

CBCS SCHEME

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15EC34

Third Semester B.E. Degree Examination, June/July 2018 Network Analysis

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Determine the equivalent resistance across XY shown in Fig.Q1(a) (05 Marks)

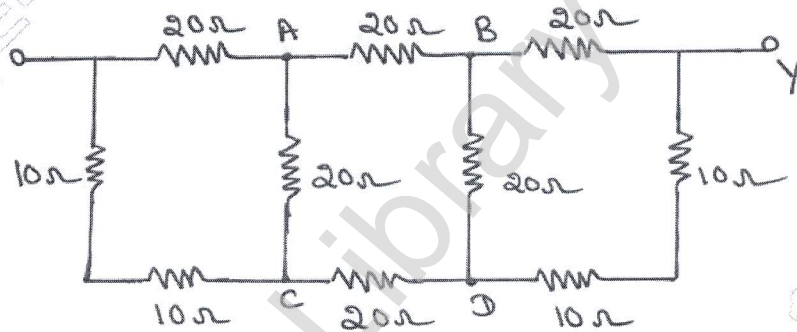


Fig.Q1(a)

- b. Calculate the voltage across the 6Ω resistor using source shifting and transformation technique shown in Fig.Q1(b). (05 Marks)

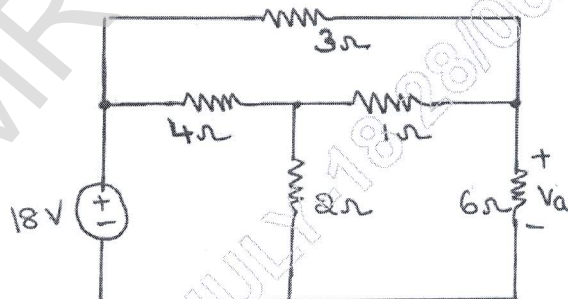


Fig.Q1(b)

- c. Determine the power supplied by the dependent source of Fig.Q1(c) shown. (06 Marks)

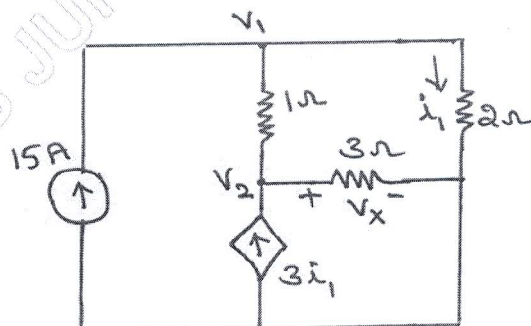


Fig.Q1(c)

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.

- 2 a. Using Mesh current analysis, find the current through 24Ω in the circuit shown in Fig.Q2(a). (08 Marks)

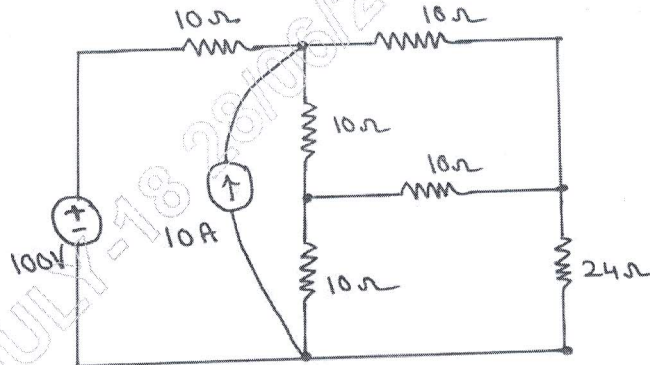


Fig.Q2(a)

- b. For the network of Fig.Q2(b) determine the node voltage by nodal analysis. (08 Marks)

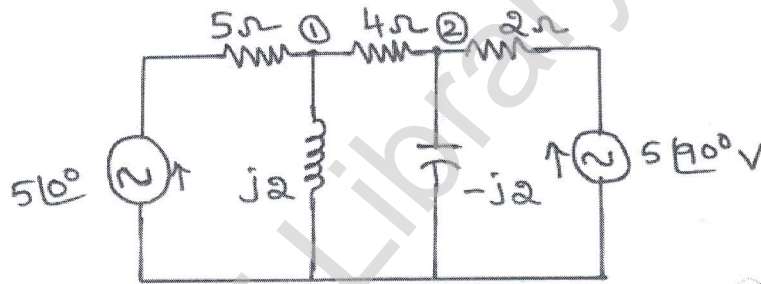


Fig.Q2(b)

Module-2

- 3 a. State superposition theorem. In the circuit of Fig.Q3(a), use the superposition principle to determine the value of i_x . (08 Marks)

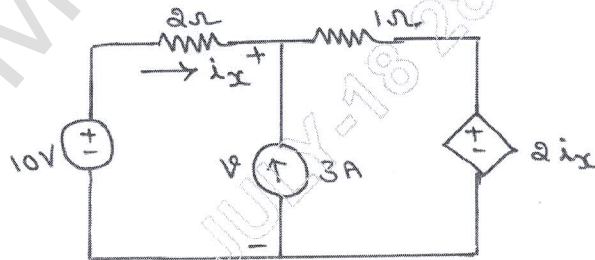


Fig.Q3(a)

- b. Obtain the Thevenin and Norton equivalent circuits at terminals AB for the network shown in Fig.Q3(b). (08 Marks)

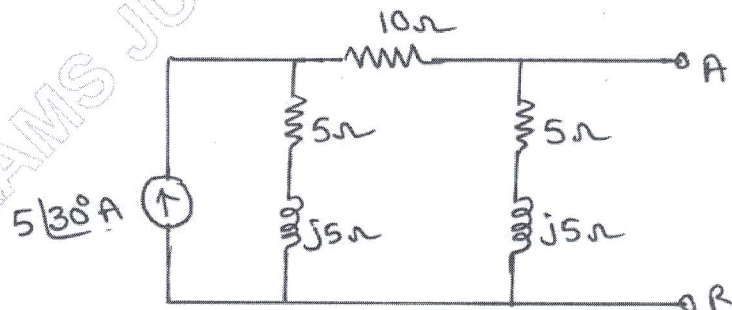


Fig.Q3(b)

OR

- 4 a. Using Millman's theorem, find I_L through R_L for the network shown in Fig.Q4(a). (06 Marks)

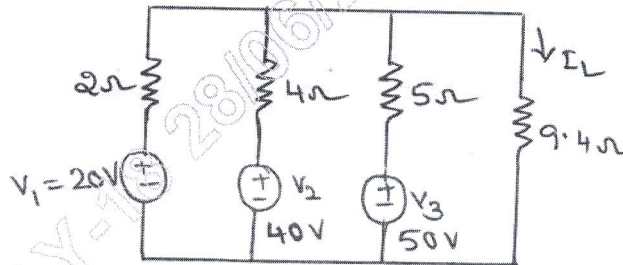


Fig.Q4(a)

- b. Verify reciprocity theorem for the circuit shown in Fig.Q4(b). (06 Marks)

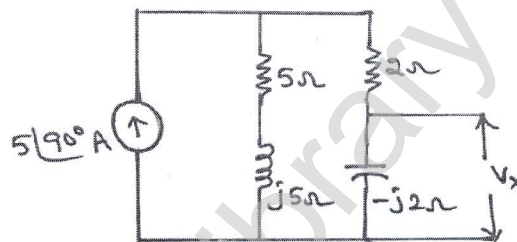


Fig.Q4(b)

- c. State and explain maximum power transfer theorem. (04 Marks)

Module-3

- 5 a. In the circuit shown in Fig.Q5(a), the switch K is changed from position 1 to position 2 at $t = 0$, the steady state has been reached before switching. Find the values of i , $\frac{di}{dt}$ and $\frac{di^2}{dt^2}$ at $t = 0$. (08 Marks)

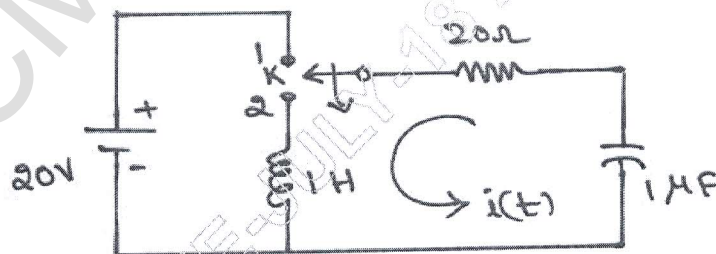


Fig.Q5(a)

- b. The switch in the network shown in Fig.Q5(b) is closed at $t = 0$. Determine the voltage across the capacitor. Use Laplace transform. (08 Marks)

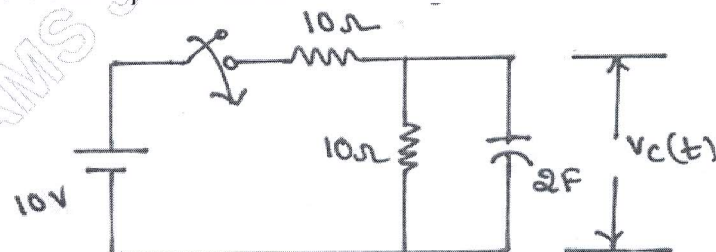


Fig.Q5(b)

OR

- 6 a. In the network shown in Fig.6(a), the switch K is opened at $t = 0$. At $t = 0^+$, solve for the values of v , $\frac{dv}{dt}$ and $\frac{d^2v}{dt^2}$ if $I = 2A$, $R = 200\Omega$ and $L = 1H$. (08 Marks)

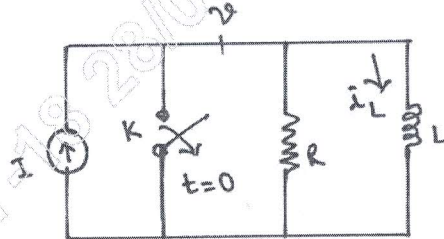


Fig.Q6(a)

- b. Determine the Laplace transform of the periodic saw tooth waveform of Fig.Q6(b). Use gate function. (08 Marks)

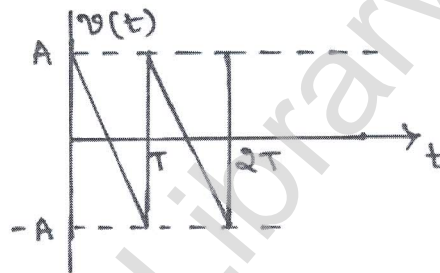


Fig.Q6(b)

Module-4

- 7 a. Derive for a resonant circuit, the resonant frequency $f_0 = \sqrt{f_1 f_2}$, where f_1 and f_2 are the two half power frequencies. (07 Marks)
- b. Find the value of L for which the circuit shown in Fig.Q7(b) is resonant at a frequency of $\omega = 5000$ rad/sec. (06 Marks)

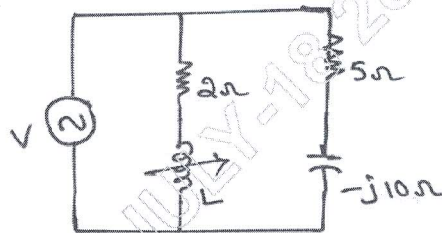


Fig.Q7(b)

- c. A series RLC circuit has $R = 10\Omega$, $L = 0.01H$ and $C = 0.01\mu F$ and it is connected across 10mV supply. Calculate : i) f_0 ii) Q_0 iii) B.W. (03 Marks)

OR

- 8 a. A series RLC circuit has a resistance of 10Ω , an inductance of $0.3H$ and a capacitance of $100\mu F$. The applied voltage is $230V$. Find : i) Resonant frequency ii) Quality factor iii) Lower and upper cut off frequencies iv) Bandwidth v) Current at resonance vi) currents at f_1 and f_2 vii) voltage across inductance at resonance. (08 Marks)
- b. Derive an expression for the resonant frequency of a parallel resonant circuit. Also show that the circuit is resonant at all frequencies if $R_L = R_C = \sqrt{\frac{L}{C}}$ where $R_L =$ Resistance in the inductor branch, $R_C =$ resistance in the capacitor branch. (08 Marks)

Module-5

- 9 a. Find Y parameters and Z parameters for the circuit show in Fig.Q9(a). (08 Marks)

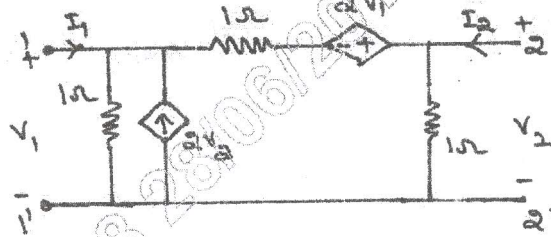


Fig.Q9(a)

- b. Express ABCD parameters interms of Y-parameters and h-parameters. (08 Marks)

OR

- 10 a. Determine z parameters for the network shown in Fig.Q10(a). (08 Marks)

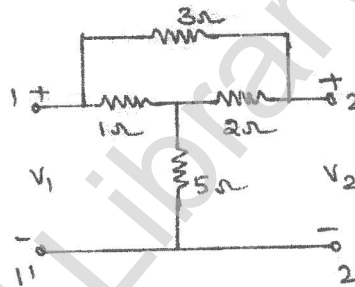


Fig.Q10(a)

- b. Express h-parameters interms of Y-parameters. (08 Marks)
