Code No: **R201213** **R20** **SET - 1**

I B. Tech II Semester Regular/Supplementary Examinations, July/August-2023

NETWORK ANALYSIS

(Common to ECE, EIE, ECT)

Time: 3 hours Max. Marks: 70

Answer any five Questions one Question from Each Unit
All Questions Carry Equal Marks

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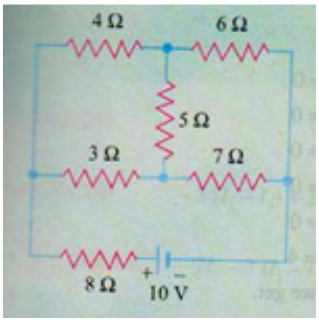
UNIT - I

1 a) What are the classifications of network elements? Discuss them. [5M]

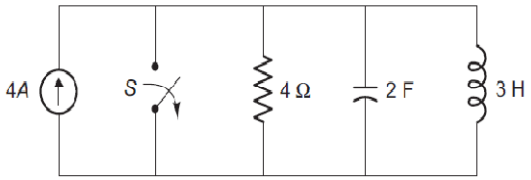
b) Calculate the current in 5 Ω resistor by using Kirchhoff's laws as shown in below figure. [9M]



(OR)

2 a) Define the following [7M]
RMS value, (ii)Average value, (iii)Form factor and (iv)peak factor

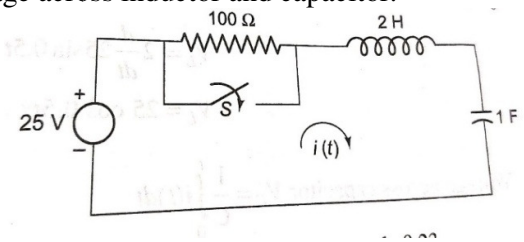
b) Construct the dual for the network shown in Figure. Also, explain the procedure used. [7M]



UNIT-II

3 a) Describe the study of initial conditions of circuit parameters [5M]

b) Find the transient current i(t) for the network shown in figure. At t =0, the switch S is closed. Find the voltage across inductor and capacitor. [9M]



(OR)

4 a) Describe the Laplace Transform of signal waveforms with necessary diagrams and expressions. [6M]

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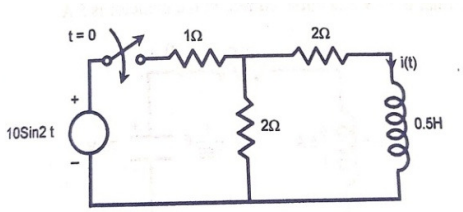
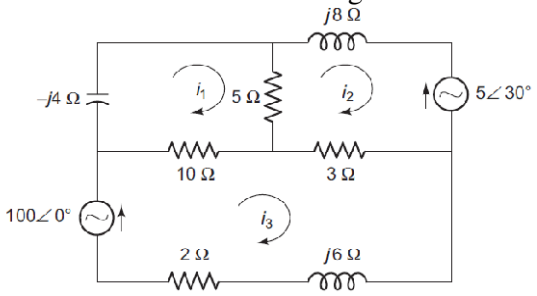
b) Find the current through the inductor for t> 0 in figure. [8M]



UNIT-III

5 Find the mesh currents for the network shown in figure. [14M]



(OR)

6 a) Derive the expression for coefficient of coupling of magnetic circuit. [7M]

b) For the series connection of two coupled coils, find the expression for mutual inductance. When the fluxes of the two coils assist each other, the net equivalent inductance is L_1 and when the fluxes of the two coils oppose each other, the equivalent inductance is L_2. [7M]

UNIT-IV

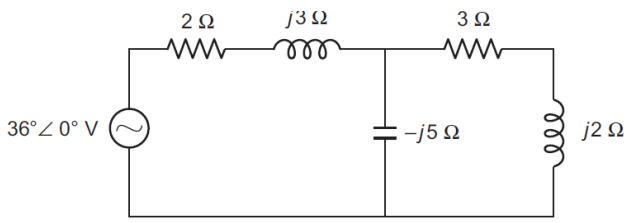
7 a) Derive the expression for resonant frequency in terms of half power frequencies. [7M]

b) Following are parameters for a series *RLC* circuit: R = 50 ohms, L = 0.5 H and C = 30 μF. If a constant voltage of 230 V, at variable frequency is applied, find the frequency at which resonance occurs. Also find maximum voltages across L and C. [7M]

(OR)

8 a) State and explain the Substitution theorem. [6M]

b) For the circuit shown in Figure, verify the reciprocity theorem. [8M]

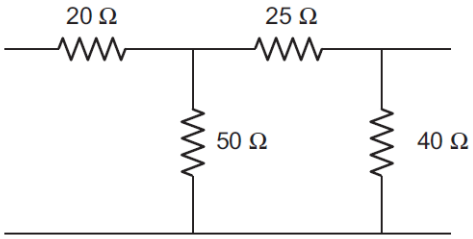


Code No: **R201213** **R20** **SET - 1**

UNIT-V

9 a) Obtain the transmission parameters in terms of Z and Y-parameters. [6M]

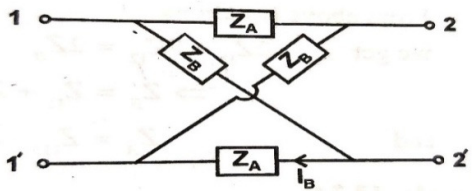
b) Find the *ABCD* parameters of the circuit shown in Figure. [8M]



(OR)

10 a) Obtain the conditions for reciprocity and symmetry for Z-parameters. [6M]

b) The network shown in figure is known as a lattice network. Find (i) Z-parameters of the lattice network and (ii) express Z_A and Z_B in terms of Z-parameters. [8M]



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Code No: **R201213** **R20** **SET - 2**

I B. Tech II Semester Regular/Supplementary Examinations, July/August-2023

NETWORK ANALYSIS

(Common to ECE, EIE, ECT)

Time: 3 hours Max. Marks: 70

Answer any five Questions one Question from Each Unit
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UNIT - I

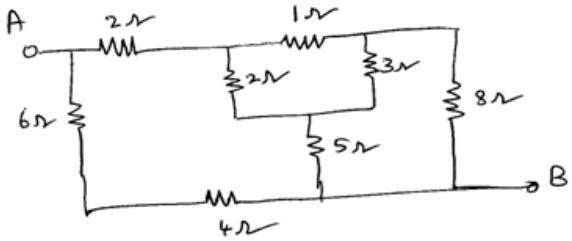
1 a) Define the following [6M]
(i) Electric charge (ii) Current (iii) Electric energy (iv) Potential

b) A Wheatstone bridge ABCD is arranged as follows: AB = 1 Ω, BC = 2 Ω, CD = 3 Ω; DA = 4 Ω. A resistance of 5 Ω connected between B and D. A 20-volt battery of internal resistance 1 Ω is connected between A and C. Calculate i) The magnitude and direction of current in 5 Ω resistor and ii) the resistance between A and C. [8M]

(OR)

2 a) Explain the procedure for obtaining fundamental tie set matrix of a given network [6M]

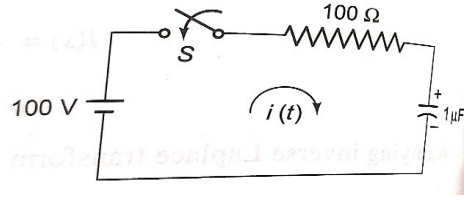
b) For the circuit shown in below figure, find the resistance between the terminals A and B. [8M]



UNIT-II

3 a) Explain the procedure evaluating initial conditions of circuit parameters [7M]

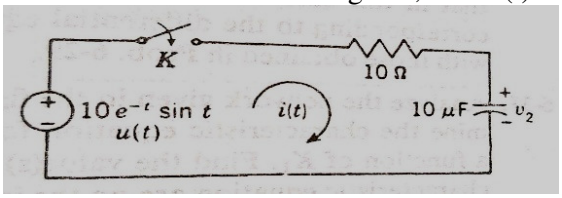
b) For the circuit given in the figure, find the transient current and also determine the voltage drop across resistor and capacitor when switch S is closed at t =0. [7M]



(OR)

4 a) Explain the differences between first order and second order differential equations. [7M]

b) In the network of the figure, the switch S is closed at t =0 with the capacitor initially unenergized. For the numerical values given, find I (t). [7M]



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Code No: **R201213** **R20** **SET - 2**

UNIT-III

5 a) Explain the mesh analysis with suitable circuit diagram and derive its expressions [7M]

b) A voltage of (100+ j40) volts drives a current of (4-j6) Amp through a series R-L-C Circuit. Determine the following [7M]
i) The complex expression for impedance
ii) Power consumed
iii) Power factor
iv) Draw the phasor diagram

(OR)

6 a) Explain the dot convention with suitable diagrams [7M]

b) An iron ring of mean length 150 cm with an air gap of 1mm has a winding of 600 turns and the relative permeability of iron is 600. When a current of 5 A flows in the winding, determine flux density. Neglect leakage and fringe ring. [7M]

UNIT-IV

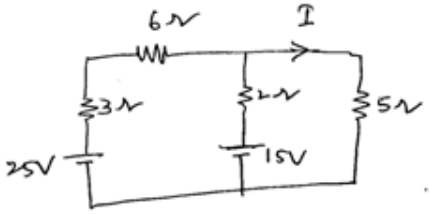
7 a) Derive the expression for Q factor and bandwidth of parallel RLC circuit at resonance [7M]

b) An impedance coil having resistance of 28ohms and inductance 28 mH is connected in parallel with variable capacitors. Determine value of *C* when the circuit undergoes resonance if a 100 V, 430 Hz source is applied. Find also the line current under resonance. [7M]

(OR)

8 a) State and explain the Milliman's theorem [6M]

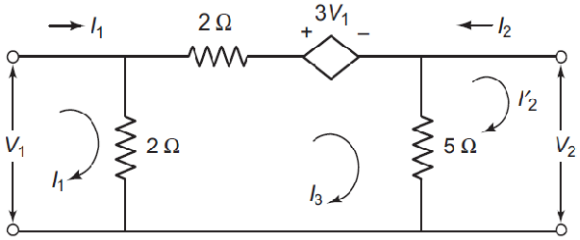
b) Determine the current I in the network by using Thevenin's theorem as shown in below figure. [8M]



UNIT-V

9 a) Obtain the relationships between Y-parameters in terms of ABCD parameters. [6M]

b) Find the *Z*-parameters of the circuit shown in Figure. [8M]

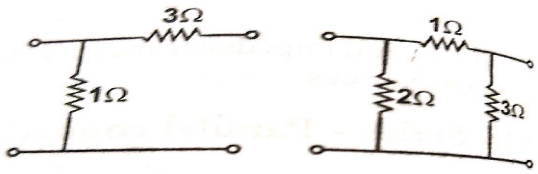


|''|''|||''|'''|||'|

(OR)

10 a) Obtain the conditions for reciprocity and symmetry for transmission-parameters. [7M]

b) Connect in parallel the two circuits shown in figure and fine Y-parameters. [7M]



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Code No: **R201213** **R20** **SET - 3**

I B. Tech II Semester Regular/Supplementary Examinations, July/August-2023

NETWORK ANALYSIS

(Common to ECE, EIE, ECT)

Time: 3 hours Max. Marks: 70

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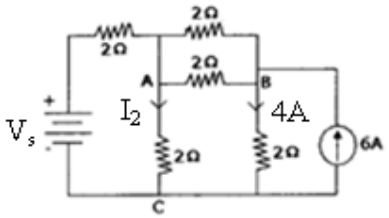
UNIT - I

1 a) Explain Independent and dependent sources with their characteristics. [7M]

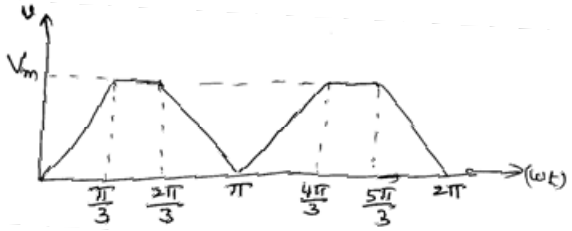
b) For the circuit as show in following figure, determine the value of the current I_2 and source voltage V_s (All resistance are in ohms). [7M]



(OR)

2 a) Definition the following [7M]
(i) Branch (ii) Node (iii) Tree (iv) Planar Graph

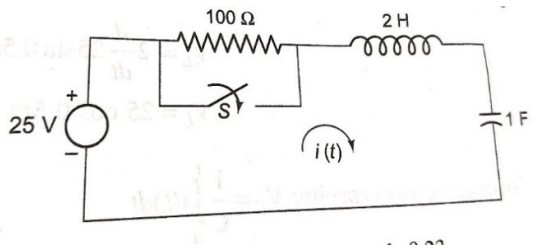
b) For the wave form as shown in below figure, calculate the RMS value and Average value: hence the value of form factor. [7M]



UNIT-II

3 a) What are initial conditions? Why are they necessary? [6M]

b) Find the transient current i(t) for the network shown in figure. At t =0, the switch S is closed. Find the voltage across inductor and capacitor. [8M]



(OR)

4 a) Distinguish between classical and Laplace transform methods of solution of a circuit. [6M]

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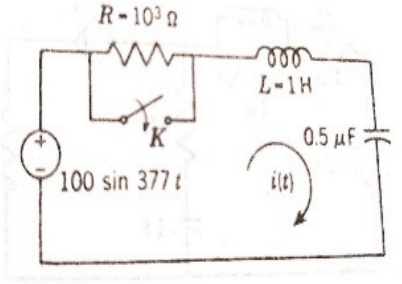
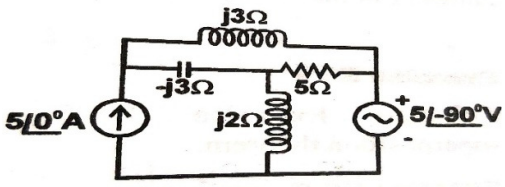
b) In the network shown in the accompanying figure, a steady state is reached with the switch S is open. AT t =0, the switch is closed. For the element values given, determine the current, i(t) for t ≥0. [8M]



UNIT-III

5 Determine all mesh currents for the circuit shown in figure using mesh analysis. [14M]



6 a) Compare between magnetic circuits and electrical circuits. [6M]

b) An iron ring of mean circumference 50 cm and a circular cross-sectional area of 2 cm^2 has a saw cut 2 mm in length and is wound with 300 turns of wire. If a 1 mWb flux exists across the air gap, find the exciting current. Take leakage factor as 1.6 and μ_r for iron as 500. [8M]

UNIT-IV

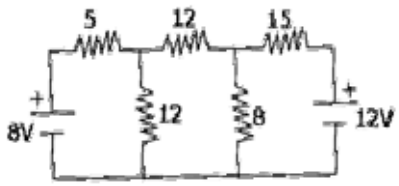
7 a) Derive the resonance frequency of parallel circuit considering internal resistances of L only. [7M]

b) Calculate half-power frequencies of a resonant circuit where the resonant frequency is 255 kHz and the bandwidth is 150 kHz. [7M]

(OR)

8 a) State and explain the Compensation theorem. [6M]

b) Using superposition theorem calculates the current in 8 ohms resistances shown in following figure (All resistance is in ohms). [8M]

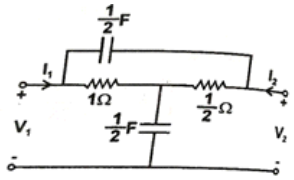


Code No: **R201213** **R20** **SET - 3**

UNIT-V

9 a) Obtain the relationships between Z-parameters in terms of h- parameters. [7M]

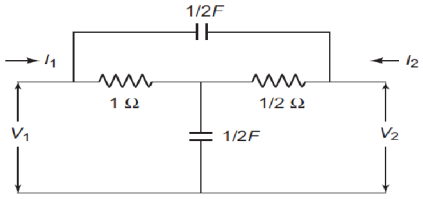
b) The network shown in figure is known as bridge T-network. Determine Y-parameters of the network. [7M]



(OR)

10 a) Obtain the conditions for reciprocity and symmetry for h-parameters. [6M]

b) Find the ABCD parameters of the network shown in figure. [8M]



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Code No: **R201213** **R20** **SET - 4**

I B. Tech II Semester Regular/Supplementary Examinations, July/August-2023

NETWORK ANALYSIS

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Time: 3 hours Max. Marks: 70

Answer any five Questions one Question from Each Unit
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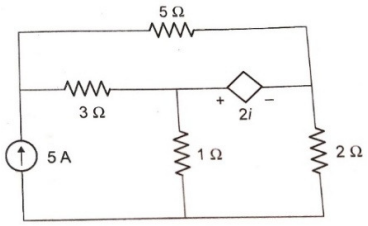
UNIT - I

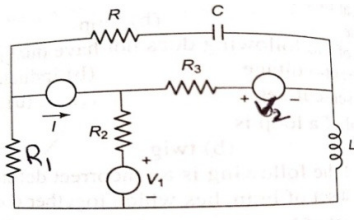
1 a) Definitions of terms associated with periodic functions [6M]
(i) Time period (ii) Angular velocity (iii) frequency

b) Using nodal method, find the current through the 5 ohms resistor in the circuit show in the figure. [8M]

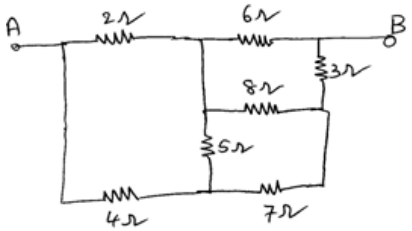


(OR)

2 a) What is the Principal of Duality? Write the procedure for obtaining the dual of a given planer network shown in figure [7M]



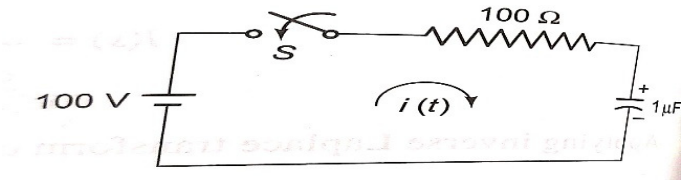
b) Determine the resistance between the points A and B of the network as shown in the figure? [7M]



UNIT-II

3 a) Explain the evaluating initial conditions procedure. [7M]

b) For the circuit given in the figure, find the transient current and also determine the voltage drop across resistor and capacitor when switch S is closed at t =0. [7M]



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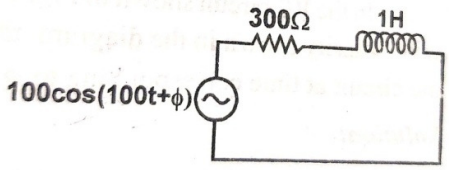
Code No: **R201213** **R20** **SET - 4**

(OR)

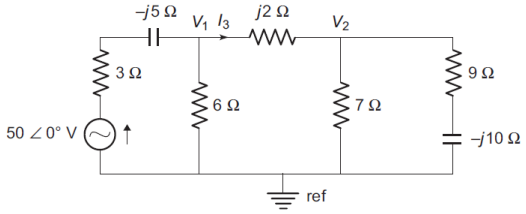
4 a) Describe the Laplace Transform of signal waveforms with necessary diagrams and expressions. [7M]

b) An RL series circuit with R = 300 ohms and L =1 H has a sinusoidal voltage v = 100 cos(100t +ϕ) volts. If the switch is closed with ϕ =45^0, obtain the resulting current i(t). [7M]



UNIT-III

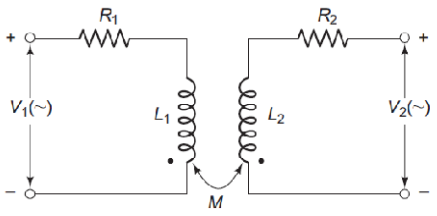
5 Determine the power supplied to the circuit shown in figure by a source $V1 = 50\angle 0^0\ V$. Also find the power dissipated by each resistor in the circuit using nodal method. [14M]



(OR)

6 a) Write down the dissimilarities of magnetic circuit and electric circuit. [6M]

b) Find the value of mutual inductance for the circuit shown in Figure representing a coupled coil circuit where L_1 =30 mH, L_2 = 40 mH, and coefficient of coupling, K = 0.6. Also write down the mesh equations in time domain. [8M]



UNIT-IV

7 a) Derive the resonance frequency of parallel circuit considering internal resistances of L and C. [7M]

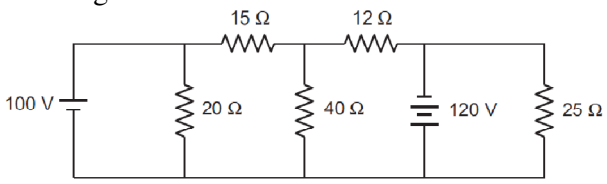
b) An impedance coil having resistance 15 ohms and inductance coil of 0.02 H is connected in series with 0.01 μF capacitor. Calculate. [7M]
(i) Q of coil
(ii) Resonant frequency of the circuit
(iii) Half-power frequencies

|''|''|||''|'''|||'|

(OR)

8 a) State and explain the Tellegens theorem. [6M]

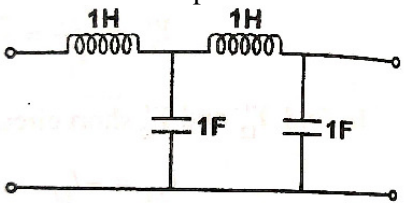
b) Using Millman's theorem to calculate voltage drop across the 40 ohms resistor of the network shown in figure. [8M]



UNIT-V

9 a) Obtain the relationships between Y-parameters in terms of h- parameters [6M]

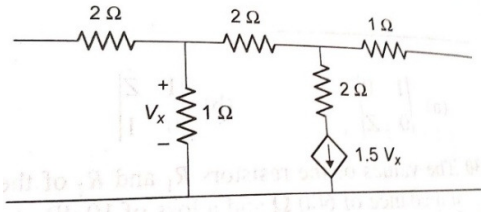
b) Find transmission parameters for the low pass filter network shown in figure. [8M]



(OR)

10 a) Obtain the conditions for reciprocity and symmetry for Y-parameters. [6M]

b) Determine the Z-parameters for the network shown in the figure. [8M]



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