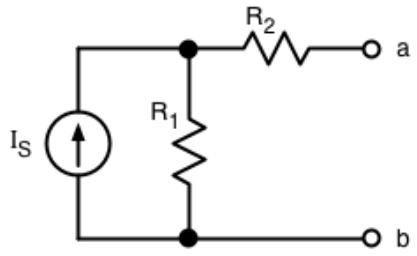
ELECTRICAL TECHNOLOGY

MODEL QUESTION PAPER

Unit-I

Short Answer Questions:

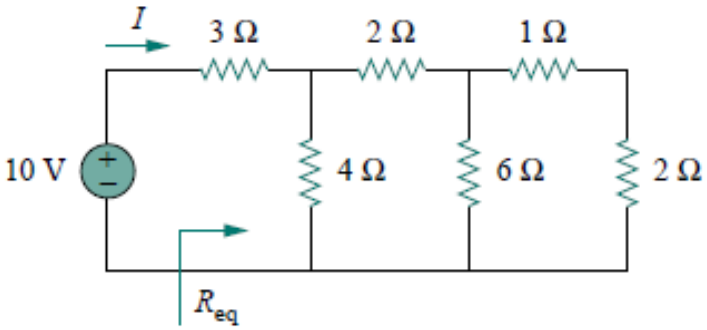
1. Define Charge, Current, Voltage, Power, Energy?
2. Define Ohm's law and Kirchoff's Law.
3. What are the types of sources?
4. What are different types of elements
5. State superposition theorem
6. State Maximum Power Transfer Theorem. Give the expression for maximum power.
7. For the circuit shown below. R_1 = 12 kΩ, R_2 = 1 kΩ, and I_S = 10 mA. Find the values for Thevenin and Norton equivalent circuit with respect to the terminals a and b.



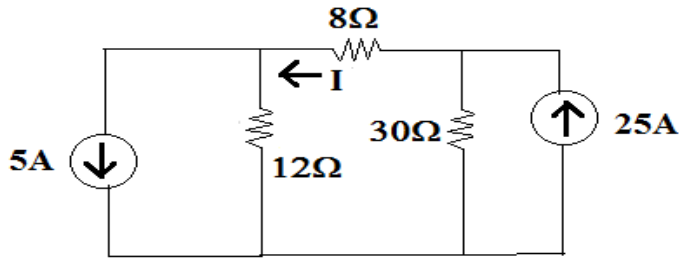
8. Write voltage, current, power, energy relations for a) Resistor b) Inductor c) Capacitor

Long Answer Questions

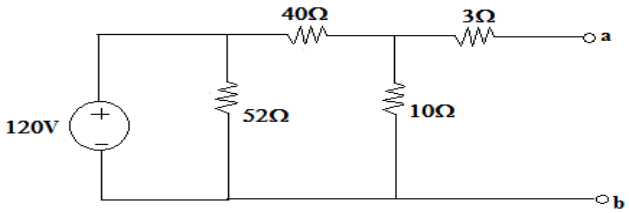
1. Derive expressions for a) Star to Delta transformation b) Delta to Star transformation
2. a) Find equivalent resistance



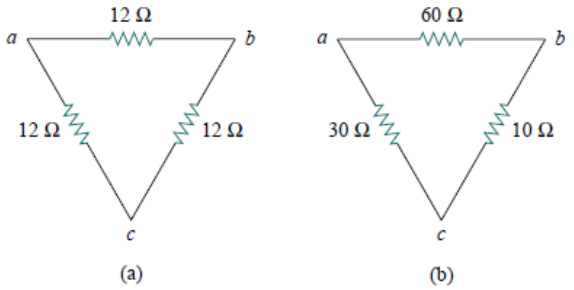
b) For the network shown in fig below the two current sources provide I' and I" when I' + I" = I. Use superposition to obtain these currents. Also prove the theorem using mesh analysis.



3. a) Determine the Thevenin's equivalent circuit with respect to terminals a & b for the network figure below. Find the value of resistance to be connected between terminals a and b so that maximum power is transferred.



b) Transform the given Delta connection to Star connection.



4. a) For the circuit shown in figure 2, use nodal analysis to determine voltage across 3Ω and 12Ω resistance. Compute power absorbed by 6Ω resistor.
b) Calculate the mesh currents in the network shown in Figure 3.

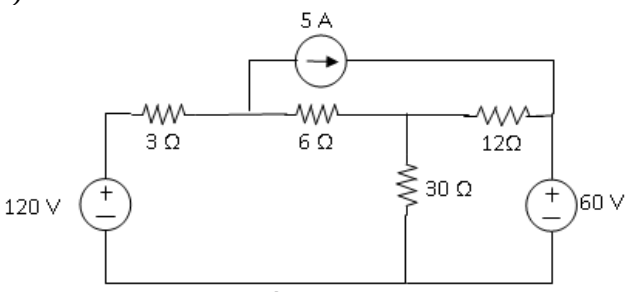


Figure 2

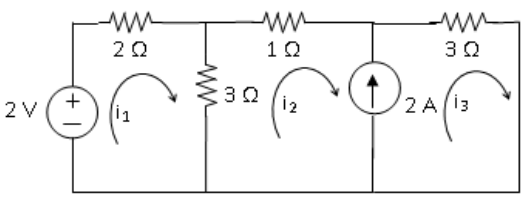
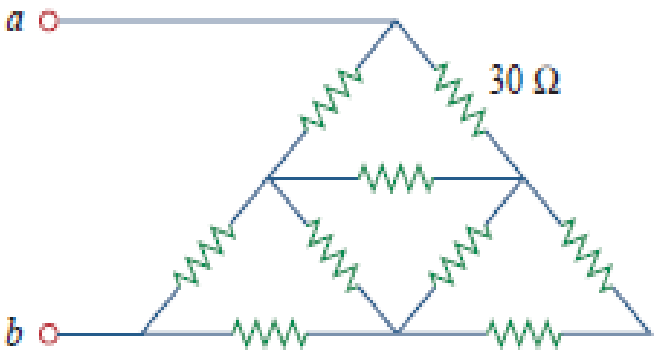
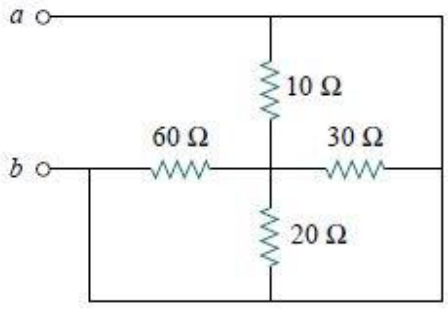


Figure 3

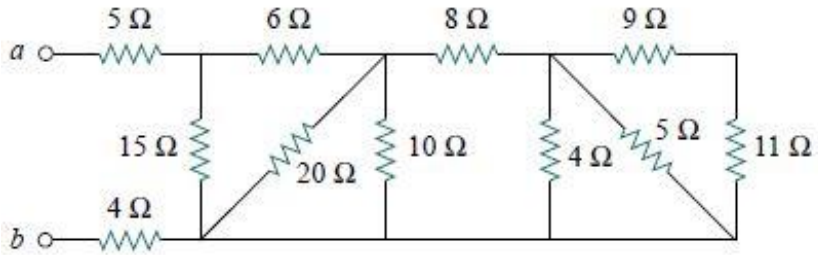
5. a) Explain the voltage division in series circuit and current division in parallel circuit for a resistive network?
   b) Obtain the equivalent resistance for the circuit shown if each resistance has 30 ohms.



6. Find Equivalent Resistance for the two figures below.

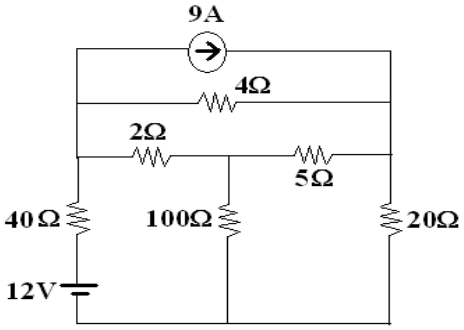


(a)



(b)

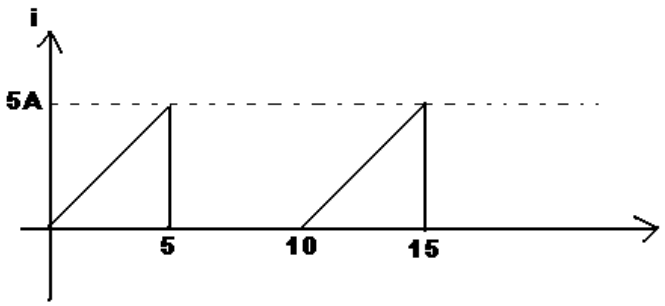
7. Use nodal analysis to determine the voltage across 5Ω resistor and the current in the 40 Ω resistor



Unit-II

Short Answer Questions

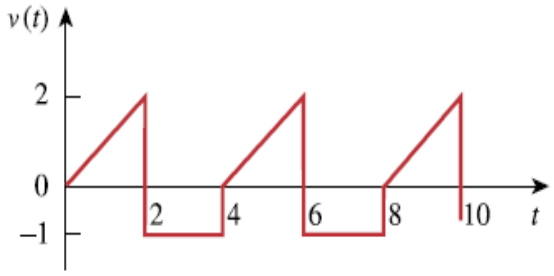
1. Define time period, frequency
2. Define RMS value and write the expression for RMS value of a sinusoidal voltage.
3. Define average value and write the expression for average value of a sinusoidal voltage. What is the form factor of a sinusoidal and a square wave?
4. Explain the relation between resistance, reactance and impedance. Draw impedance triangle.
5. Draw the phasor relation between voltage and current in a) inductor b)capacitor
6. Find the total impedance offered by the circuit for R-30 Ohm, L=20mH, C=50micro F when fed by 60Hz supply.
7. Draw phasor diagram for RL , RC circuits.
8. Calculate the Average value



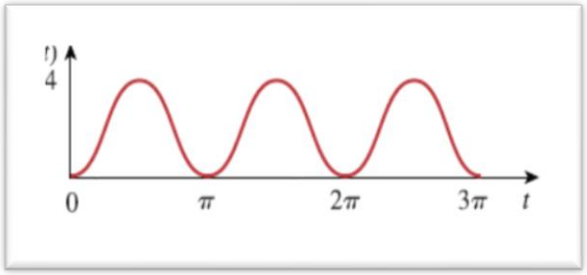
Long Answer Questions

1. a) What is the significance of the R.M.S and average values of a wave? Determine the R.M.S. & average value of the Sine wave form.

   b) Find Average and RMS values, Form factor, peak factor of below waveform



2. a) Find Average and RMS values, Form factor, peak factor of below sine wave



b) Define and explain the terms Instantaneous Value, Average Value, RMS value, Form factor, peak factor for an A.C Input.

3. a) Explain steady state analysis of series RC circuit with neat waveforms phasor diagrams.

   b) A Capacitor of capacitance 79.5μF is connected in series with a non-inductive resistance of 30Ω across a 100V, 50Hz supply. Find (i) impedance (ii) current (iii) phase angle

4. a) Explain the steady state analysis of RLC series circuit.

   b) Find the equivalent impedance of the circuit containing 2 resistances in parallel each of 20 Ohm, which is in series with the parallel combination of 20H inductor and 15micro Farad whose supply voltage is 200V, 50Hz.

5. A 230 V, 50 Hz ac supply is applied to a coil of 0.06 H inductance and 2.5 resistance connected in series with a 6.8 μF capacitor. Calculate (i) Impedance (ii) Current (iii) Phase angle between current and voltage.

6. What is the significance of the r.m.s and average values of a wave? Determine the r.m.s. & average value of the wave form shown.

(a)

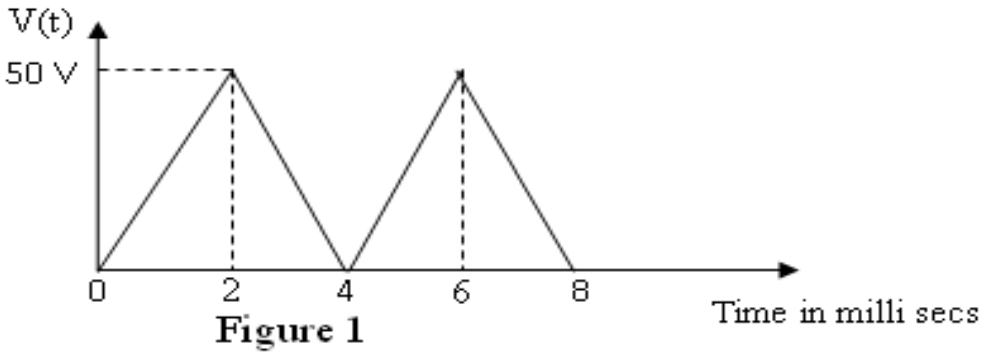


Figure 1

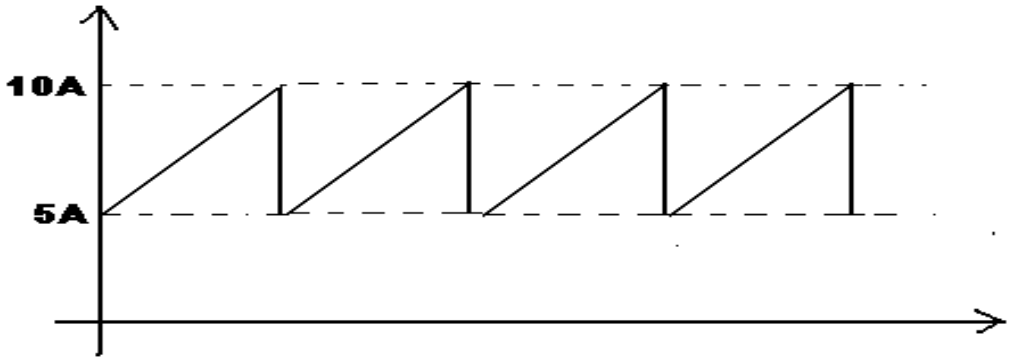
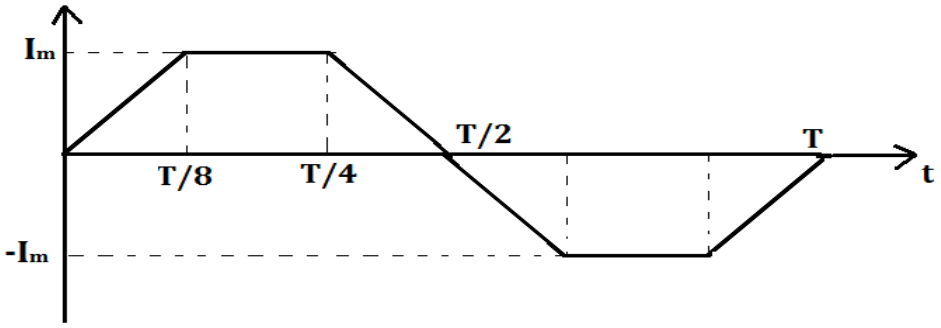


Figure 2

7. For the trapezoidal current wave-form, determine its effective value.



Unit-III

Short Answer Questions

1. Define Faradays law of electromagnetic induction
2. Define transformer?
3. Define self-induced EMF and mutually induced EMF.
4. Differentiate Core type and shell type transformers.
5. Explain Lenz law?
6. Define step-up and step-down transformer?

. Long Answer Questions

1. a) Write working principle of transformer
   b) Give the constructional details of 1-Ø transformer?
2. a) Derive the EMF equation of 1-Ø transformer?
   b) A 250 / 3000 V, 50 Hz, 1-Ø transformer has the maximum flux density is 1.2 Wb/m^2. If the emf per turn is 8 V, determine (i) cross sectional area of the core (ii) No. of primary and secondary winding turns.
3. 25 kVA, 1-Ø transformer has 500 turns on primary winding and 50 turns on secondary winding. The primary is connected to 3000 V, 50 Hz supply. Find (i) the full-load primary and secondary currents (ii) the secondary emf (iii) the maximum flux in the core.
4. A 100 kVA, 11000 / 317 V, 50 Hz, 1-Ø transformer has core loss of 0.48 kW and full-load copper loss of 0.62 kW. Find its full-load efficiency at unity power factor, 0.8, 0.7, and 0.5 power factor lagging.
5. a) Explain in detail, the OC and SC tests of a single ϕ transformer and their use to find the regulation of the transformer

   b) A 4KVA, 200/400V, 50Hz, single ϕ transformer gave the following test results

   No load test : 200V, 0.7A, 60W (LV side)

   SC test : 9V, 6A, 21.6W (HV side)

   Calculate the efficiency and the voltage regulation of transformer on full load at 0.9 power factor lagging.