CBCS SCHEME

USN | | | | | | | | | | |

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)**

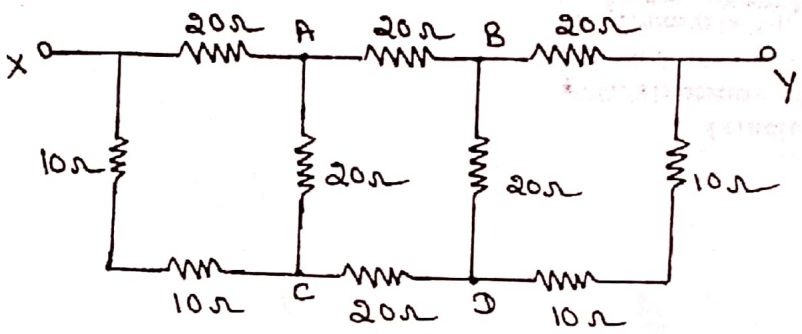

Fig.Q1(a)

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

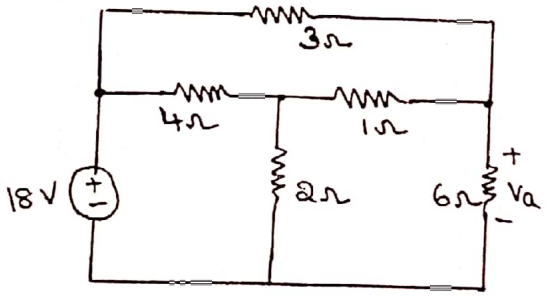

Fig.Q1(b)

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

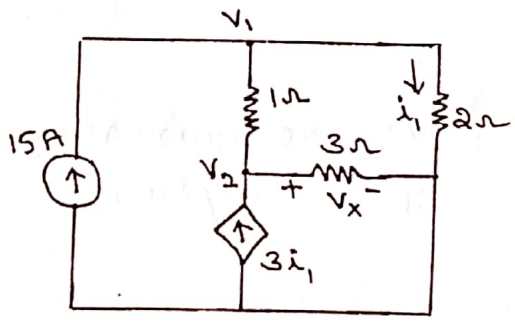

Fig.Q1(c)

OR

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

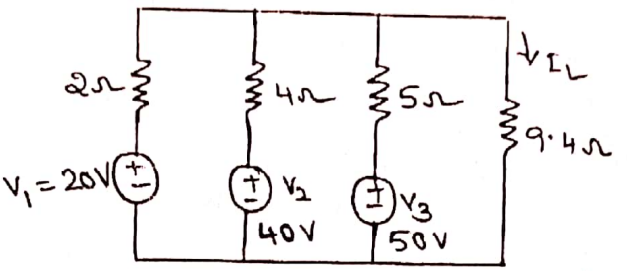

Fig.Q4(a)

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

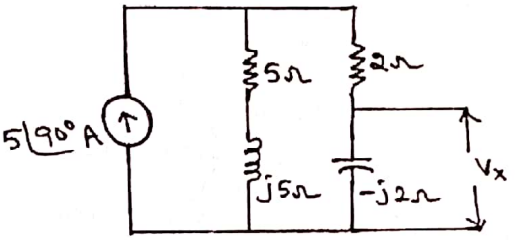

Fig.Q4(b)

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)**

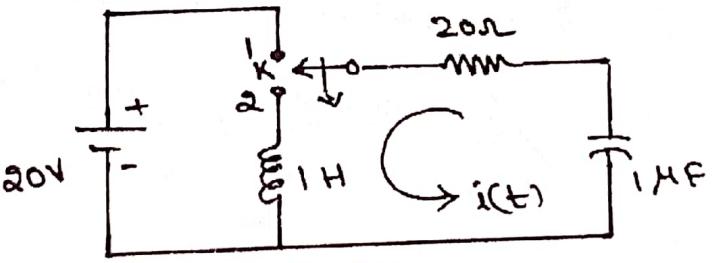

Fig.Q5(a)

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)**

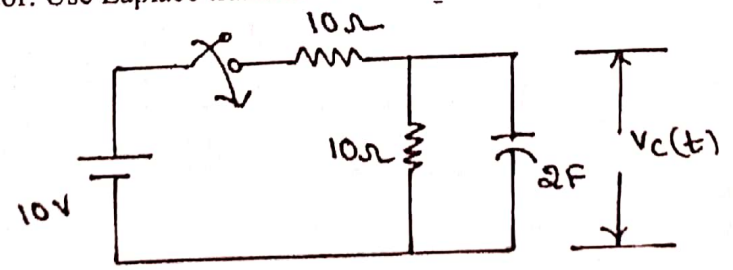

Fig.Q5(b)

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 = 200Ω and L = 1H. (08 Marks)

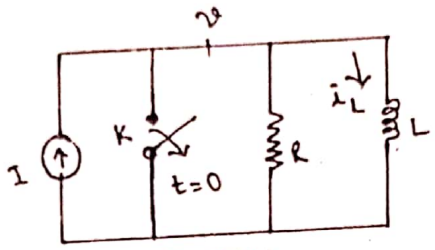

Fig.Q6(a)

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

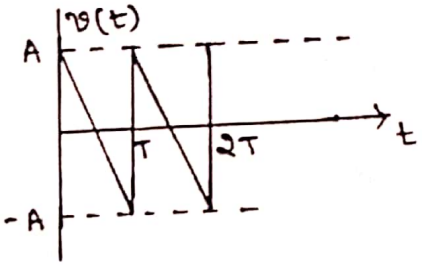

Fig.Q6(b)

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 w = 5000 rad/sec. (06 Marks)

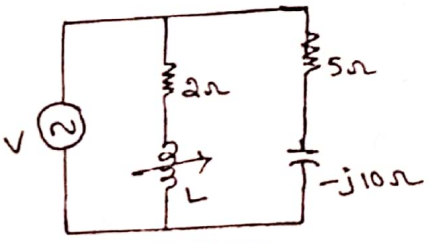

Fig.Q7(b)

c. A series RLC circuit has R = 10Ω, L = 0.01H and c = 0.01μF 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 100μF. 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)

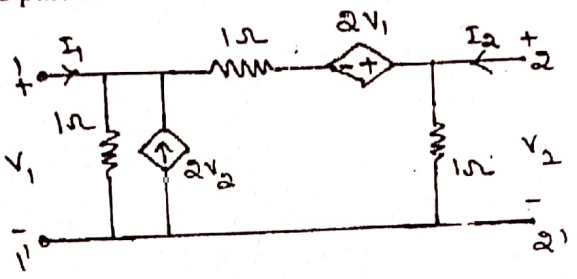

Fig.Q9(a)

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)

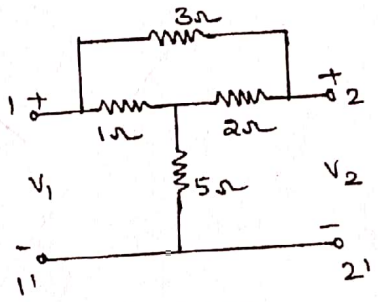

Fig.Q10(a)

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

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CBCS SCHEME

USN | | | | | | | | | | |

17EC35

Third Semester B.E. Degree Examination, June/July 2019
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. Define the following terms with examples:
- i) Active elements
- ii) Passive elements
- iii) Linear and non linear elements
- iv) Lumped node
- v) Unilateral and bilateral elements. **(10 Marks)**

b. Use the node analysis and find the value of V_x in the circuit shown in below Fig.Q.1(b). Such that the current through the impedance $(2 + J3)\Omega$ is zero.

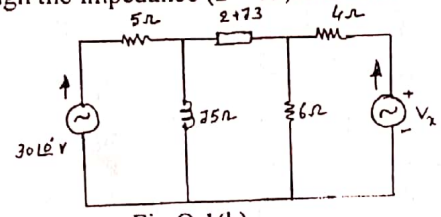

Fig.Q.1(b) **(10 Marks)**

OR

2 a. Derive an expression for i) Δ to Y transformation ii) Y to Δ transformation. **(10 Marks)**

b. Find the voltage across 20Ω resistor in the network shown in Fig.Q.2(b) below by using Mesh analysis method. **(10 Marks)**

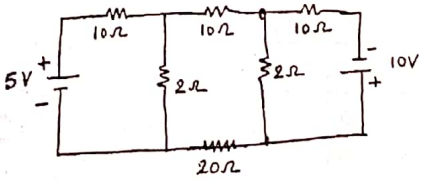

Fig.Q.2(b)

Module-2

3 a. State and prove Millman's theorem with an example. **(10 Marks)**

b. Find the Thevenin's equivalent circuit of Fig.Q.3(b) shown below: **(10 Marks)**

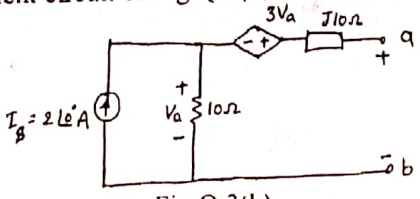

Fig.Q.3(b)

OR

4 a. Prove that the maximum power transferred from source to load when,

i) $R_L = R_o$ ii) $R_L = |Z_o|$ iii) $Z_L = \dot{Z}_o$ **(10 Marks)**

b. Find the value of i_b using Norton's equivalent circuit when R = 667Ω, refer Fig.Q.4(b). **(10 Marks)**

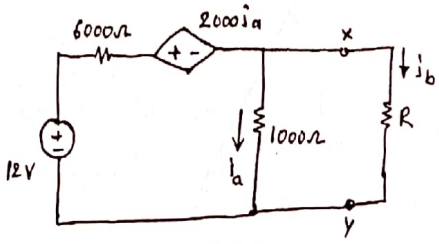

Fig.Q.4(b)

Module-3

5 a. Determine i, $\frac{di}{dt}$, $\frac{d^2i}{dt^2}$ at $t = 0^+$, when the switch is closed at t = 0, from the Fig.Q.5(a) shown below. **(10 Marks)**

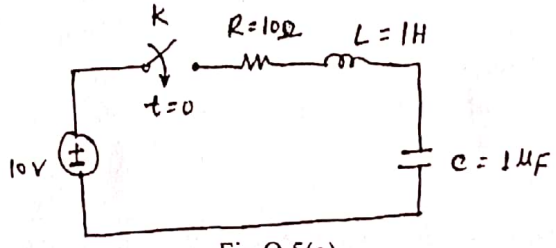

Fig.Q.5(a)

b. Find :

i) $i(0^-)$ and $v(0^+)$

ii) $\frac{di(0^+)}{dt}$ and $\frac{dv(0^+)}{dt}$

iii) $I(\infty)$ and $v(\infty)$

from the circuit shown in Fig.Q.5(b) below. **(10 Marks)**

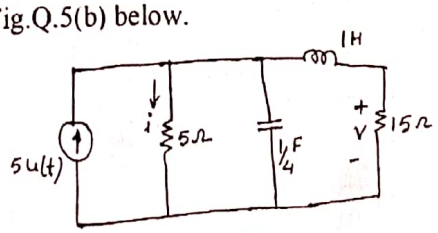

Fig.Q.5(b)

OR

6 a. Deduce the Laplace transform of the following:

i) Sin^2t ii) Cos^2t iii) Sinwt iv) $\int_0^t i(t).dt$ **(10 Marks)**

b. State and prove Initial and Final value theorems. **(10 Marks)**

Module-4

7 a. Demonstrate the terms: i) Resonance ii) Q-factor iii) Band width iv) Selectivity v) Half power frequency pertaining to a R-L-C series circuit. **(10 Marks)**

b. Prove that the Resonating frequency in a R-L-C series circuit is geometrical mean of half power frequencies i.e. $f_0 = \sqrt{f_1 f_2}$. **(10 Marks)**

OR

8 a. Evaluate w_0, Q, BW and half power frequencies and the output voltage V at W_0, refer Fig.Q.8(a). **(10 Marks)**

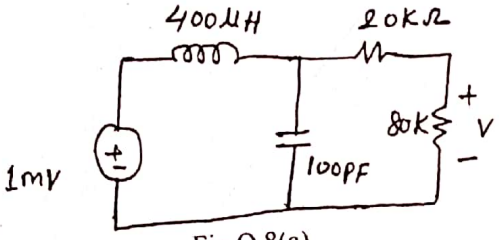

Fig.Q.8(a)

b. Derive an expression for resonance by varying R_L in parallel RLC circuit. **(10 Marks)**

Module-5

9 a. Express Z parameters in terms h parameters and what are hybrid parameters. **(10 Marks)**

b. Determine the transmission parameters for the network shown Fig.Q.9(b) below. **(10 Marks)**

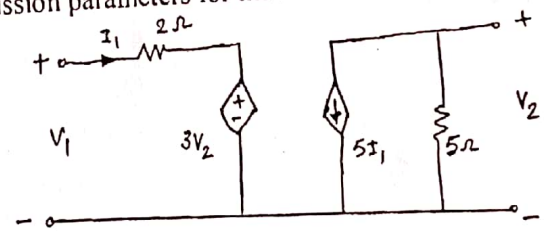

Fig.Q.9(b)

OR

10 a. Obtain the condition of transmission parameters for two networks connected in cascade. **(10 Marks)**

b. Determine the Z-parameters for the circuit shown in Fig.Q.10(b) below. **(10 Marks)**

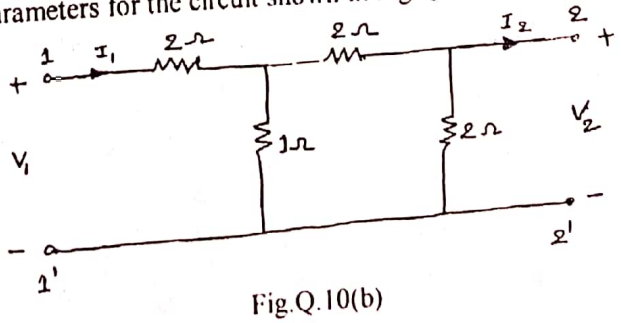

Fig.Q.10(b)

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CBCS SCHEME

USN | | | | | | | | | | |

17EC35

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020
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 the expression for: (i) Δ to Y transformation (ii) Y to Δ transformation **(10 Marks)**

b. Calculate the voltage across the 6Ω resistor in the network of Fig.Q1(b) using source shifting technique.

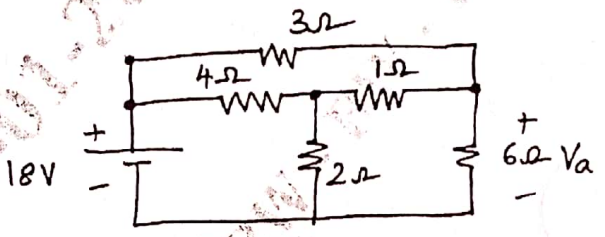

Fig.Q1(b) **(10 Marks)**

OR

2 a. Determine the resistance between the terminals A and B of the network shown in Fig.Q2(a).

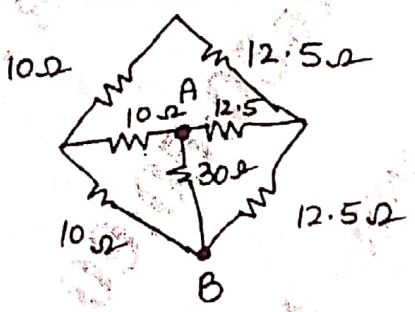

Fig.Q2(a) **(10 Marks)**

b. Find currents in all the branches of the network shown in Fig.Q2(b) using mesh analysis.

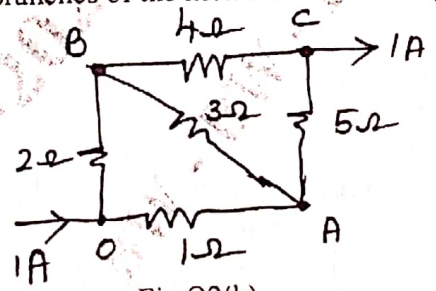

Fig.Q2(b) **(05 Marks)**

c. Find voltages V_1 and V_2 in the network shown in Fig.Q2(c) using node analysis method.

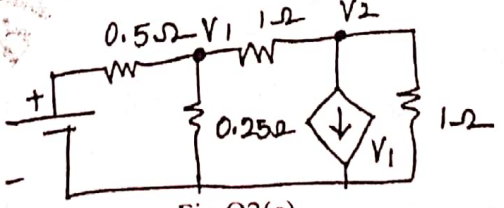

Fig.Q2(c) **(05 Marks)**

Module-2

3 a. Obtain Thevenin's equivalent network for Fig.Q3(a). (08 Marks)

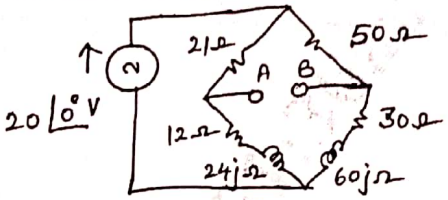

Fig.Q3(a)

b. State and prove Millman's theorem. (06 Marks)

c. For the circuit shown in Fig.Q3(c), find the voltage V_x and verify reciprocity theorem.

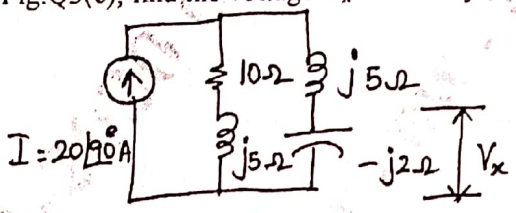

Fig.Q3(c) (06 Marks)

OR

4 a. State and prove maximum power transfer theorem for AC circuits (when R_L and X_L are varying) (10 Marks)

b. Find 'V' in the circuit shown in Fig.Q4(b) using super position theorem.

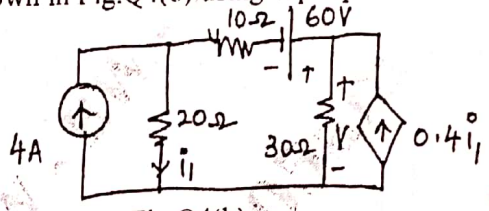

Fig.Q4(b) (10 Marks)

Module-3

5 a. What is the significance of initial conditions? Write a note on initial and final conditions for basic circuit elements. (05 Marks)

b. In the network shown in Fig.Q5(b) switch 'S' is changed from A to B at t = 0 having already established a steady state in position A shown that at $t = 0^+$, $i_1 = i_2 = \frac{-V}{R_1 + R_2 + R_3}$ and $i_3 = 0$.

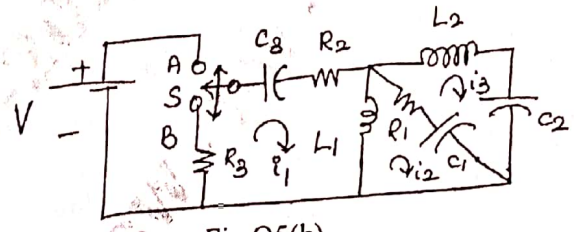

Fig.Q5(b) (10 Marks)

c. In the network of Fig.Q5(c) switch 'S' is closed at t = 0 with zero initial current in the inductor. Find i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$ if R = 10 Ω, L = 1 H and V = 10 Volts.

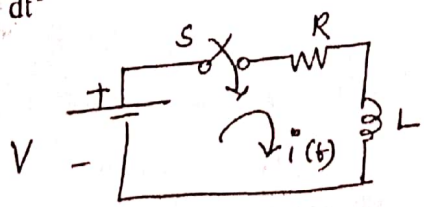

Fig.Q5(c) (05 Marks)

OR

6 a. Obtain Laplace transform of:
(i) Step function
(ii) Ramp function
(iii) Impulse function (10 Marks)

b. Find the Laplace transform of the waveform shown in Fig.Q6(b).

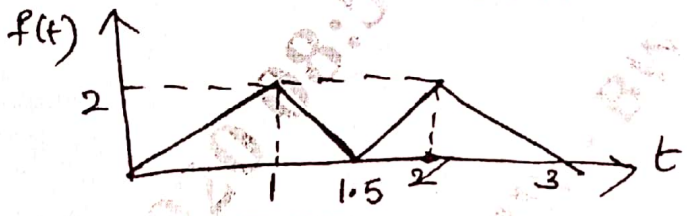

Fig.Q6(b) (10 Marks)

Module-4

7 a. Derive the relation between bandwidth and quality factor B.W = f_0/Q. (10 Marks)

b. Show that the value of capacitance for max voltage across the capacitor in case of capacitor tuning series resonance is given by $C = \frac{L}{R^2 + X_L^2}$.

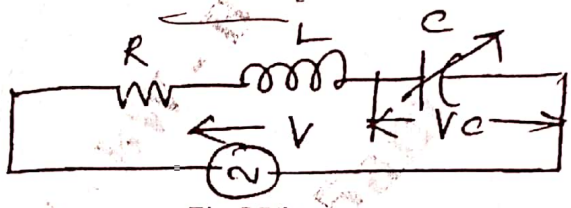

Fig.Q7(b) (10 Marks)

OR

8 a. Derive for f_0 for parallel resonance circuit when the resistance of the capacitance is considered.

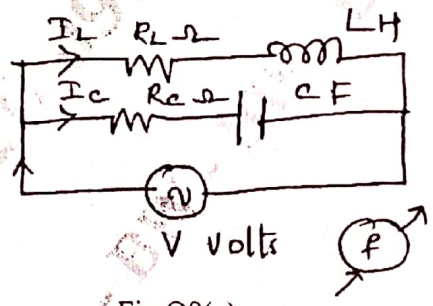

Fig.Q8(a) (10 Marks)

b. Find the value of L for which the circuit in Fig.Q8(b) resonates at ω = 5000 rad/sec.

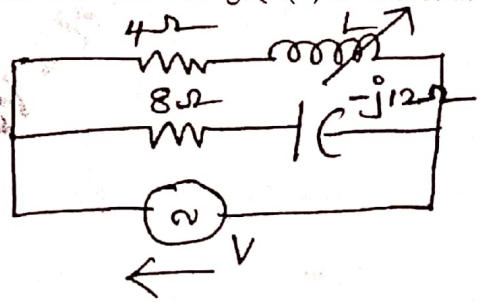

Fig.Q8(b) (10 Marks)

Module-5

9 a. Derive the expression of Z parameters in terms of Y parameters. **(10 Marks)**

b. Determine Y and Z parameters for the network shown in Fig.Q9(b).

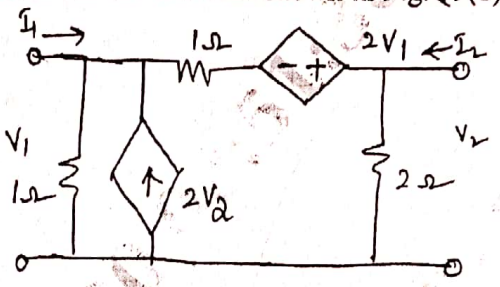

Fig.Q9(b) **(10 Marks)**

OR

10 a. Derive the expression of h parameters in terms of ABCD parameters. **(10 Marks)**

b. Find ABCD constants and show that AD – BC = 1 for the network shown in Fig.Q10(b).

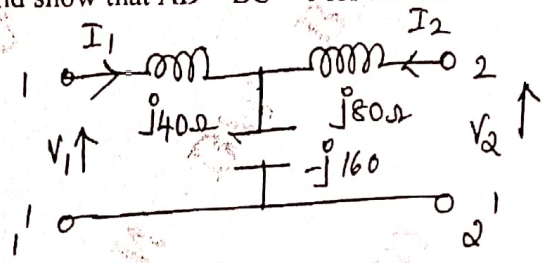

Fig.Q10(b) **(10 Marks)**

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ADICHUNCHANAGIRI UNIVERSITY

18EC35

Third Semester BE Degree Examination November 2020
(CBCS Scheme)

Time: 3 Hours Max Marks: 100 marks

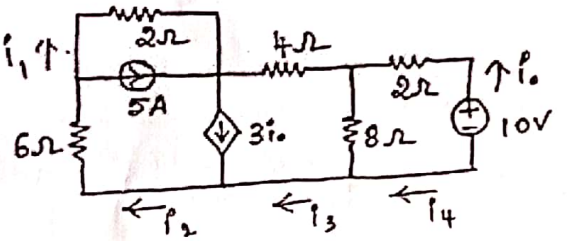
Sub: Network Analysis

Q P Code: 62305

Instructions: 1. Answer **five full** questions.
2. Choose one full question from each module.
3. Your answer should be specific to the questions asked.
4. write the same question numbers as they appear in this question paper.
5. Write Legibly

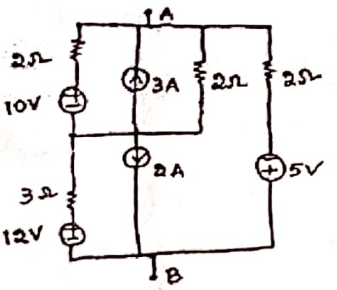
Module – 1

1 a Find the currents i_1, i_2, i_3 and i_4 using mesh analysis for the circuit shown in figure Q1(a). 07 marks



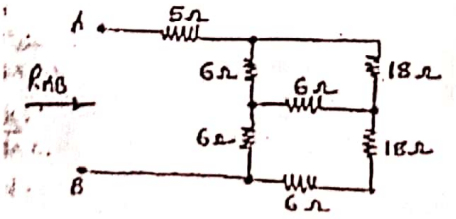
Fig, Q1(a)

b Reduce the network shown in figure Q1(b) to a single voltage source in series with a resistance between terminals A and B. 07 marks



Fig, Q1(b)

c Determine R_{AB} in the network shown in figure Q1(c). 06 marks

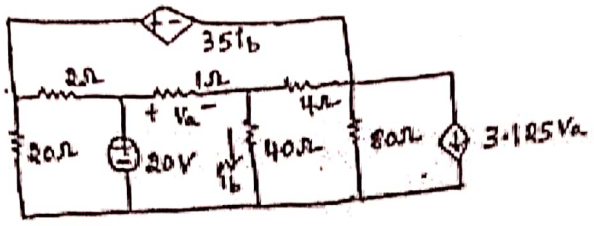


Fig, Q1(c)

PTO

Or

2 a Determine the power supplied by the 20V voltage source to the circuit shown in figure Q2(a) using nodal analysis. 10 marks



Fig, Q2(a)

b Distinguish between the following with suitable examples 10 marks

i) Linear and non-linear elements.
ii) Dependent and independent sources.
iii) Supernode and supermesh.
iv) Ideal and practical current sources.
v) Unilateral and bilateral elements.

Module – 2

3 a State and prove Thevenin's theorem. 10 marks

b Using superposition theorem, obtain the response I for the network shown in figure Q3(b). 10 marks

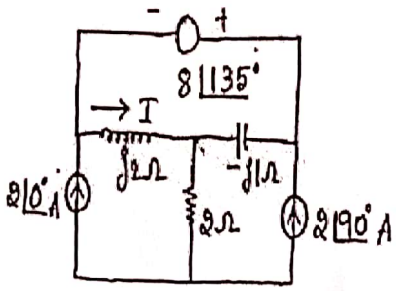


Fig. Q3(b)

Or

4 a State and prove maximum power transfer theorem for an AC circuit with an impedance as the load with variable R_L and fixed load reactance. 10 marks

b For the circuit shown in figure Q4(b), find Thevenin's equivalent circuit across the terminals ab. 10 marks

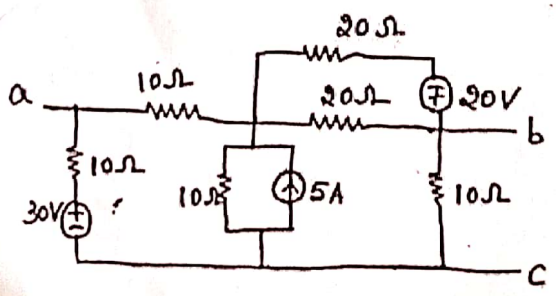


Fig. Q4(b)

Module – 3

a The network shown in figure Q5(a), has two independent node pairs. Switch K is opened at t=0, find the following quantities at $t=0^+$. 10 marks

i) V_1 ii) V_2 iii)dV_1/dt iv) dV_2/dt v) di_L/dt

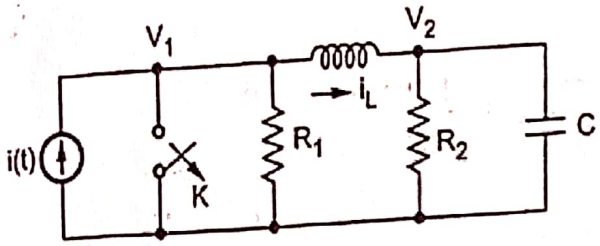


Fig. Q5(a)

b In the network shown in figure Q5(b), K is changed from position 1 to 2 at t=0. Solve for i, di/dt and d^2i/dt^2 at $t=0^+$. 10 marks

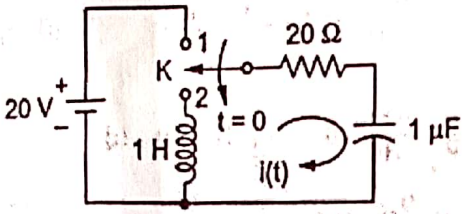


Fig. Q5(b)

Or

6 a Obtain the Laplace transform of saw tooth waveform shown in figure Q6(a). 06 marks

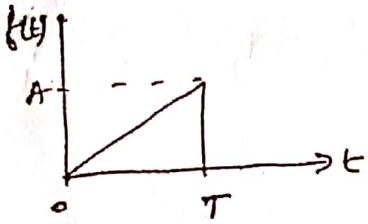


Fig. Q6(a)

b Find the Laplace transform of i) δ(t) ii)t iii) e^{-at} 06 marks

c Find initial and final value theorem for the function given below. 08 marks

$F(s)=(s^3+7s^2+5)/s(s^3+3s^2+4s+2)$

Module – 4

7 a Two coils one of $R_1=0.51\Omega$, $L_1=32mH$, the other of $R_2=1.3\Omega$ and $L_2=15mH$ and two capacitors of 25μF and 62μF are all in series with a resistance of 0.24Ω. Determine the following of this circuit. 10 marks

i) Resonance frequency ii) Q of each coil iii) Q of the circuit

iv)Cut-off frequencies v) Power dissipated of resonance if E=10V.

b In a two RL-RC parallel resonant circuit L=0.4H and C=40μF, obtain resonant frequency for the following values of R_L and R_C. 10 marks

i) $R_L=120\ \Omega$, $R_C=80\ \Omega$ ii) $R_L= R_C =80\Omega$ iii) $R_L=80\ \Omega$, $R_C =0\ \Omega$

iv) $R_L= R_C =100\ \Omega$ v) $R_L = R_C =120\ \Omega$

PTO

Or

8 a A RLC series circuit consists of 50 Ω resistance, 0.2H inductance and 10μF capacitance with an applied voltage of 20V. Determine i) Resonant frequency ii) Q factor iii) Lower and upper frequency limits iv) Bandwidth. 10 marks

b Define the following terms with reference to resonant circuit 04 marks
i) Resonance ii) Q-factor iii) Half-power frequency iv) Selectivity

c Derive the expression for resonant frequency of a parallel resonant circuit with lossless capacitor in parallel with a coil of resistance R and inductance L. 06 marks

Module – 5

9 a Define Y parameters. Determine the Y parameters for the network shown in figure Q9(a). 08 marks

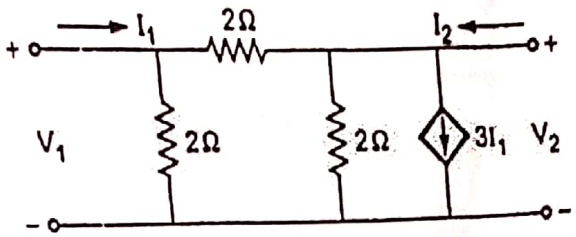


Fig. Q9(a)

b The Z parameters of a two port network are $Z_{11}=20\Omega$, $Z_{12}=10\Omega$, $Z_{21}=10\Omega$ and $Z_{22}=10\Omega$. Find its Y and ABCD parameters. 06 marks

c Define h-parameters. Represent h-parameters in terms of ABCD parameters. 06 marks

Or

10 a Define transmission parameters and Z parameters. Express transmission parameters in terms of impedance parameters. 10 marks

b Find the h parameters of the network shown in figure Q10(b). Also draw its equivalent circuit. 10 marks

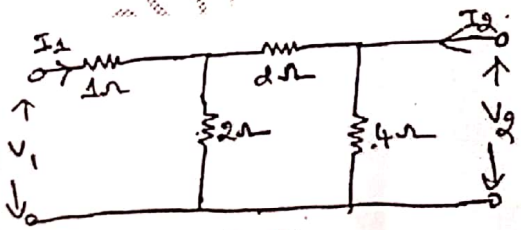


Fig. Q10(b)

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ADICHUNCHANAGIRI UNIVERSITY

18EC35

Third Semester BE Degree Examination January 2020

(CBCS Scheme)

Time: 3 Hours Max Marks: 100 Marks

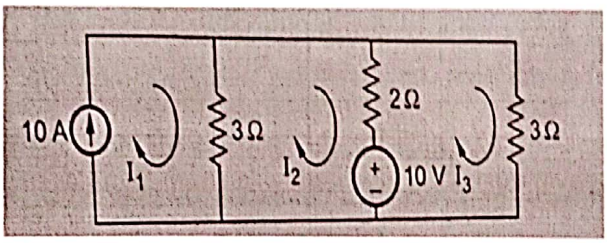
Sub: Network Analysis

Instructions:
1. Answer five full questions
2. Choose one full question from each module
3. Your answer should be specific to the questions asked
4. Write the same question numbers as they appear in this question paper
5. Write Legibly.

Module -1

1 a. Derive expressions for i) Star to Delta conversion
ii) Delta to Star conversion **(10 marks)**

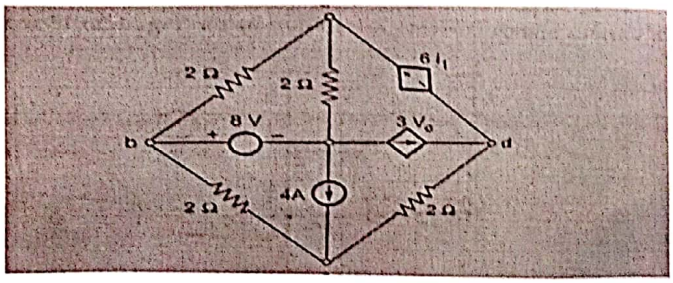
b. Write the mesh equation for the circuit shown below and determine mesh currents using mesh analysis. **(10 marks)**



OR

2 a. Explain the classification of Networks. **(10 marks)**

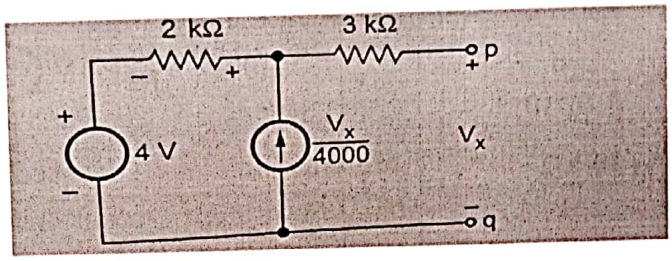
b. For the network shown below, find the node voltages V_d and V_e. **(10 marks)**



Module -2

3 a. State and prove Maximum power transfer theorem for AC circuits. **(10 marks)**

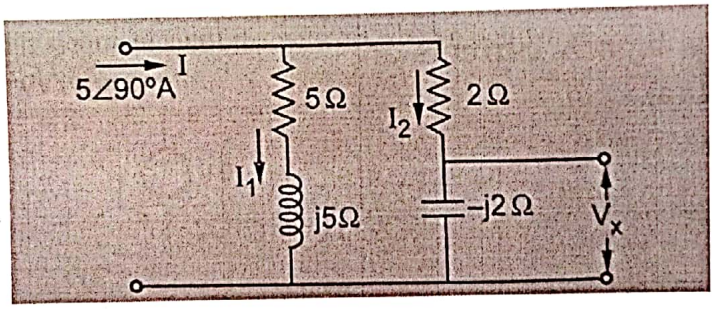
b. Find the Thevenin's equivalent of the network shown below. **(10 marks)**



OR

4 a. State and prove Millman's Theorem. **(10 marks)**

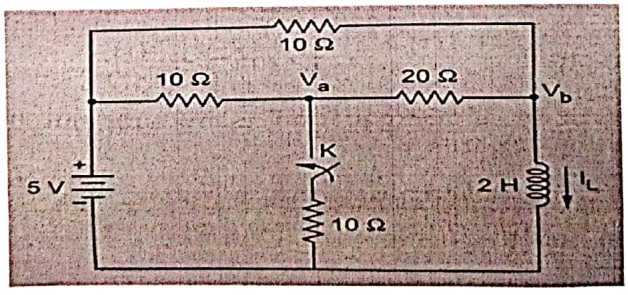
b. Find the voltage V_x and verify the reciprocity theorem for the network shown below. **(10 marks)**



Module -3

5 a. Write a note on initial conditions in basic circuit elements. **(10 marks)**

b. In the network shown below, a steady state is reached with the switch K open. At t =0, the switch is closed. For the element values given, determine the values of $V_a(0^-)$ and $V_a(0^+)$. **(10 marks)**



OR

6 a. State and prove i) Initial value theorem and ii) Final value theorem. **(10 marks)**

b. Find the Laplace transform of the fallowing: i) Sin^2t and ii) Cos^2t **(10 marks)**

Module -4

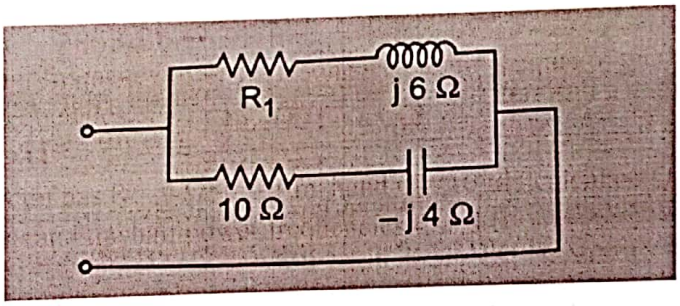
7 a. Show that resonant frequency of series resonance circuit is equal to the geometric mean of two half power frequencies. **(10 marks)**

b. A series RLC circuit has R = 4 Ω, L = 1 mH and C = 10 μF, calculate Q-factor, bandwidth, resonant frequency and the half power frequencies f_1 and f_2. **(10 marks)**

OR

8 a. Derive the expression for resonant frequency for parallel circuit containing resistance in both the branches. **(10 marks**

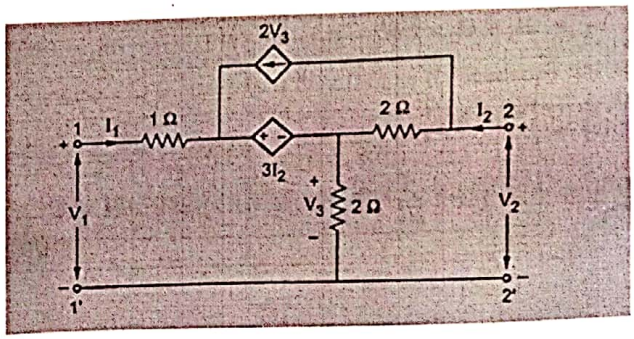
b. Find the value of R_1 such that the circuit given below is resonant. **(10 marks)**



Module -5

9 a. Define Y parameters and derive Y parameters in terms of h parameters. **(10 marks)**

b. Find Z parameters for the circuit shown below. **(10 marks)**



OR

10 a. Define Z parameters and derive Z parameters in terms of y parameters. **(10 marks)**

b. Determine Y parameters for the circuit shown below. **(10 marks)**