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10ES34

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018
Network Analysis

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Define the following terms with examples :
i) Lumped Element ii) Active Element iii) Practical Source. **(03 Marks)**

b. Find the current I_3 using mesh analysis for the circuit shown in fig.Q1(b), if the circuit is operating at frequency 5000 rad/s. **(07 Marks)**

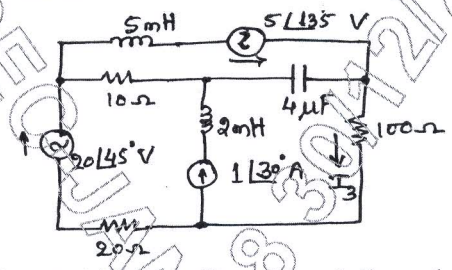


Fig.Q1(b)

c. For the circuit shown in fig. Q1(c), find the power delivered by dependent source using node analysis. **(06 Marks)**

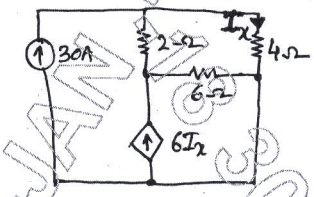


Fig.Q1(c)

d. Find the resistance R_{AB} for the network shown in fig.Q(d), using Δ - Y conversion. **(04 Marks)**

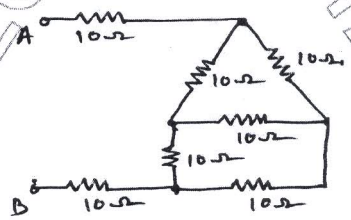


Fig.Q1(d)

2 a. Define the following terms with example :
i) Graph ii) Tree iii) Co - tree. **(03 Marks)**

b. For the circuit in fig.Q2(b), write the tie – set matrix using AB, BC and CA or the links of the tree. Obtain the equilibrium equations in matrix from using KVL and calculate all loop currents and branch voltages. **(10 Marks)**

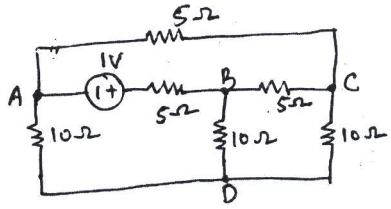


Fig.Q2(b)

c. Draw the oriented graph for the circuit shown in fig.Q2(c). Also find fundamental cut – set schedule using X_{c1} , R_2 and X_{L1} or the twigs of the tree. Find admittance matrix also. **(04 Marks)**

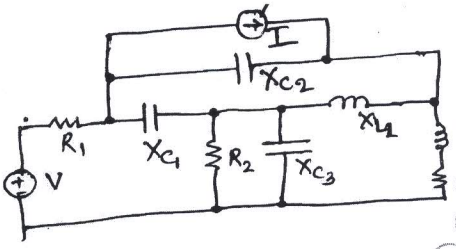


Fig.Q2(c)

d. Find the dual of the circuit shown in fig.Q2(d). **(03 Marks)**

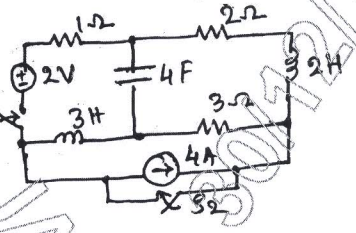


Fig.Q2(d)

3 a. Find V_x using superposition for the circuit shown in fig.Q3(a). **(08 Marks)**

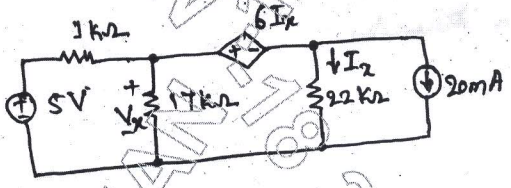


Fig.Q3(a)

b. Find the voltage V_L across the inductor and verify reciprocity theorem for the circuit shown in Fig.Q3(b). **(06 Marks)**

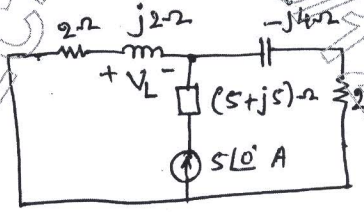


Fig.Q3(b)

c. State and prove Milliman's theorem. **(06 Marks)**

4 a. Find the Thevenin's equivalent circuit across terminals a & b for the circuit shown in fig.Q4(a). Also find the current I_L using this equivalent circuit. **(08 Marks)**

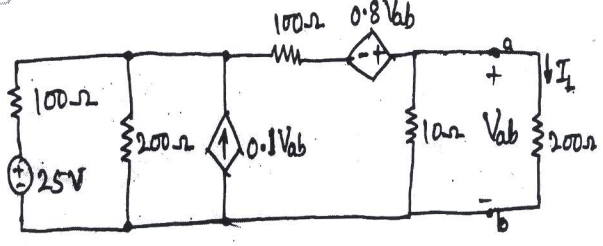
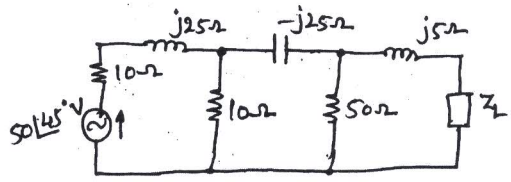


Fig.Q4(a)

b. State and prove Norton's theorem. **(05 Marks)**

c. Find Z_L for maximum power transfer for the circuit shown in fig.Q4(c). And also find the average maximum power absorbed by Z_L. **(07 Marks)**

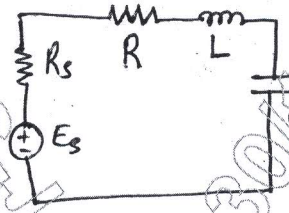
Fig.Q4(c)



PART – B

5 a. For the circuit shown in fig.Q5(a), find the transfer function, resonant frequency half power frequencies , bandwidth and Q - factor. **(10 Marks)**

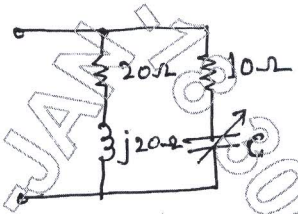
Fig.Q5(a)



b. Define the term Q – factor. Using this definition find the Q – factor of an inductor and a capacitor. **(05 Marks)**

c. For the network shown in fig.Q5(c), find the value of C for resonance to take place at w = 5000 rad/s. **(05 Marks)**

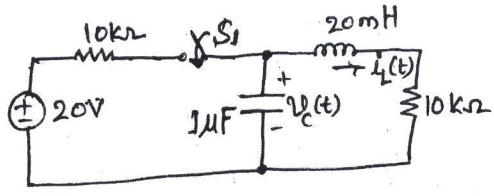
Fig.Q5(c)



6 a. Write a short note on Initial and Final conditions of circuit elements under switching conditions. **(06 Marks)**

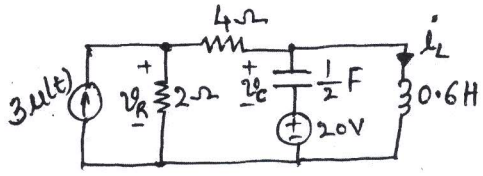
b. In the circuit shown in fig.Q6(b), the switch S_1 has been open for a long time before closing at t = 0. Find $V_c(0^+)$, $i_L(0^+)$, $Vc(\infty)$, $i_L(\infty)$, $\frac{di_L}{dt}(0^+)$ and $\frac{d^2i_L}{dt^2}(0^+)$. **(06 Marks)**

Fig.Q6(b)



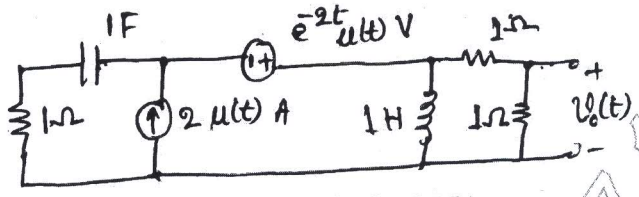
c. For the circuit shown in fig.Q6(c), calculate $i_L(0^+)$ $\frac{di_L(0^+)}{dt}$, $\frac{d}{dt}V_c(0^+)$, $V_R(\infty)$, $V_c(\infty)$ and $i_L(\infty)$ **(08 Marks)**

Fig.Q6(c)



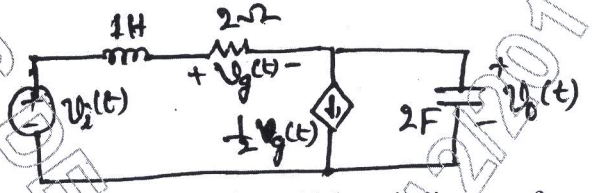
7 a. Find $V_o(t)$ of the circuit shown in fig.Q7(a). **(10 Marks)**

Fig.Q7(a)



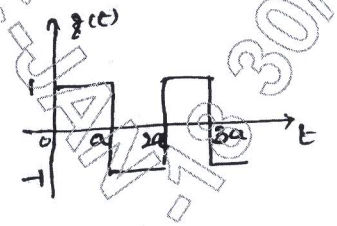
b. Find the impulse response of the circuit shown in fig.Q7(b). **(06 Marks)**

Fig.Q7(b)



c. Find the Laplace Transform of non – sinusoidal periodic waveform shown in fig.Q7(c). **(04 Marks)**

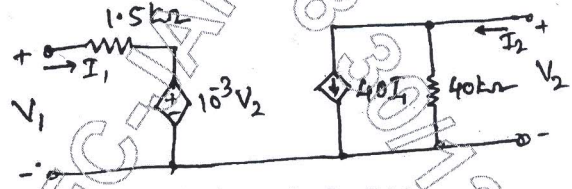
Fig.Q7(c)



8 a. Find the Z – transform in terms of Y - parameters. **(04 Marks)**

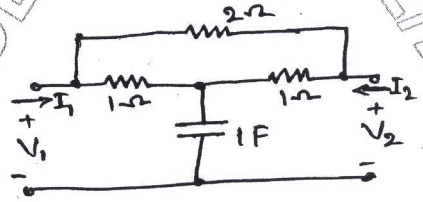
b. For the network shown in fig.Q8(b), find the transmission line parameters. **(08 Marks)**

Fig.Q8(b)



c. Find the h – parameters of the network shown in fig.Q8(c). **(08 Marks)**

Fig.Q8(c)



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