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18EC32

Third Semester B.E. Degree Examination, Feb./Mar. 2022

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. Determine current through 12Ω resistor shown in Fig.Q1(a), using source transformation.

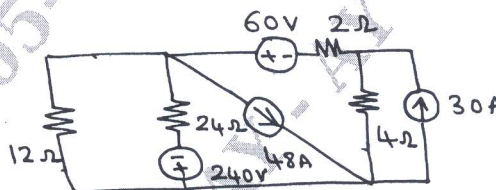


Fig.Q1(a)

(08 Marks)

- b. Find the equivalent resistance of the circuit shown in Fig.Q1(b), using star delta transformation.

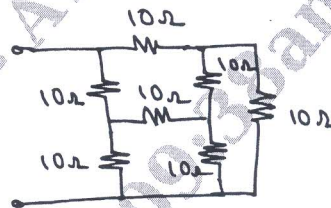


Fig.Q1(b)

(08 Marks)

- c. Discuss the dependent sources.

(04 Marks)

OR

- 2 a. Using loop analysis, find the current through 10Ω resistor for the circuit shown in Fig.Q2(a).

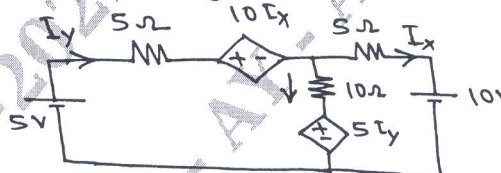


Fig.Q2(a)

(08 Marks)

- b. For the network shown in Fig.Q2(b), determine node voltages V_1, V_2, V_3 and V_4 using nodal analysis.

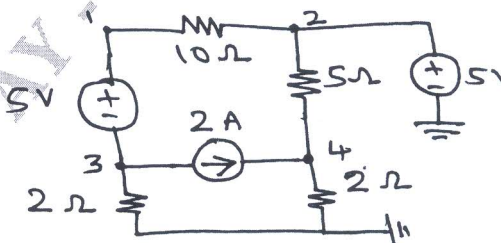


Fig.Q2(b)

(08 Marks)

- c. Explain the super Mesh with example.

(04 Marks)

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. Using super position theorem, find the current through 20Ω resistor shown in Fig.Q3(a).



Fig.Q3(a)

(08 Marks)

- b. Using Millman's theorem, determine the current through $(2 + j2)\Omega$ impedance for the network shown in Fig.Q3(b).

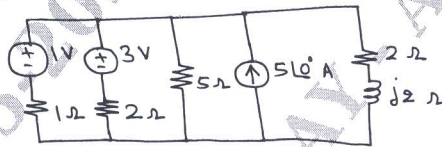


Fig.Q3(b)

(08 Marks)

- c. State the Norton's theorem and also write the procedure to be followed for solving the problem. (04 Marks)

OR

- 4 a. What should be the value of R such that maximum power transfer can take place from the rest of the network to R . Obtain the amount of this power for circuit shown in Fig.Q4(a).

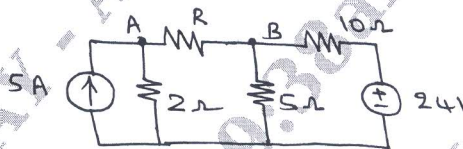


Fig.Q4(a)

(08 Marks)

- b. Obtain the Thevenin's equivalent circuit cross AB for the circuit shown in Fig.Q4(b).

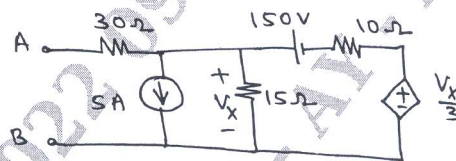


Fig.Q4(b)

(08 Marks)

- c. State the maximum power transfer theorem and also write equation of P_{max} for both DC and AC circuits. (04 Marks)

Module-3

- 5 a. Explain the transient behavior of the resistance, inductance and capacitor. Also write the procedure for evaluating transient behavior. (10 Marks)
- b. In the network shown in Fig.Q5(b), a steady state is reached with the switch 'K' open. At $t = 0$ the switch is closed. Determine the value of $V_a(0^+)$ and $V_a(0^-)$.

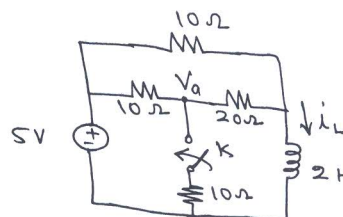


Fig.Q5(b)

(10 Marks)

OR

- 6 a. For the network shown in Fig.Q6(a) $V_1(t) = e^{-t}$ for $t \geq 0$ and is zero for all $t < 0$. If the capacitor is initially uncharged determine the value of $\frac{d^2v_2}{dt^2}$ and $\frac{d^3v_2}{dt^3}$ at $t = 0^+$.

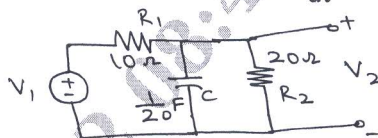


Fig.Q6(a)

(10 Marks)

- b. The switch 'S' is changed from position 1 to position 2 at $t = 0$. Steady state conditions have been reached in position 1. Find the value of i , $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$ for the circuit shown in Fig.Q6(b).

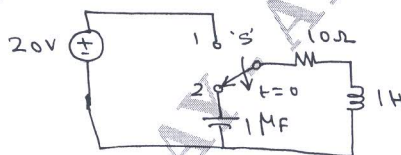


Fig.Q6(b)

(10 Marks)

Module-4

- 7 a. Find the Laplace transform of $f(t)$ shown in Fig.Q7(a).

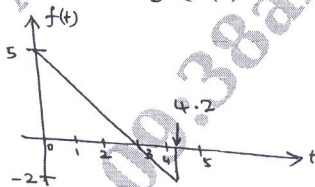


Fig.Q7(a)

(10 Marks)

- b. Find the Laplace transform of the pulse shown in Fig.Q7(b).

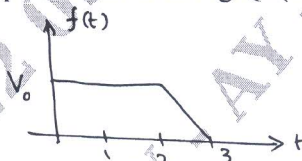


Fig.Q7(b)

(10 Marks)

OR

- 8 a. Find $i(t)$ for the circuit shown in Fig.Q8(a).

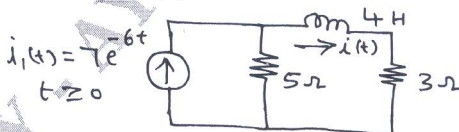


Fig.Q8(a)

(10 Marks)

- b. A voltage pulse of 10V and 5μsec duration is applied to the RC network shown in Fig.Q8(b). Find the current $i(t)$.

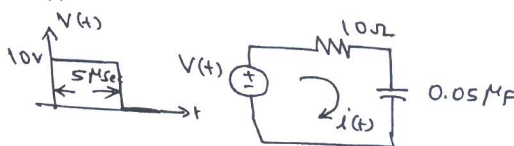


Fig.Q8 (b)

(10 Marks)

Module-5

- 9 a. Obtain y-parameters in terms of z-parameters and h-parameters. (10 Marks)
 b. For the network shown in Fig.Q9(b), find the T-parameters.

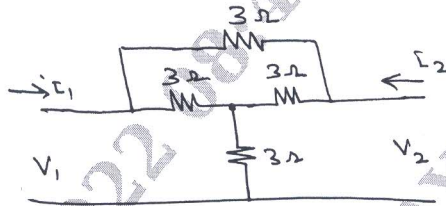


Fig.Q9(b)

(10 Marks)

OR

- 10 a. Derive the expression of bandwidth, half power frequencies and selectivity of a series resonance circuit. (10 Marks)
 b. For the parallel resonant circuit shown in Fig.Q10(b), find I_0 , I_L , I_C , f_0 and dynamic resistance.

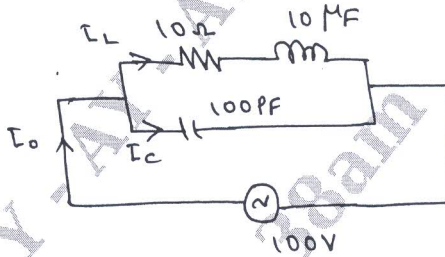


Fig.Q10(b)

(10 Marks)
