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17EC35

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

Network Analysis

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Derive expression for Delta to star network. (06 Marks)
- b. Find the power delivered by the 5A current source in the network shown in Fig.Q1(b), using node analysis.

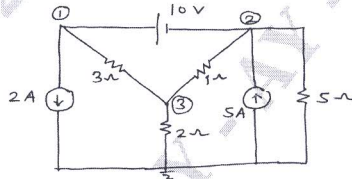


Fig.Q1(b)

(07 Marks)

- c. Determine the current through 6Ω resistance shown in Fig.Q1(c), using loop analysis.

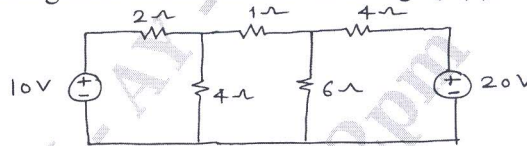


Fig.Q1(c)

(07 Marks)

OR

- 2 a. For the networks shown in Fig.Q2(a), determine the voltage V using source shift and /or source transformation techniques only.

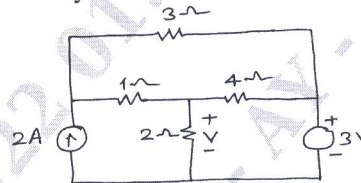


Fig.Q2(a)

(06 Marks)

- b. Use mesh current method to find the power delivered by the dependent voltage source in the network shown in Fig.Q2(b).

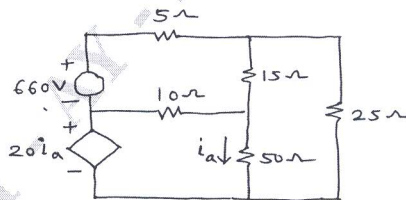


Fig.Q2(b)

(07 Marks)

- c. Find the value of V such that current through 4Ω resistance is zero, using nodal analysis for the circuit shown in Fig.Q2(c).

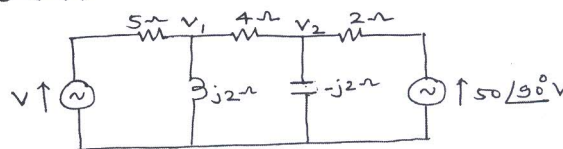


Fig.Q2(c)

(07 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. State and prove Reciprocity theorem. (06 Marks)
 b. Find the Thevenin's equivalent for the circuit shown in Fig.Q3(b) with respect to terminals a - b.

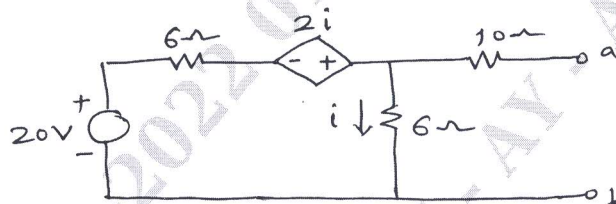


Fig.Q3(b)

(07 Marks)

- c. State Millman's theorem. Using the same calculate the current through load R_L in the circuit shown in Fig.Q3(c).

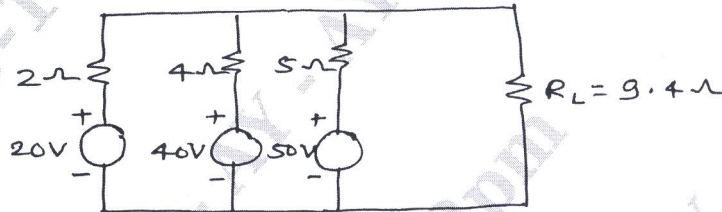


Fig.Q3(c)

(07 Marks)

OR

- 4 a. State and prove maximum power transfer theorem. (06 Marks)
 b. Find I_x for the circuit shown in Fig.Q4(b) using superposition theorem.

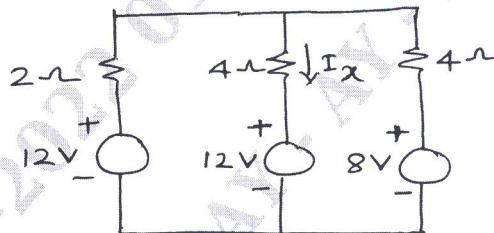


Fig.Q4(b)

(07 Marks)

- c. Determine the current through 1Ω resistance connected between X, Y of the network shown in Fig.Q4(c) using Norton's theorem.

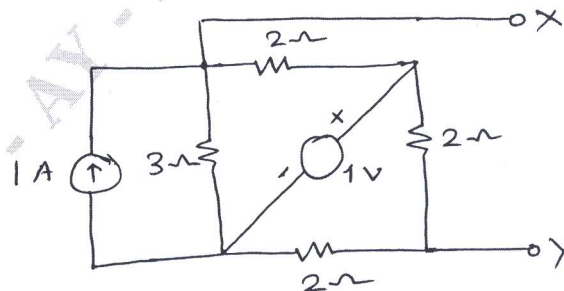


Fig.Q4(c)

(07 Marks)

Module-3

- 5 a. In the network shown in Fig.Q5(a), the switch is closed at $t = 0$. Determine i , $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$.

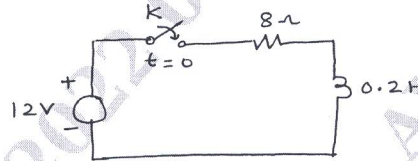


Fig.Q5(a)

(10 Marks)

- b. Determine the Laplace transform of the waveform shown in Fig.Q5(b).

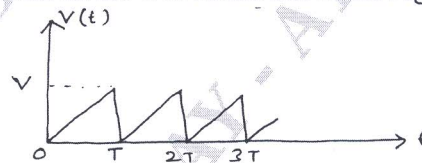


Fig. Q5(b)

(10 Marks)

OR

- 6 a. In the network shown in Fig.Q6(a), the switch is moved from position 1 to position 2 at $t = 0$. The steady state has been reached before switching, calculate :

$$i, \frac{di}{dt} \text{ and } \frac{d^2i}{dt^2} \text{ at } t = 0^+$$

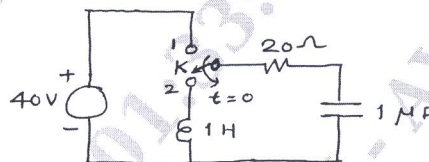


Fig.Q6(a)

(10 Marks)

- b. Obtain the Laplace transform of the square wave train shown in Fig.Q6(b).

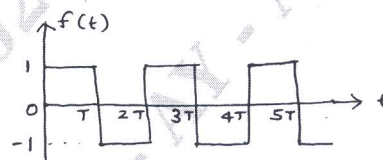


Fig.Q6(b)

(10 Marks)

Module-4

- 7 a. Derive expression for frequency at which voltage across the capacitor is maximum. (07 Marks)
- b. For the circuit shown in Fig.Q7(b), find for what value of R_C the circuit resonates.

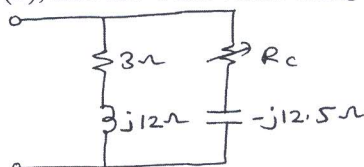


Fig.Q7(b)

(07 Marks)

- c. A series RLC circuit has $R = 10\Omega$, $L = 0.01\text{H}$ and $C = 0.01\ \mu\text{F}$ and it is connected across 10mV supply. Calculate : i) f_0 ii) Q_0 iii) Band width. (06 Marks)

OR

- 8 a. Derive an expression for resonant frequency of parallel resonant circuit. (7 Marks)
 b. A series RLC circuit has a quality factor of 5 at 50r/sec. The current flowing through the circuit at resonance is 10A and the supply voltage is 100V. The total impedance of the circuit is 20Ω . Find the circuit constants. (06 Marks)
 c. Find the value of L at which the circuit resonates at a frequency of 1000 r/sec in the circuit shown in Fig.Q8(c).

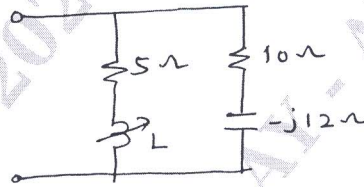


Fig.Q8(C)

(07 Marks)

Module-5

- 9 a. Express Z parameters in terms of Y parameters and h parameters. (10 Marks)
 b. Determine the z parameters of the network shown in Fig.Q9(b).

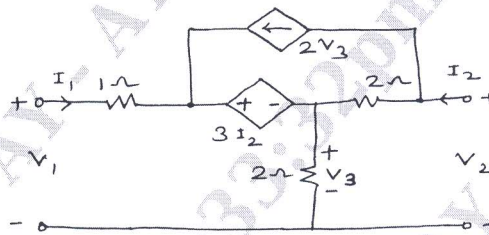


Fig.Q9(b)

(10 Marks)

OR

- 10 a. Express Y parameters in terms of Z parameters and ABCD parameters. (10 Marks)
 b. Find the h parameters of the network shown in Fig.Q10(b) and draw the h parameter equivalent circuit.

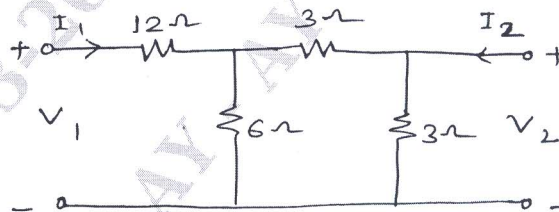


Fig.Q10(b)

(10 Marks)
