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Third Semester B.E. Degree Examination, Dec.2019/Jan.2020 Network Theory

Time: 3 hrs.

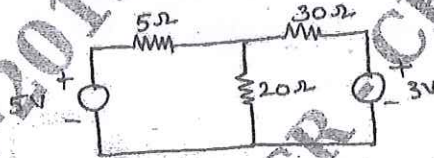
Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

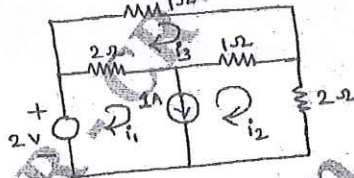
- 1 a. Using source transformation technique find the current through 5Ω resistor for the circuit shown in Fig.Q.1(a) (06 Marks)

Fig.Q.1(a)



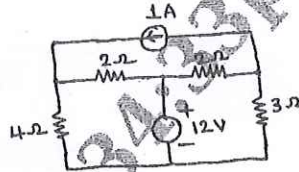
- b. Use Mesh Analysis to determine the Mesh currents i_1 , i_2 and i_3 for the network shown in Fig.Q.1(b). (06 Marks)

Fig.Q.1(b)



- c. Find the power delivered by 1A current source using nodal analysis for the circuit shown in Fig.Q.1(c). (08 Marks)

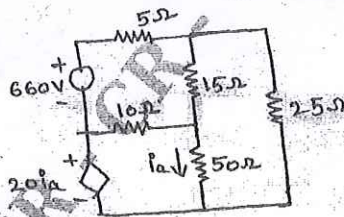
Fig.Q.1(c)



OR

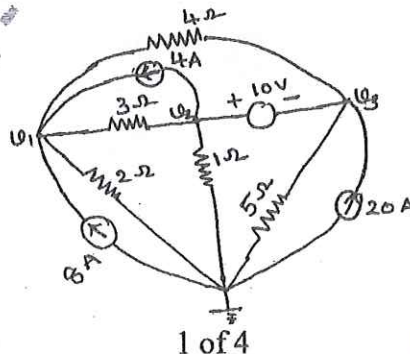
- 2 a. Three Impedances are connected in delta, obtain the star equivalent of the network. (06 Marks)
- b. Use Mesh Analysis to find the power delivered by the dependent voltage source in the circuit shown in Fig.Q.2(b). (06 Marks)

Fig.Q.2(b)



- c. Determine all the node voltages for the circuit shown in Fig.Q.2(c) using nodal analysis. (08 Marks)

Fig.Q.2(c)



Important Note : 1. On completing your answers, compulsorily 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.

Module-2

- 3 a. State and explain superposition theorem (06 Marks)
 b. Use Millman's Theorem to find the current flowing through $(2 + j3)\Omega$ impedance for the circuit shown in Fig.Q.3(b). (08 Marks)

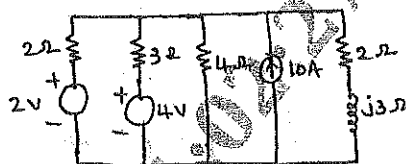


Fig.Q.3(b)

- c. State and prove Norton's theorem. (06 Marks)

OR

- 4 a. Find the Thevenin's equivalent for the circuit shown in Fig.Q.4(a) with respect to terminals X-Y. (08 Marks)

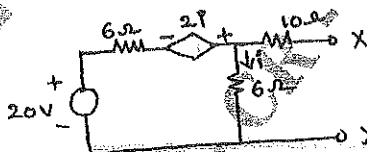


Fig.Q.4(a)

- b. Find the condition for maximum power transfer in the AC circuit, where both R_L and X_L are varying. (06 Marks)
 c. Determine the current through the load resistance using Norton's Theorem for the circuit shown in Fig.Q.4(c). (06 Marks)

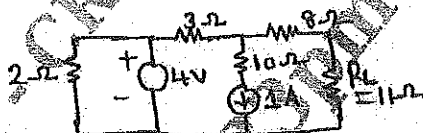


Fig.Q.4(c)

Module-3

- 5 a. Explain the behavior of R, L, C elements at the time of switching at $t = 0$, at $t = 0^+$ and $t = \infty$. (07 Marks)
 b. In the network shown in Fig.Q.5(b). Find i , $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$. Assume that the capacitor is initially uncharged. (07 Marks)

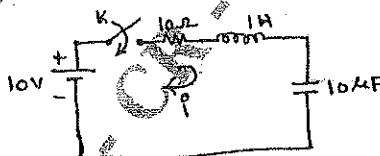


Fig.Q.5(b)

- c. In the network shown in Fig.Q.5(c) find, i , $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$. The switch k is closed at $t = 0$ with zero current in the inductor. (06 Marks)

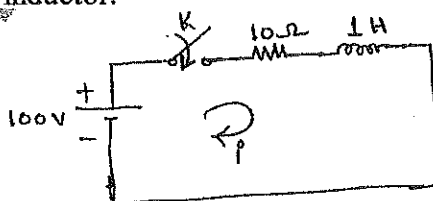


Fig.Q.5(c)

OR

- 6 a. In the network shown in Fig.Q.6(a). The switch k is changed from position a to b at $t = 0$, the steady state is reached at position a. Find i , $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$. Assume that the capacitor is initially uncharged. (10 Marks)

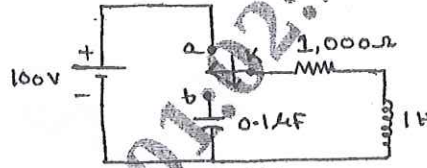


Fig.Q.6(a)

- b. For the network shown in Fig.Q.6(b). The network is in steady state with switch k is closed. At $t = 0$, the switch is opened. Determine the voltage across the switch V_k and $\frac{d}{dt}V_k$ at $t = 0^+$. (10 Marks)

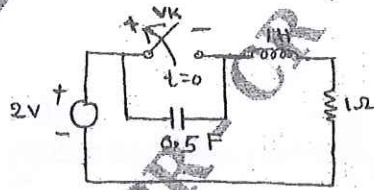


Fig.Q.6(b)

Module-4

- 7 a. Obtain Laplace transform of
 i) Step function
 ii) Ramp function
 iii) Impulse function. (09 Marks)
- b. Find the Laplace transform of the periodic signal $x(t)$ as shown in Fig.Q.7(b). (11 Marks)

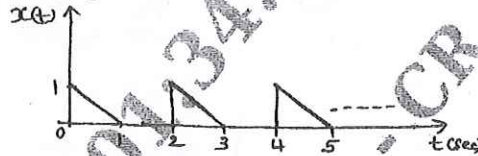


Fig.Q.7(b)

OR

- 8 a. In the series RL circuit shown in Fig.Q.8(a), the source voltage is $v(t) = 50 \sin 250t$ V. Using Laplace transform determine, the current when switch K is closed at $t = 0$. (10 Marks)

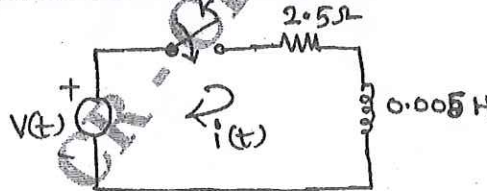


Fig.Q.8(a)

- b. Find the Laplace transform of the non-sinusoidal periodic waveform shown in Fig.Q.8(b)

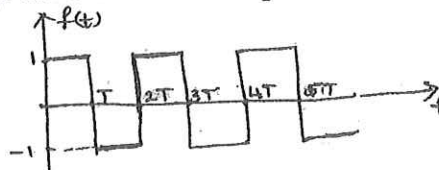


Fig.Q.8(b)

(10 Marks)

Module-5

- 9 a. Define Z parameters. Determine Z parameters in terms of Y parameters. (06 Marks)
- b. Determine h parameters of the circuit shown in Fig.Q.9(b) (07 Marks)

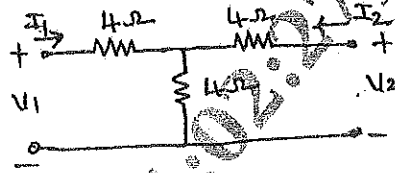


Fig.Q.9(b)

- c. For the network shown in Fig.Q.9(c) Find the transmission parameters. (07 Marks)

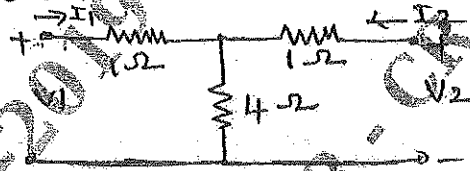


Fig.Q.9(c)

OR

- 10 a. Define Q-factor, selectivity and Band width. (03 Marks)
- b. A series RLC circuit has a resistance of 10Ω , an inductance of 0.3H and a capacitance of $100\mu\text{F}$. The applied voltage is 230V . Find: i) The resonant frequency ii) lower and upper cut off frequencies iii) current at resonance iv) currents at f_1 and f_2 v) Voltage across the inductance at resonance. (07 Marks)
- c. Derive the expression for the resonant frequency of the circuit shown in Fig.Q.10(c). Also show that the circuit will resonate at all frequency if $R_L = R_C = \sqrt{\frac{L}{C}}$. (10 Marks)

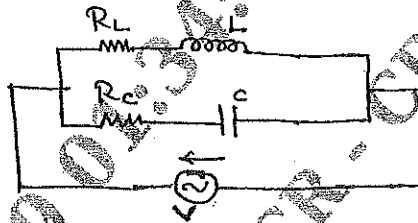


Fig.Q.10(c)

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