SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR
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Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (DESCRIPTIVE)

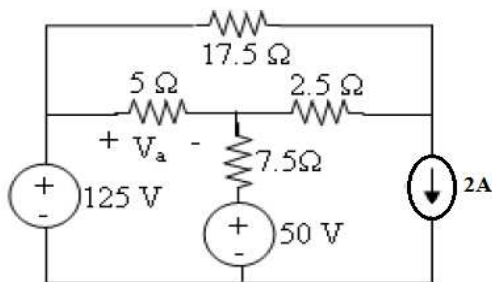**Subject with Code :** Network Analysis(16EE205)   **Course & Branch**: B.Tech - ECE

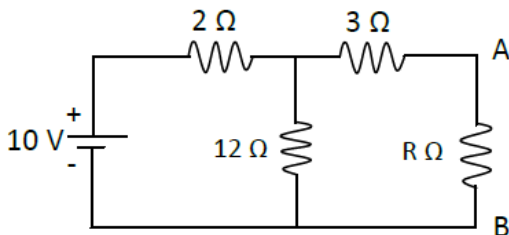**Year & Sem:** I-B.Tech & II-Sem   **Regulation:** R16

UNIT –I

INTRODUCTION

1. a) What do you mean by an electric network and an electric circuit?   [L1] [4M]
    b) Find the value of V_a for the following circuit using KVL.   [L3] [6M]


2. a) Explain the concept of source transformation?   [L3] [4M]

    b) Find the maximum power delivered to the load by using maximum power transfer theorem for the following circuit.   [L3] [6M]
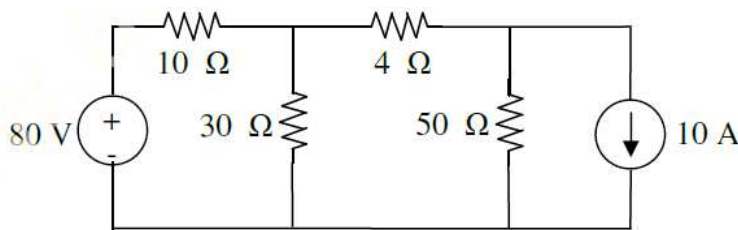

3. (a) State and explain Kirchhoff's laws?   [L3] [4M]
    (b) Using nodal analysis find all branch currents for the following circuit   [L3] [6M]
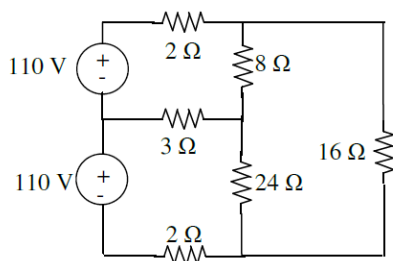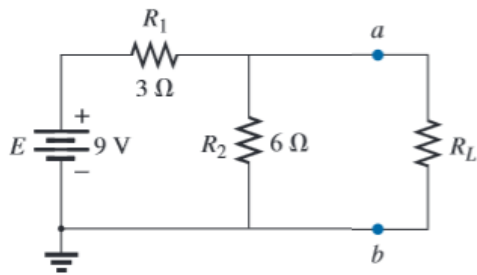
4. a) What is the condition for maximum power transfer to the load?　　　　　[L3] [4M]

   b) Find Thevenin's equivalent for the following circuit.　　　　　　　　　[L3] [6M]
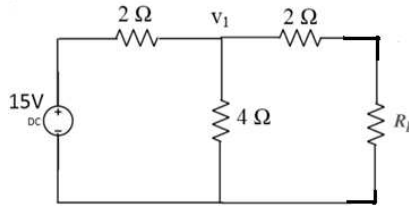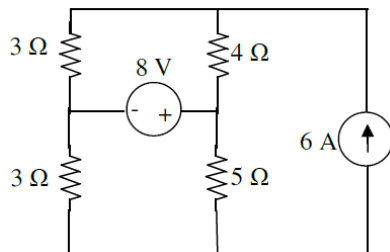

5. a) State and explain Superposition theorem?　　　　　　　　　　　　　　[L3] [4M]

   b) Verify Superposition theorem for 4Ω resistor for the following circuit.　　　[L3] [6M]

6. a) State and explain milliman's theorem.　　　　　　　　　　　　　　　　[L3] [4M]

   b) Find Norton's equivalent for the following circuit.　　　　　　　　　　[L3] [6M]

7. (a) State Kirchhoff's voltage law?　　　　　　　　　　　　　　　　　　[L3] [4M]

    (b) Find branch currents for the following circuit.　　　　　　　　　　[L3] [6M]

8. a)State and explain Norton's theorem?　　　　　　　　　　　　　　　　　[L3] [4M]

   b) Verify the reciprocity theorem for the network shown in fig .　　　　　　[L3] [6M]
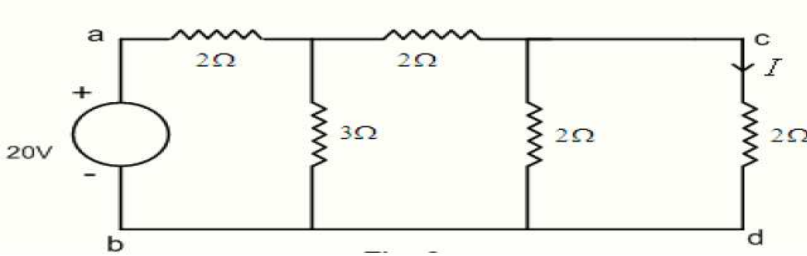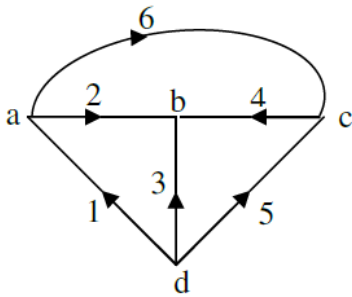
9. (a) Define the following terms

(i) Branch   (ii) Sub graph (iii) Node   (iii) Tree   [L3] [4M]

    (b) For the graph shown below find incidence and cut set matrices.   [L3] [6M]
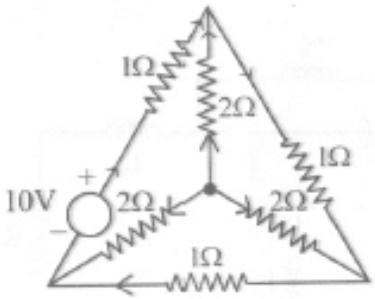

10. (a) Define and state the properties of incidence matrix.   [L2] [4M]

    (b) For the network shown below draw the graph and find incidence and tie – set matrices.

    [L3] [6M]

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Year & Sem: I-B.Tech & II-Sem   **Regulation:** R16

UNIT-II

AC CIRCUITS

1. a) What is time constant? What are the time constants of series RL and RC circuits? [L3] [4M]
    b) Deduce the transient response source free series RC circuit.   [L3] [6M]
2. (a) Explain about properties of Exponential Response of RLC circuits.   [L3] [4M]
    (b) Deduce the transient response source free series RL circuit   [L3] [6M]
3. (a) Explain about Source free RL and RC Circuits.   [L3] [4M]
    (b) Explain the complete response of source free series RLC Circuits.   [L3] [6M]
4. (a) Explain about Natural & Forced Response of RLC Circuits.   [L3] [4M]
    (b) Explain the complete response of source free parallel RLC Circuits.   [L3] [6M]
4. a) Define Admittance   [L3] [2M]
    b) The impedances of parallel circuit are $Z1= (6+j8)$ ohms and $Z2 = (8-j6)$ ohms. If the applied voltage is 120V, find (i) current and power factor of each branch (ii) overall current (iii) power consumed by each impedance. Draw the phasor diagram.   [L3] [8M]
5. (a) Explain the phasor relation for R,L,C elements.   [L3] [4M]
    (b) A resistor of 50Ω, inductance of 100mH and a capacitance of 100µF are connected in series across 200V, 50Hz supply. Determine the following   [L3] [6M]
      (i) Impedance   (ii) current flowing through the circuit   (iii) power factor
      (iv) voltage across R,L &C   (v) power in watts
6. (a) Explain the phasor relation for series RL and RC circuit.   [L3] [4M]
    (b) A 120V AC circuit contain 10 Ω resistance and 30 Ω inductive reactance in series. What is average power of this circuit.   [L3] [6M]
7. (a) Explain the phasor relation for parallel RLC circuit.   [L2] [4M]
    (b) A parallel RLC circuit is supplied with a voltage source of 230 V, 50Hz. Determine circuit current and power factor if R=40Ω, L=0.2H and C=50µF.   [L3] [6M]

8. (a) Define power factor, apparent power, active power and reactive power.   [L3] [4M]

    (b) The impedances of parallel circuit are $Z1= (4+j6)$ ohms and $Z2 = (12-j8)$ ohms. If the applied voltage is 220V, find (i) current and power factor of each branch (ii) overall current (iii) power consumed by each impedance. Draw the phasor diagram.   [L3] [6M]

9. (a) Explain the phasor relation for parallel RL and RC elements.   [L3] [4M]

(b) A 120V AC circuit contain 10 Ω resistance and 30 Ω inductive reactance in series. What is average power of this circuit. [L3] [6M]

10. (a) Explain the characteristics of sinusoids. [L3] [4M]

(b) A resistor of 150Ω, inductance of 200mH and a capacitance of 10μF are connected in series across 500V, 150Hz supply. Determine the following [L3] [6M]

(i) Impedance   (ii) current flowing through the circuit   (iii) power factor

(iv) voltage across R,L &C   (v) power in watts

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UNIT-III
RESONANCE & MAGNETICALLY COUPLED CIRCUITS

1. A series RLC circuit has R=10Ω, L=0.5H and C=40μF. The applied voltage is 100V. Find (a) Resonant frequency & Quality factor of a coil (b) Bandwidth (c) Upper and lower Half power frequencies (d) Current at resonance & current at half power points (e) Voltage across inductance & voltage across capacitance at resonance. [L3] [10M]

2. (a) In a parallel resonance circuit (Tank circuit) R=2Ω, L=1mH and C=10μF, Find the Resonant frequency, Dynamic impedance and Bandwidth. [L3] [6M]

(b) Obtain the expression for resonant frequency for parallel RL-RC circuit. [L3] [4M]

3. Obtain the expression for resonant frequency, bandwidth and Q-factor for parallel R-L-C circuit. [L3] [10M]

4. Obtain the expression for resonant frequency, bandwidth and Q-factor for Series R-L-C circuit. [L3] [10M]

5. Show that the resonant frequency circuit $f_r^2 = f_1 f_2$ where f_1 and f_2 are the half power frequencies and f_r is the resonant frequency. [L3] [10M]

6. Write the comparison between series resonance and parallel resonance? [L2] [10M]

7. Define and explain self and mutual inductance. [L3] [10M]

8. a) Explain about dot convention in mutually coupled circuits. [L1] [4M]

b) Discuss briefly about energy considerations in mutually coupled circuits. [L3] [6M]

9. Explain about linear transformer and ideal transformer. [L2] [10M]

10. In a parallel Resonant circuit shown in figure. (1), find the Resonant frequency, Dynamic Impedance, Bandwidth, Q-factor and Current at resonance? [L3] [10M]
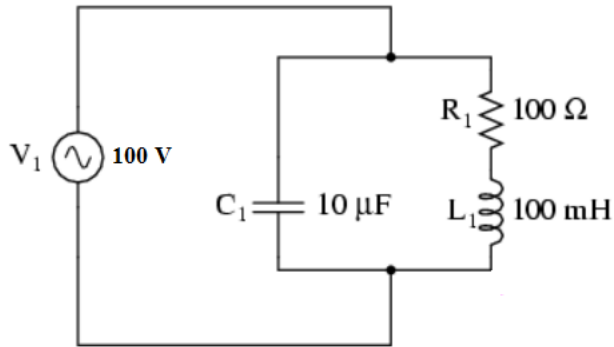
Fig.(1)

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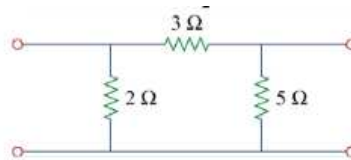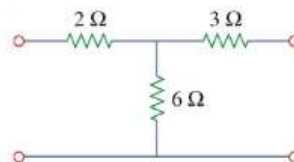**Year & Sem:** I-B.Tech & II-Sem   **Regulation:** R16

UNIT-IV
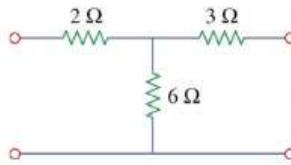## TWO PORT NETWORKS & STATE VARIABLE ANALYSIS

1. a) Find the Z- parameters for the following circuit.   [L3] [6M]

   b) Express ABCD parameters in terms of h parameters.   [L3] [4M]

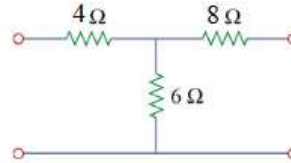2. a) Find the Y- parameters for the following circuit.   [L3] [6M]

   b) Express h parameters in terms of ABCD parameters.   [L3] [4M]

3. a) Find the ABCD parameters for the following circuit.   [L3] [6M]
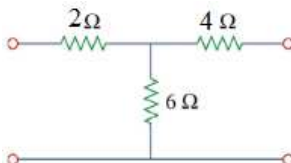
b) Express Y parameters in terms of h parameters.   [L3] [4M]

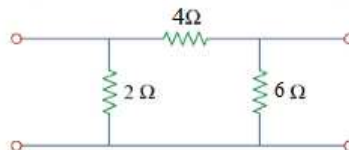4. a) Find the h- parameters for the following circuit.   [L3] [6M]

b) Find the relationship between Z and h parameters.   [L3] [4M]

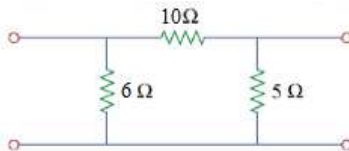5. Find the Z and Y parameters for the following circuit.   [L3] [10M]

6. a)Find the Y- parameters for the following circuit.   [L3] [6M]

b) Express Z parameters in terms of ABCD parameters.   [L3] [4M]

7. Find the ABCD and h - parameters for the following circuit.   [L3] [10M]

8. Explain about the state variables and state variables of circuits.   [L3] [10M]

9. a) What are the advantages of state variable analysis.   [L3] [4M]

   b) The transfer function of a system is G(s)=2/(s+1)(s+2). Obtain a state

variable representation for the system.   [L3] [6M]

10. Explain about proper and improper behavior of the circuits.   [L3] [10M]

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UNIT-V
FILTERS

1. a) Explain Neper and Decibel.   [L2] [4M]
   b) What is a constant K low pass filter, derive its characteristics impedance.   [L2] [6M]
2. a) What is a filter? Explain about various types of filters.   [L2] [4M]
   b) Explain the classification of pass band and stop band in detail.   [L2] [6M]
3. Derive the expression for characteristic impedance in a pass band filter.   [L2] [10M]
4. Explain the design procedure for a constant K low pass filter and its characteristics.   [L2] [10M]
5. Design a constant K high pass filter and explain its design procedure in detail.   [L2] [10M]
6. What is high pass filter. Explain the general configuration and parameters of a contant-K   high pass filter.   [L2] [10M]
7. What is an m-derived filter? Explain the general configuration and parameters of m-derived low pass filter.   [L2] [10M]
8. Derive necessary expressions for m-derived high pass filter.   [L2] [10M]
9. Give the analysis for the design of constant-K band pass filter.   [L2] [10M]
10. Design a band elimination filter and explain its design procedure in detail.   [L2] [10M]

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