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10ES34

Third Semester B.E. Degree Examination, June / July 2014
Network Analysis

Time: 3 hrs. Max. Marks:100

Note:1. ***Answer FIVE full questions, selecting at least TWO questions from each part.***
2. ***Assume suitable missing data if any.***

PART – A

1 a. The node equations of a network are $\left[\frac{1}{5}+\frac{1}{2}j+\frac{1}{4}\right]V_1-\frac{1}{4}V_2=\frac{50\angle 0^\circ}{5}$ and $-\frac{1}{4}V_1+\left[\frac{1}{4}-\frac{1}{2j}+\frac{1}{2}\right]V_2=\frac{50\angle 90^\circ}{2}$. Derive the network. **(10 Marks)**

b. Find the current I in 28 Ω resistor by mesh analysis in Fig. Q1 (b). **(05 Marks)**

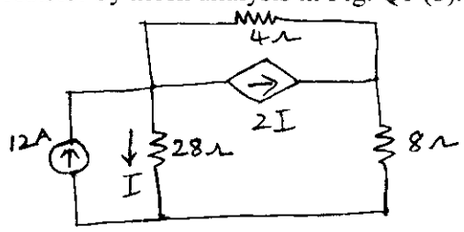

Fig. Q1 (b)

c. Using source transformation find power delivered by 50 V source in given network of Fig. Q1 (c). **(05 Marks)**

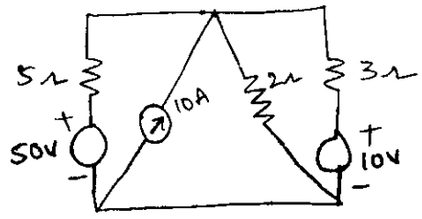

Fig. Q1 (c)

2 a. Define the following terms with respect to network topology and give examples:
i) Oriented and unoriented graphs.
ii) Isomorphic graphs.
iii) Fundamental cut set. **(06 Marks)**

b. For the network shown in Fig. Q2 (b), write the tie set schedule selecting centre star as tree and find all the branch currents by solving equilibrium equations. **(10 Marks)**

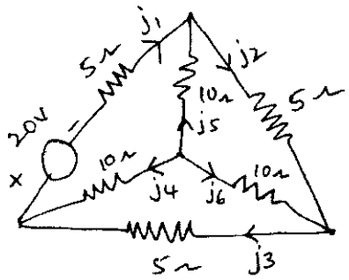

Fig. Q2 (b)

c. For the network shown in Fig. Q2 (c) draw the dual network. **(04 Marks)**

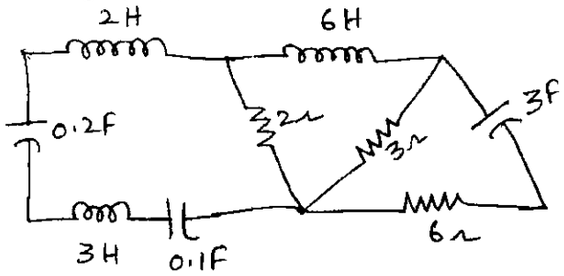

Fig. Q2 (c)

3 a. State and prove superposition theorem. **(06 Marks)**

b. Find i_x and hence verify reciprocity theorem for the network in Fig. Q3 (b). **(08 Marks)**

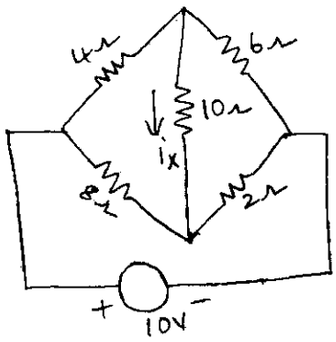

Fig. Q3 (b)

c. Using Millman's theorem find I_L through R_L for the network of Fig. Q3 (c). **(06 Marks)**

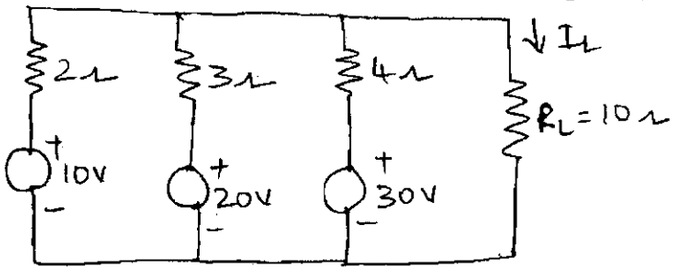

Fig. Q3 (c)

4 a. State and prove Thevenin's theorem. **(06 Marks)**

b. Find the value of load resistance when maximum power is transferred across it and also find the value of maximum power transferred for the network of Fig. Q4 (b). **(08 Marks)**

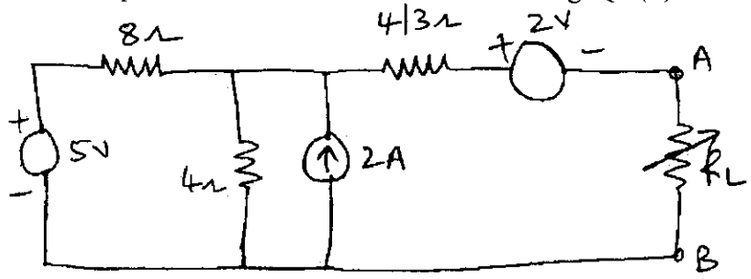

Fig. Q4 (b)

4 c. Find the current through 16 Ω resistor using Nortons theorem in Fig. Q4 (c). **(06 Marks)**

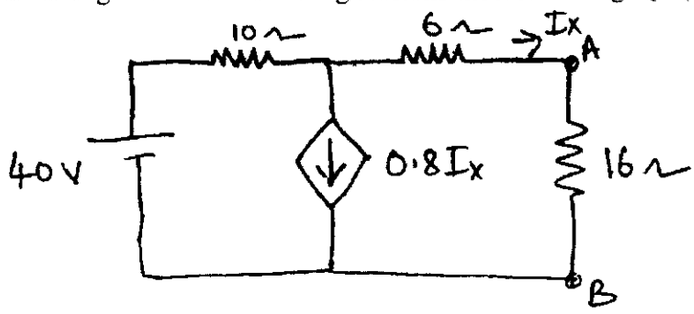

Fig. Q4 (c)

PART – B

5 a. Define the following terms: i) Resonance ii) Q-Factor iii) Selectivity of series RLC circuit iv) Bandwidth **(04 Marks)**

b. Prove that $f_0 = \sqrt{f_1 f_2}$ where f_1 and f_2 are the two half power frequencies of a resonant circuits. **(08 Marks)**

c. A series RLC circuit has R = 4 Ω, L = 1 mH and C = 10 μF. Calculate Q factor, band width, resonant frequency and the half power frequencies f_1 and f_2. **(08 Marks)**

6 a. For the circuit shown in Fig. Q6 (a), determine complete solution for current when switch K is closed at t = 0. Applied voltage is v(t) which is given as $100\cos\left(10^3 t + \frac{\pi}{2}\right)$. **(10 Marks)**

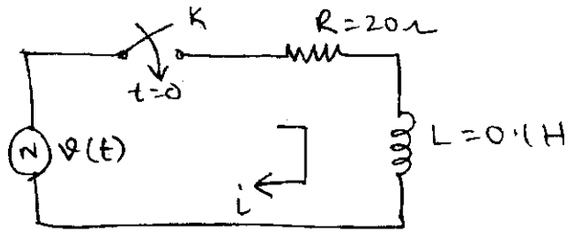

Fig. Q6 (a)

b. For the given circuit of Fig. Q6 (b) switch K is changed from position 1 to position 2 at t = 0, the steady state having been reached before switching. Find the values of i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^-$. **(10 Marks)**

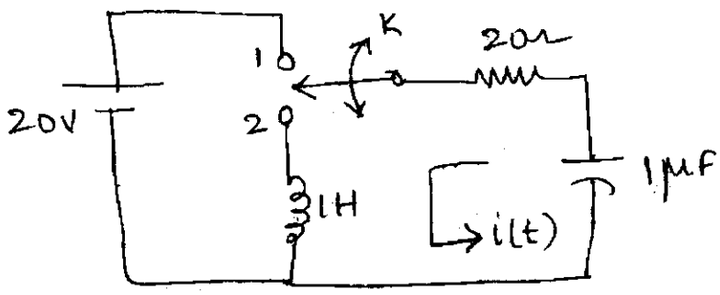

Fig. Q6 (b)

7 a. State and prove initial value and final value theorem. **(08 Marks)**

b. Obtain the Laplace transform of the saw tooth waveform shown in Fig. Q7 (b). **(08 Marks)**

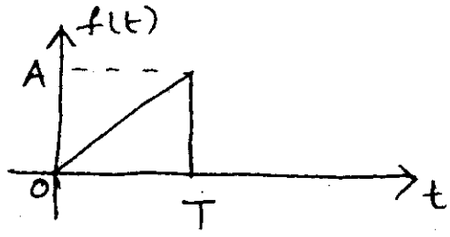

Fig. Q7 (b)

c. Find the Laplace transform of , (i) t (ii) $\delta(t)$. **(04 Marks)**

8 a. Obtain the relationship between h and y parameters of a two port network. **(08 Marks)**

b. Determine the transmission parameters for the network shown in Fig. Q8 (b). **(08 Marks)**

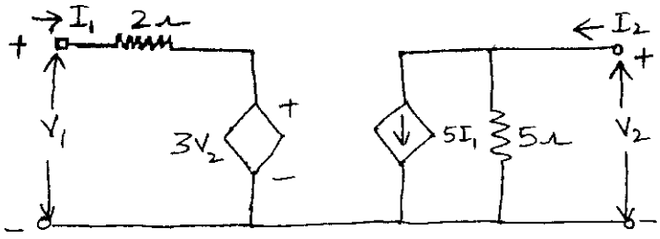

Fig. Q8 (b)

c. Define z parameters and draw the equivalent network in terms of z parameters. **(04 Marks)**

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