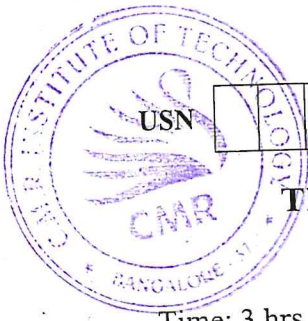


CBCS SCHEME



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18EC32

Third Semester B.E. Degree Examination, Aug./Sept. 2020 Network Theory

Max. Marks: 100

Time: 3 hrs.

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

Module-1

- 1 a. Using source shifting and source transformation techniques, find the value of V_x for the circuit in Fig.Q1(a).

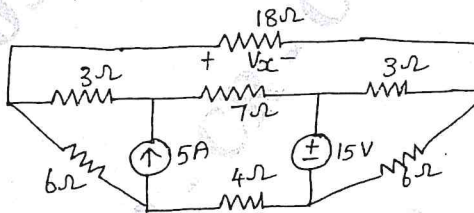


Fig.Q1(a)

(10 Marks)

- b. Use Mesh analysis to the circuit shown in Fig.Q1(b) to find the power supplied by 4V source.

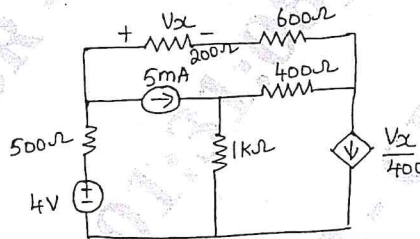


Fig.Q1(b)

(10 Marks)

OR

- 2 a. Find the resistance R_{xy} for the circuit shown in Fig.Q2(a) using star-delta transformation.

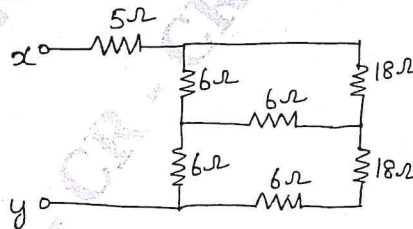


Fig.Q2(a)

(10 Marks)

- b. Find I_1 in the circuit of Fig.Q2(b) using nodal analysis.

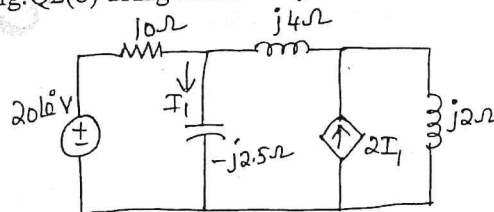


Fig.Q2(b)

(10 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.

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Module-2

- 3 a. Use superposition theorem to find i_0 in the circuit shown in Fig.Q3(a).

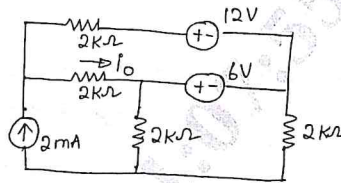


Fig.Q3(a)

(10 Marks)

- b. Find the Thevenin's and Norton's equivalent circuits at the terminals a-b for the circuit in Fig.Q3(b).

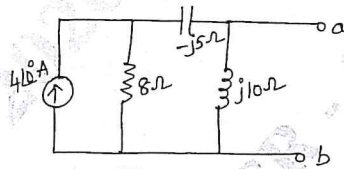


Fig.Q3(b)

(10 Marks)

OR

- 4 a. Find the current through $(10 - j3)\Omega$ using Millman's theorem Refer Fig.Q4(a).

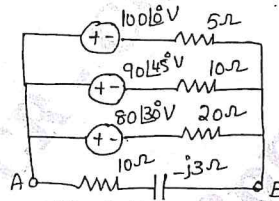


Fig.Q4(a)

(10 Marks)

- b. Find the value of R_L for the network shown in Fig.Q4(b) that results in maximum power transfer. Also find the value of maximum power.

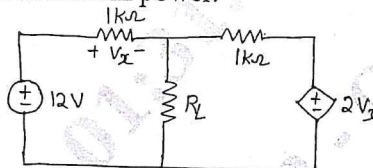


Fig.Q4(b)

(10 Marks)

Module-3

- 5 a. For the circuit shown in Fig.Q5(a), the switch K is changed from position 1 to position 2 at $t = 0$. Steady-state condition having been reached at position 1. Find the values of

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

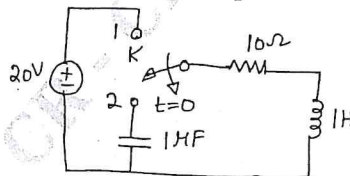


Fig.Q5(a)

(10 Marks)

- b. For the circuit shown in Fig.Q5(b), steady-state is reached with switch K open. At $t = 0$, the switch is closed. Determine the values $V_a(0^-)$ and $V_a(0^+)$.

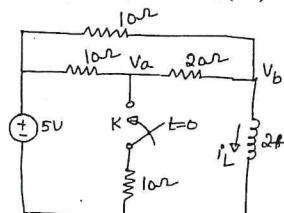


Fig.Q5(b)

(10 Marks)

OR

- 6 a. In the network shown in Fig.Q6(a), the switch K is opened at $t = 0$. Find v , $\frac{dv}{dt}$ and $\frac{d^2v}{dt^2}$ at $t = 0^+$.

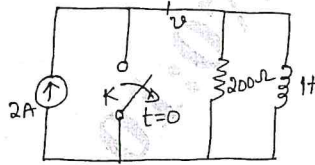


Fig.Q6(a)

(10 Marks)

- b. For the circuit shown in Fig.Q6(b) find :

- i) $i(0^+)$ and $v(0^+)$ ii) $\frac{di(0^+)}{dt}$ and $\frac{dv(0^+)}{dt}$ iii) $i(\infty)$ and $v(\infty)$.

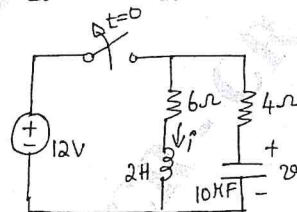


Fig.Q6(b)

(10 Marks)

Module-4

- 7 a. State and prove initial-value theorem and final-value theorem. (10 Marks)
 b. For the circuit of Fig.Q7(b).
 i) Write a differential equation for $i_L(t)$ ii) find $I_L(s)$ iii) solve for $i_L(t)$.

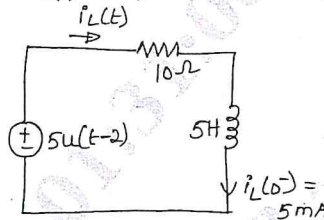


Fig.Q7(b)

(10 Marks)

OR

- 8 a. Find the Laplace transform of the periodic signal $x(t)$ shown in Fig.Q8(a).

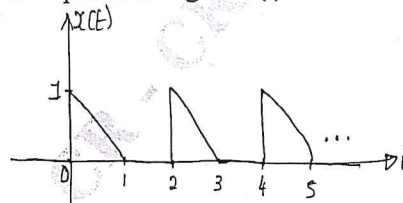


Fig.Q8(a)

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(10 Marks)

- b. For the circuit shown in Fig.Q8(b), steady state is reached with the 100V source. At $t = 0$, switch k is opened. What is the current through the inductor at $t = \frac{1}{2}$ seconds.

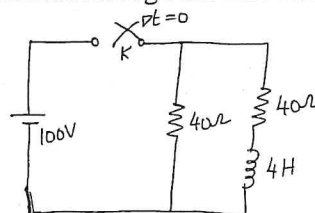


Fig.Q8(b)

(10 Marks)

Module-5

- 9 a. Explain h-parameters. Express h-parameters in terms of z-parameters.
 b. Find y-parameters for the circuit shown in Fig.9(b). (10 Marks)

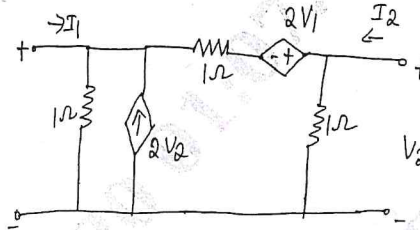


Fig.Q9(b)

(10 Marks)

OR

- 10 a. A series RLC circuit has $R = 10\Omega$, $L = 0.1\text{H}$ and $C = 100\mu\text{F}$ and is connected across a 200V, variable frequency source, find :
 i) Resonant frequency
 ii) Impedance at this frequency
 iii) Voltage drops across l and c at this frequency
 iv) Quality factor
 v) Bandwidth. (07 Marks)
- b. Find the value of R_1 such that the circuit given in Fig.10(b) is resonant.

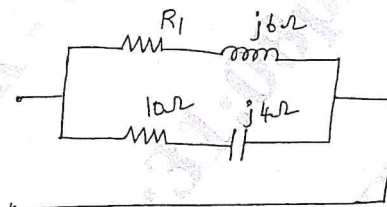


Fig.10(b)

(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) Bandwidth iv) f_1 and f_2 v) I_0 . (06 Marks)
