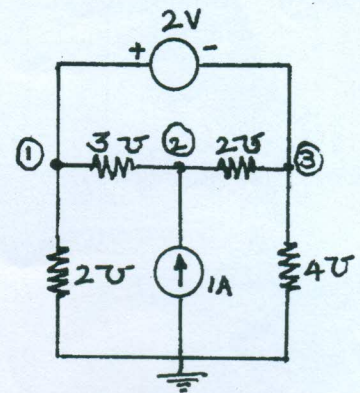


Fig. Q1(c)

- 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)

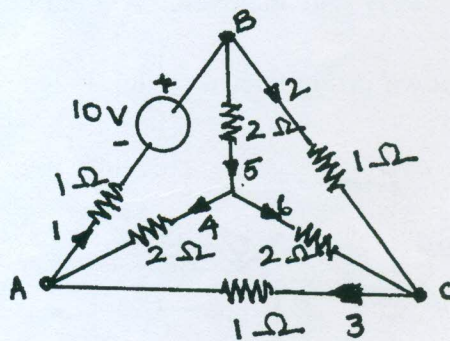


Fig. Q2(b)

Important Note : 1. On completing your answers, carefully draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

- 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)

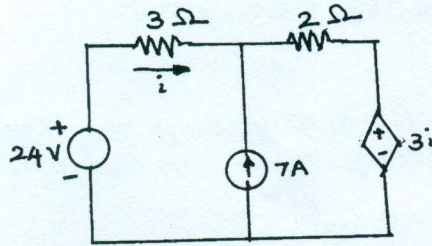


Fig.Q3(b)

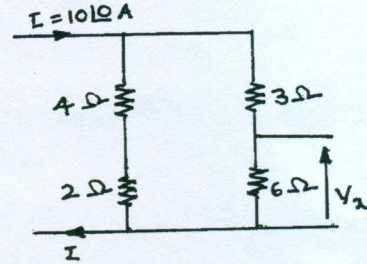


Fig. Q3(c)

- 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  $5\Omega$  resistor connected between terminals A and B. (10 Marks)

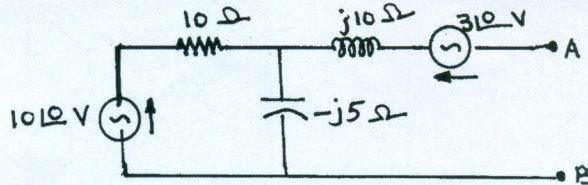


Fig. Q4(b)

**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  $t = 0$ . 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)

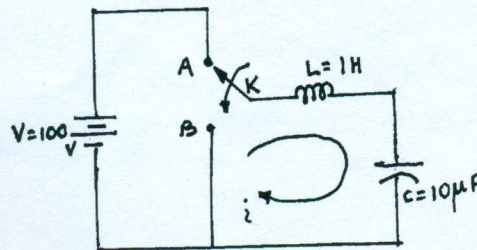


Fig. Q6(a)

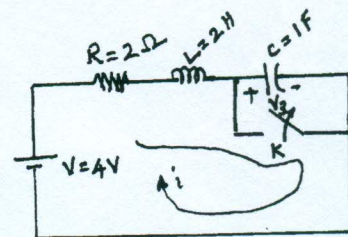


Fig. Q6(b)



- 7 a. Using convolution theorem find the inverse Laplace transform of following functions. (10 Marks)
- i)  $F(s) = \frac{1}{(s-a)^2}$  and ii)  $F(s) = \frac{1}{s(s+1)}$
- b. Obtain the Laplace transform of the triangular waveform shown in Fig Q7(b). (10 Marks)

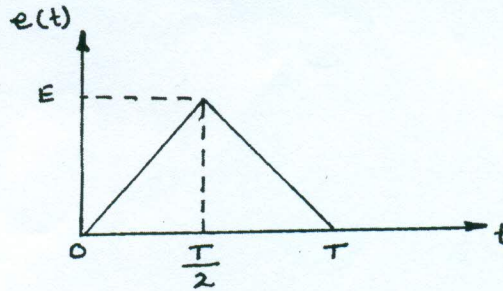


Fig. Q7(b)

- 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)

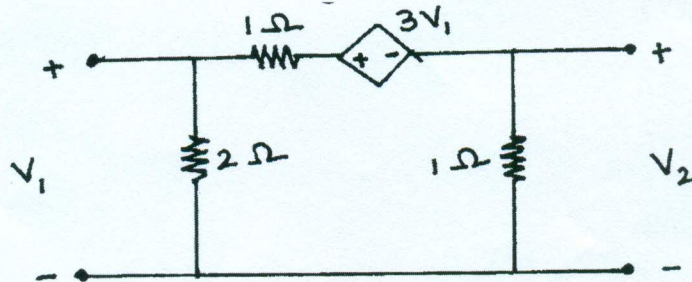


Fig. Q8(b)

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