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10ES34

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019
Network Analysis

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. For the circuit shown in Fig Q1(a) find the mesh current I_3.

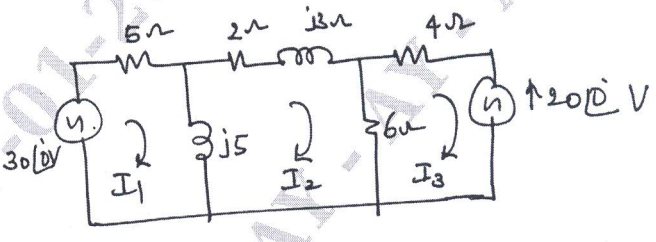

Fig Q1(a) **(06 Marks)**

b. Using node voltge analysis find the currents in each branch of the network shown in Fig Q1(b).

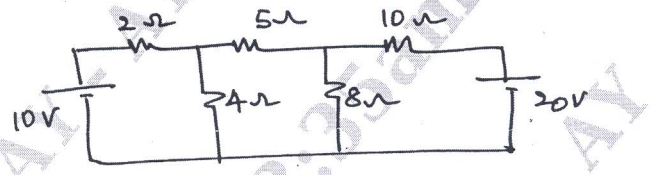

Fig Q1(b) **(07 Marks)**

c. Find the resistance between the terminals A and B in the circuit shown in Fig Q1(c)

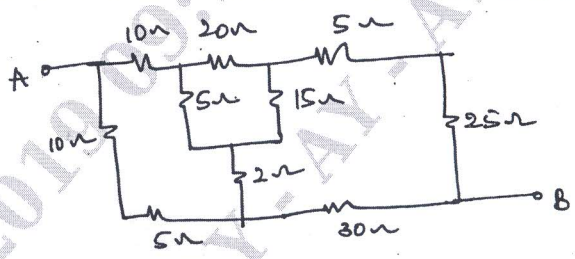

Fig Q1 (c) **(07 Marks)**

2 a. Define the following terms with respect to the network topology.
i) True ii) Graph iii) Co-tree iv) Tieset v) Cutset **(10 Marks)**

b. In the network shown in Fig Q2(b) consider branches 1, 3, 4 forming a tree. Write tie set schedule and hence write equilibrium equation on loop current basis and find the values of loop currents.

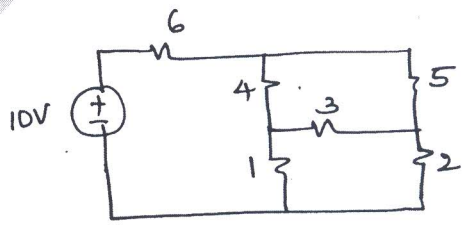

Fig Q2(b) **(10 Marks)**

3 a. State and explain (i) Reciprocity theorem (ii) Millman's theorem as applied to electrical circuits. **(10 Marks)**

b. By using superposition theorem, find the current through $R_L = 7.5\Omega$ in the network shown in Fig Q3(b).

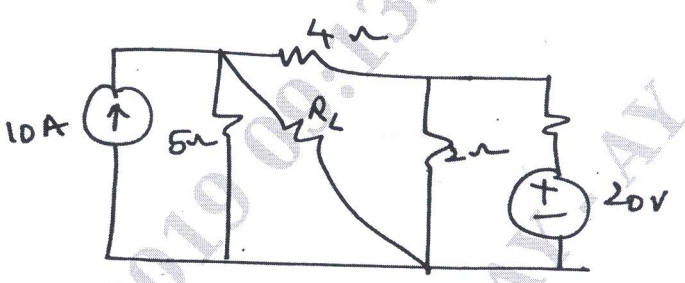

Fig Q3(b) **(10 Marks)**

4 a. Determine the current through 1Ω resistor connected across AB in the network shown in Fig Q4(a) using Norton's theorem.

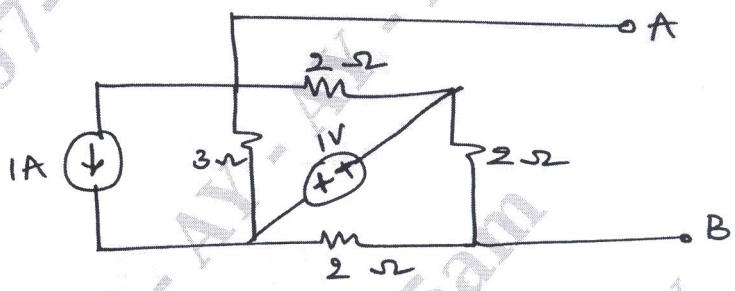

Fig Q4(a)

b. State and explain Thevenin's theorem. **(08 Marks)**

c. Find the value of R for which the power transferred across AB of the circuit shown in Fig Q4(c) is maximum and the maximum power transferred. **(04 Marks)**

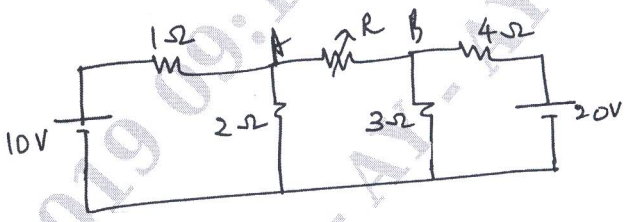

Fig Q4(c) **(08 Marks)**

PART – B

5 a. An RLC series circuit has a resistance of 10Ω a capacitance of 100μF and a variable inductance.

i) Find the value of the inductance of which the voltage across the resistance is maximum

ii) Q factor

iii) Voltage drops across R, L and C.

The applied voltage is 230V, 50Hz. **(06 Marks)**

b. Give the comparison between series resonance and parallel resonance. **(06 Marks)**

c. Derive an expression for the resonance frequency of a resonant circuit consisting of R_L, L in parallel with R_L C. draw the frequency response curve of the above circuit, indicating the half power frequencies **(08 Marks)**

6 a. In the network of Fig Q6(a), the switch K is closed at t = 0, with the capacitor uncharged. Find the values of i, $\frac{d_i}{dt}$, $\frac{d^2i}{dt^2}$ at $t = 0^+$, for elements V = 100V, R = 1000Ω, C = 1μF. **(10 Marks)**

b. For the circuit shown in Fig Q6(b) the switch is opened at t = 0. Find the value of V, $\frac{dv}{dt}$ and $\frac{d^2v}{dt^2}$ at $t = 0^+$

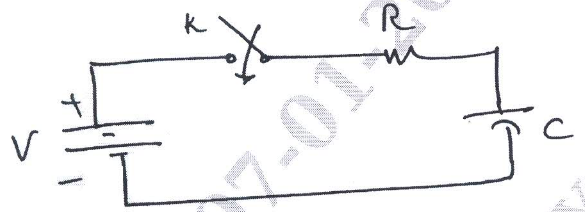

Fig Q6(a)

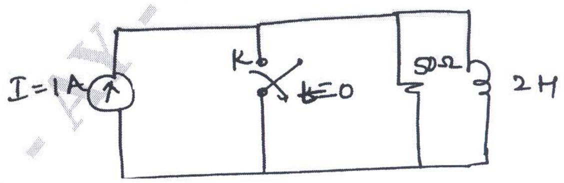

Fig Q6(b)

(10 Marks)

7 a. In the circuit shown in Fig Q7(a), the switch is closed at t = 0. Calculate the expression of the resulting currents using Laplace transform.

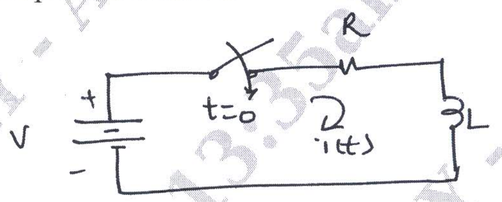

Fig Q7(a) **(10 Marks)**

b. Use initial and final value theorem to find f(0) and f(∞) for the following

i) $f(s) = \frac{s^3 + 7s^2 + 5}{s(s^3 + 3s^2 + 4s + 2)}$

ii) $f(s) = \frac{e^{2s}(s+2)}{s^2 + 5}$ **(10 Marks)**

8 a. Find Y parameters for the network shown in Fig Q8(a) **(08 Marks)**

b. Determine the ABCD parameters for the network shown in Fig Q8(b). **(12 Marks)**

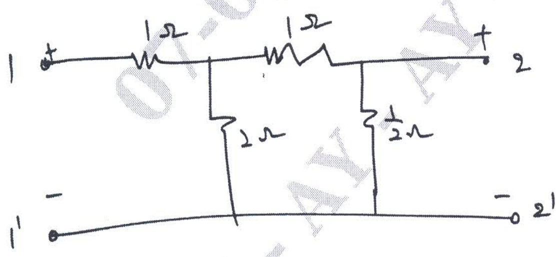

Fig Q8(a)

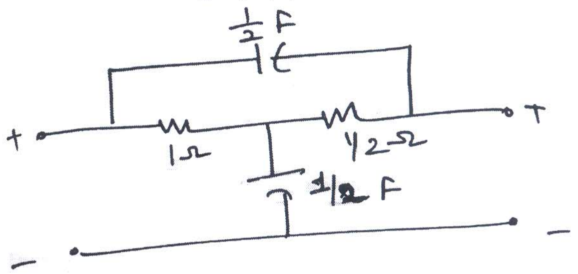

Fig Q8(b)

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