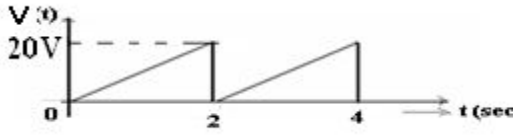
MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
UG Model question paper

Time: 3 hours **Electrical Circuit** **Max Marks: 70**

Note: This question paper contains of 5 sections. Answer five questions, choosing one question from each section and each question carries 14 marks.

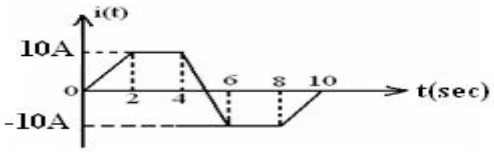
SECTION-I

1. a) Explain about the types of network elements. **[7M]**
   b) The following voltage is applied across the inductor, determine the current wave form and also draw power waveform ? **[7M]**



OR

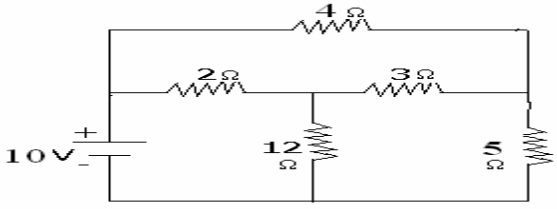
2. a) The current waveform for the pure inductance of 6mH is shown in below figure. Determine the voltage waveform and power waveform. **[8M]**



   b) Explain different types of sources ? **[6M]**

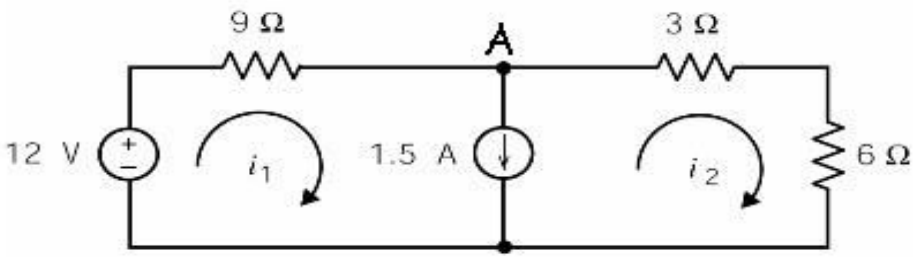
SECTION-II

3. a) Explain about mesh analysis with an example. **[6M]**
   b) Find out the power absorbed by the 12ohm resistor by using nodal analysis. **[8M]**



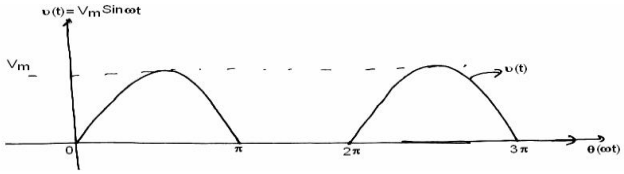
OR

4. a) Explain about the super mesh analysis with an example.
   b) Determine current flowing through 3ohms resistor using Supermesh analysis.



SECTION-III

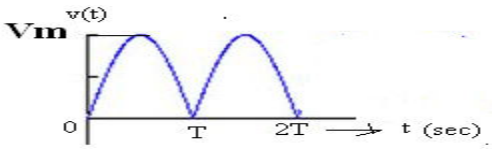
5. a) Determine the Average value, RMS value, Form factor and Peak Factor for the following alternating waveform.



b) Explain about the response of series R-L Circuit to the A.C voltage.

OR

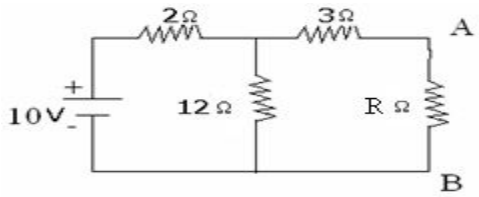
6. a) Define Average value, RMS value, Form Factor and Peak Factor for the following waveform



b) A series circuit consisting of a 10 ohms resistor, a 100 μF capacitance and 10 mH inductance is driven by a 50 Hz AC voltage source of maximum value 100 V. Calculate the equivalent impedance, current in the circuit, the power factor and power dissipated in the circuit.

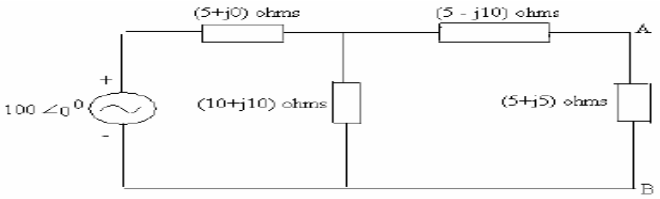
SECTION-IV

7. a) State and explain superposition theorem.
   b) When the load impedance R draws the maximum power? Find the maximum power delivered to the load by using maximum power transfer theorem for the given network.



OR

8. a) State and explain about the reciprocity theorem with an example. **[6M]**
   b) Determine the current flowing through branch AB in the given circuit by using Thevenin's theorem. **[8M]**



SECTION-V

9. a)Explain about dot convention with neat diagrams ? **[7M]**
   b) State and explain the Faraday's laws of electromagnetic induction ? **[7M]**

OR

10. a) Obtain the expression for co - efficient of coupling in magnetic circuit. **[7M]**
    b) Explain about self and mutual induction. **[7M]**

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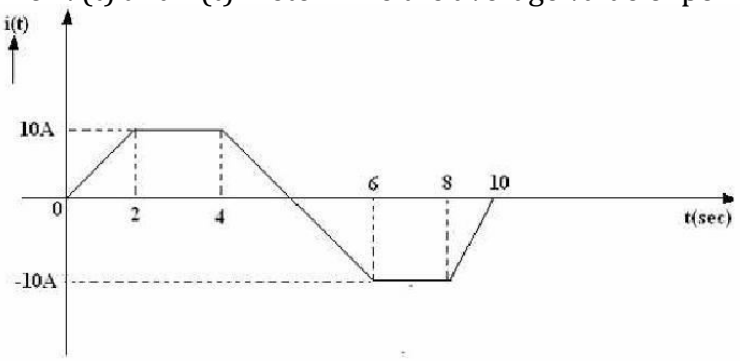
SECTION-I

1. a) Explain independent and dependent sources with neat sketch. **[7M]**
   b) Explain Kirchhoff's laws with example ? **[7M]**

OR

2. a) A pure inductance of 3 mH carries a current of the wave form shown in figure. Sketch the waveform of V(t) and P(t). Determine the average value of power. **[9M]**

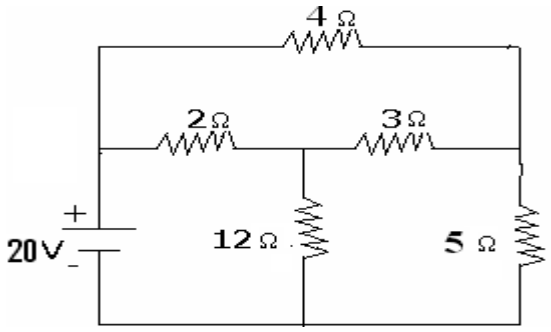


   b) Write about source transformation with neat diagrams. **[5M]**

SECTION-II

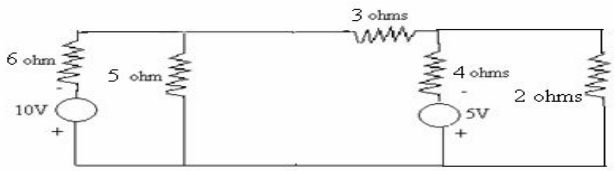
3. a) Three resistances R_{ab} , R_{bc} and R_{ca} are connected in delta connection, Derive the expressions for equivalent star connection. **[7M]**

   b) Find the current supplied by 10 V battery by using Star – Delta transformation for the following network. **7M**

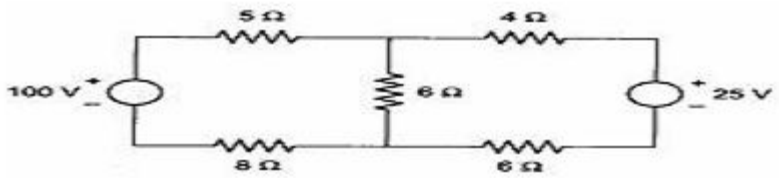


OR

4. a) Determine the graph, tree, tie set, cut set for the following network . **[7M]**

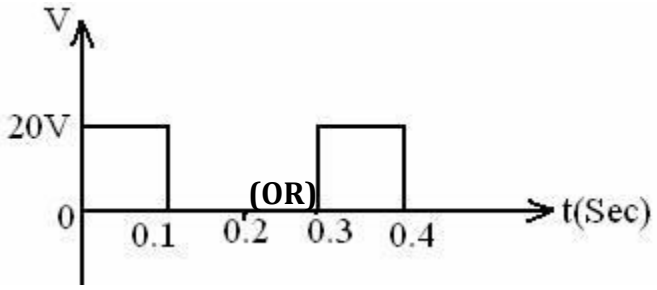


b) For the network shown in figure determine all branch currents and the voltage across 6 ohm resistor using loop current method **7M**



SECTION-III

5. a) Derive the expression for RMS value and average value of half wave rectified output waveform. **[7M**]
   b) Compute the RMS and average values of square wave form shown in below figure. **[7M]**



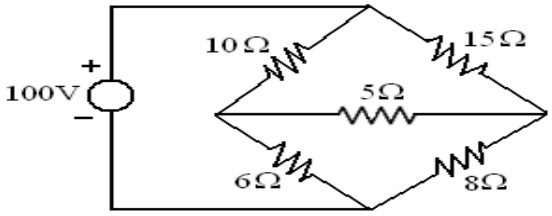
(OR)

OR

6. a) A coil takes a current of 1 A at 0.6 lagging power factor from a 220 V, 60 Hz single phase source. If the coil is modeled by a series RL circuit finds [7M]
   i) The complex power in the coil.
   ii) The values of R and L.
   b) Explain the significance of j-operator. Explain phasor algebra ?

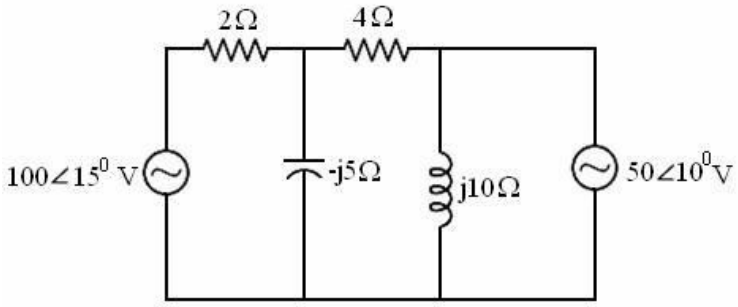
SECTION-IV

7. a) State and explain Tellegen's theorem [5M]
   b) Determine the current flowing through the 5 ohm resistor using Thevenin's Theorem. [5M]



OR

8. a)Find the current through the capacitor and voltage across 4- Ω resistance of the following network ? **[7M]**



b) State and explain Norton theorem with example. [**7M]**

SECTION-V

9. a)Explain about composite magnetic circuit. **[7M]**
   b) Derive the expression for co-efficient of coupling ? [**7M]**

OR

10. a) Derive the expression of equivalent inductance of two series connected coupled coils. [**7M]**

    b) Two coupled coils of L1 = 0.8 H and L2 = 0.2 H have a coupling coefficient k = 0.9. Find the mutual inductance M. **[7M]**

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SECTION-I

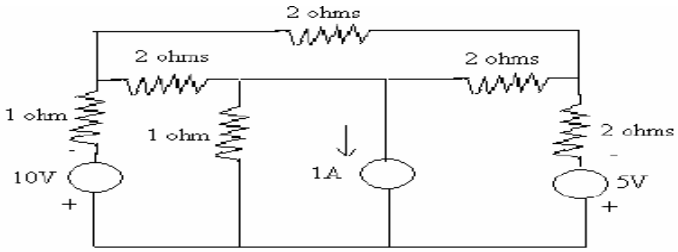
1. a) Explain Active & Passive elements in detail. **[7M]**
   b) Explain types of sources. **[7M]**

OR

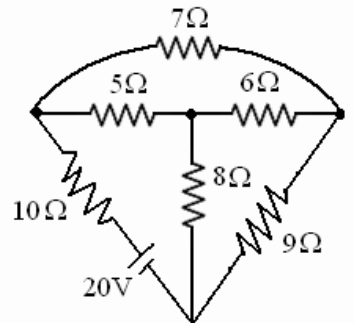
2. a) Explain About Kirchhoff's laws with an example. **[7M]**

SECTION-II

3. a). For the below network, draw
   i) Sub-Graph ii) Co-Tree iii) Oriented graph **[7M]**

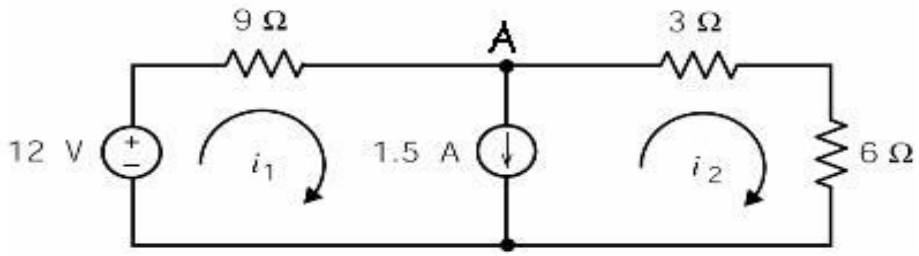


   b) Find the branch currents as shown in following figure 3 by using the concept of tie-set matrix. **[7M]**



OR

4. **a**)Explain about super mesh analysis **[7M]**
   b) Determine current flowing through 3ohms resistor using Super mesh analysis. **[7M]**



SECTION-III

5. Derive the expression for RMS value, Average value and Form Factor of alternating current wave $I = I_m \sin \omega t$. **[7M]**

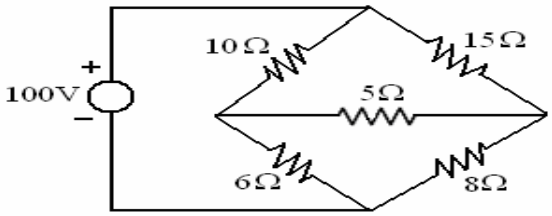
OR

6. A coil takes a current of 1 A at 0.6 lagging power factor from a 220 V, 60 Hz single phase source. If the coil is modeled by a series RL circuit finds **[7M]**
   i) The complex power in the coil.
   ii) The values of R and L.

SECTION-IV

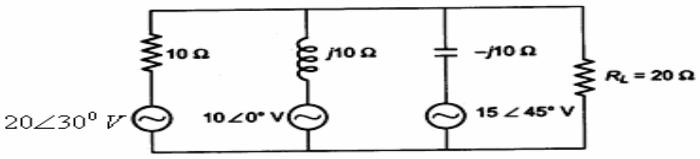
7. a) State and explain Maximum Power Transfer theorem. **[7M]**

   b) Determine the current flowing through the 5 ohm resistor using Thevenin's theorem. **[7M]**



(OR)

8. a) State and explain compensation theorem. **[7M]**
   b) Using Millman's theorem, find the current through R_L in the circuit shown in figure. **[7M]**



SECTION-V

9. a) Derive the relation between self inductances L_1,L_2 and the mutual inductance M of two coupled coils. **[7M]**

   b) Write short notes on composite magnetic circuit. **[7M]**

(OR)

10. a) Derive the expression of equivalent inductance of two parallel connected coils ? **[7M]**

    b) Derive the expression for co-efficient of coupling? [**7M]**

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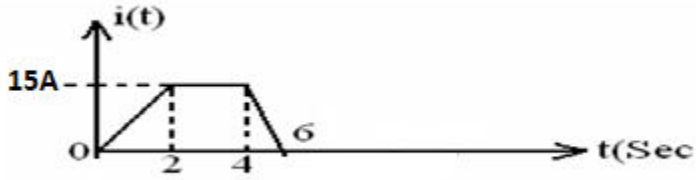
SECTION-I

1. a) Explain about the types of elements with an example. **[7M]**
   b) Explain about the source transformation. **[7M]**

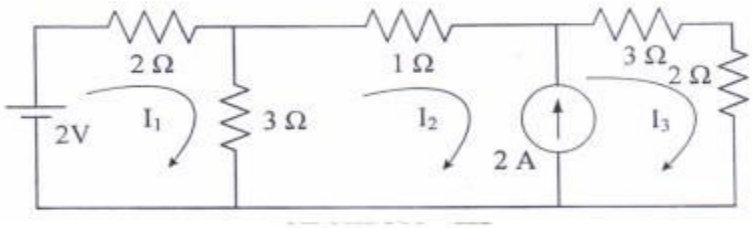
OR

2. The current waveform for the pure inductance of 10mH is shown in below figure. Draw voltage waveform and power waveform. **[14M]**



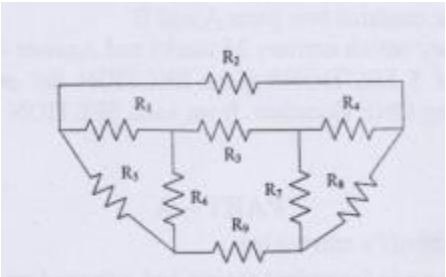
SECTION-II

3. a)Explain mesh analysis with example. **[6M]**
   b) Determine all branch currents for the following network using nodal analysis. **[8M]**



(OR)

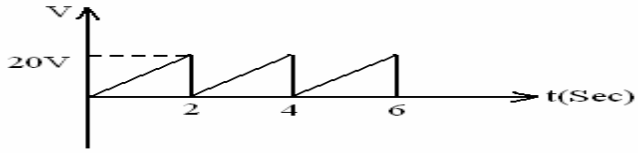
4. a) Find cutset matrix for the following network ? **[7M]**



b) Three resistors 1ohm,2ohm,3ohm are connected in delta determine their star equivalent network hence deduce the expression used ? **[7M]**

SECTION-III

5. a) Define the following terms. [**7M]**
i) Average value ii) RMS value iii) Peak factor iv) Form factor
b) Find out the average and RMS vales of the following waveform. **7M**

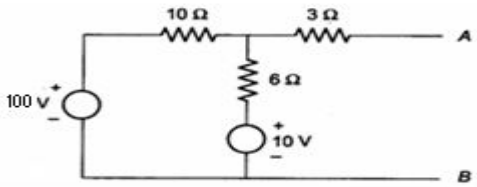


OR

6. a) Derive the expression for RMS value of alternating current wave $I = I_m \sin \omega t$. [**7M]**
b) A coil takes a current of 1 A at 0.6 lagging power factor from a 220 V, 60 Hz single phase source. If the coil is modeled by a series RL circuit. Find [**7M]**
i) The complex power in the coil and
ii) The values of R and L

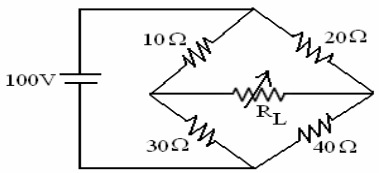
SECTION-IV

7. a) state and explain the Thevenin's theorem. **[7M]**
b) Find Thevenin's equivalent circuit for the circuit shown in below figure. **[7M]**



OR

8. a) State and explain superposition theorem. **[7M]**
b) Determine the load resistance to receive maximum power from the source, also find the maximum power delivered to the load in the circuit shown in below figure. [**7M]**



SECTION-V

9. a) Obtain the expression for co - efficient of coupling in magnetic circuit. **[7M]**
b) Derive the expression of equivalent inductance of two series coils. [**7M]**

OR

10. a) Write short notes on dot convention used in magnetically coupled coils. **[7M]**

b)) Derive the expression of equivalent inductance of two parallel connected coils. [**7M]**

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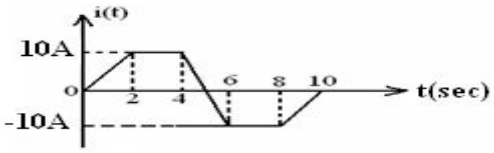
SECTION-I

1. a) Explain about independent and dependent sources. **[7M]**
   b) state and explain Kirchhoff's laws with example. **[7M]**

OR

2. a) The current waveform for the pure inductance of 6mH is shown in below figure. Determine the voltage waveform and power waveform. **[8M]**



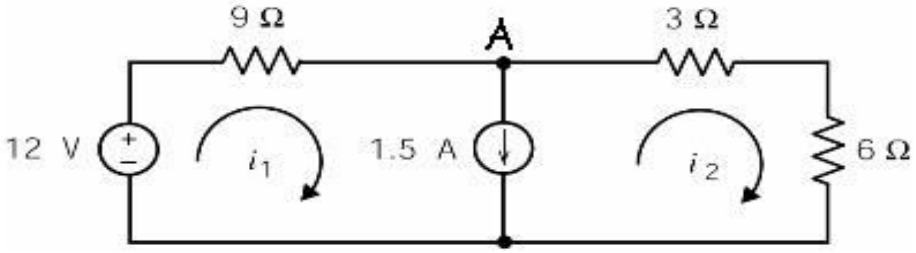
   b) Explain about voltage-current relationship for passive elements ? **[6M]**

SECTION-II

3. a) Explain about super node analysis with an example. **[7M]**
   b) Derive the expressions for star to delta transformation. **[7M]**

OR

4. a) Explain about graph, tree, tie-set and cut-set matrix with an example. **[7M]**
   b) Determine current flowing through 9 ohms resistor using Supermesh analysis. **[7M]**

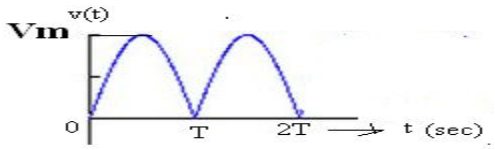


SECTION-III

5. A coil takes a current of 1 A at 0.6 lagging power factor from a 220 V, 60 Hz single phase source. If the coil is modeled by a series RL circuit finds [14M]
   i) The complex power in the coil.
   ii) The values of R and L.

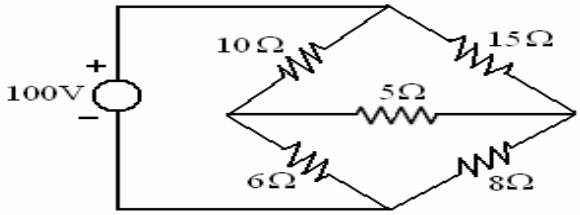
OR

6. Define Average value, RMS value, Form Factor and Peak Factor for the following waveform [**14M**]



SECTION-IV

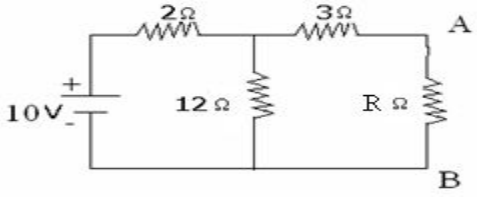
7. a) Determine the current flowing through the 5 ohm resistor using Thevenin's theorem. [7M]



b) Explain about supernode analysis with an example. [7M]

OR

8. a) State and explain the maximum power transfer theorem. [7M]
   b) When the load impedance R draws the maximum power? Find the maximum power delivered to the load by using maximum power transfer theorem for the given network.



SECTION-V

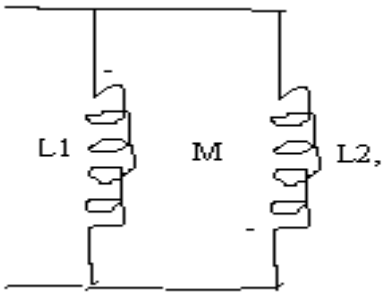
9. a) Derive expressions for the following, [7M]

   (i) Self inductance
   (ii) Mutual inductance

   b) State and explain Faraday's laws of electromagnetic induction [7M]

OR

10. a) Find the equivalent inductance of the following circuit shown in below figure. [7M]



b) Obtain an expression for coefficient of coupling [7M]