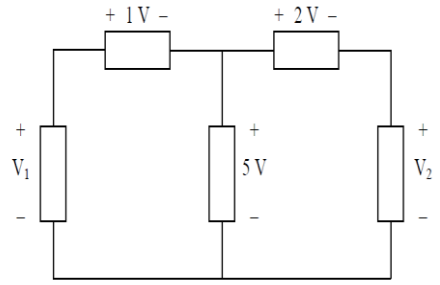
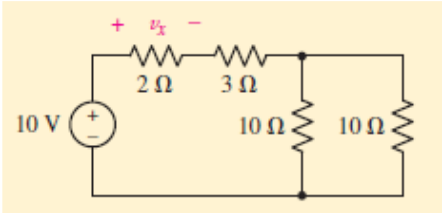
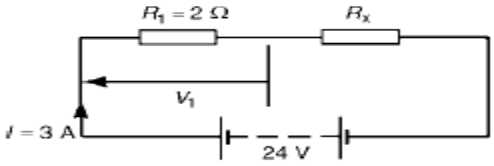
1. Calculate V1 and V2 in the circuit shown



2. State kirchoff's laws?
3. Find V_x in the circuit using voltage division rule.



4. Define Magnetic flux density and Magnetic field intensity?
5. Two resistors are connected in series across a 24V supply and a current of 3A flows in the Circuit. If one of the resistors has a resistance of 2ohms determine the value of the other resistor



6. Write the formulae used forY-Δ conversions.
7. Define (i) Magnetic field strength (ii) Mutual induced emf
8. A mild steel ring has a radius of 50mm and a cross-sectional area of 400mm2. A current of0.5A flows in a coil wound uniformly around the ring and the flux produced is 0.1mWb. If the relative permeability at this value of current is 200 find the reluctance of the mild steel.
9. Write voltage, current, power, energy relations for a) Resistor b) Inductor c) Capacitor
10. Define and explain Ohm's law.
11. Define a dependent electrical source? List out the four possible types of dependent sources along with its circuit symbols?
12. Define the following
    i. Form Factor ii. Peak factor.
13. Explain the following:
    i. Power ii. Energy iii. KCL iv. KVL
14. Explain Faradays Laws of Electromagnetic Induction.

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1. (a) Define Ohms' law. Explain about dependent and independent voltage and current sources.
   (b). Find the source currents in the resistance network shown in figure 3 by using Y- Δ transformation.

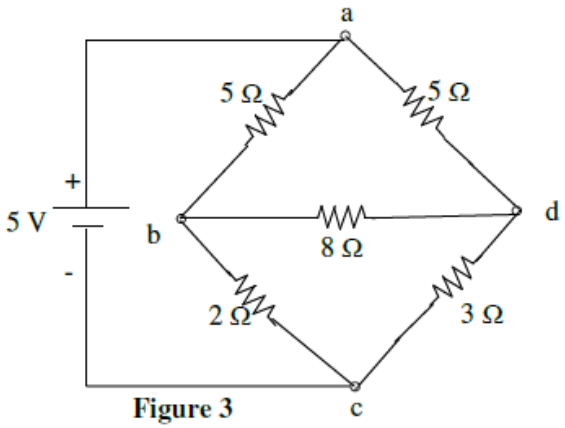
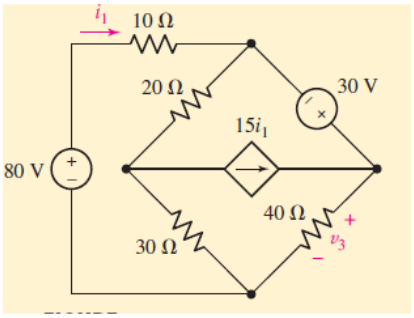
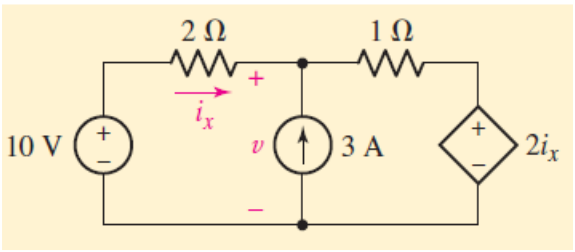


Figure 3

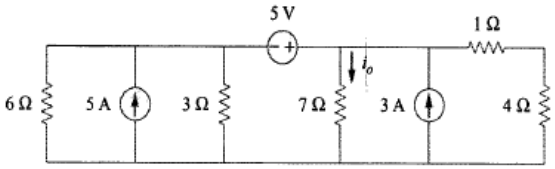
2. (a) Determine V_3 in the circuit



(b) Find the value of i_x in the below circuit



3. (a) Use source transformation technique to find current i_0 in the circuit below



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.

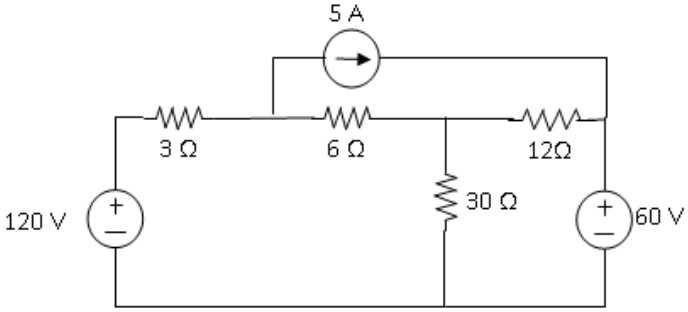


Figure 2

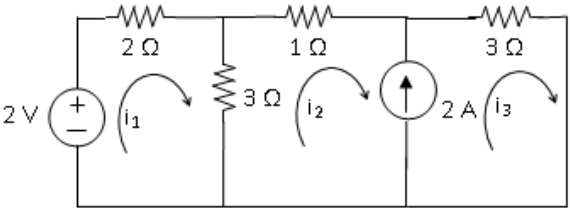
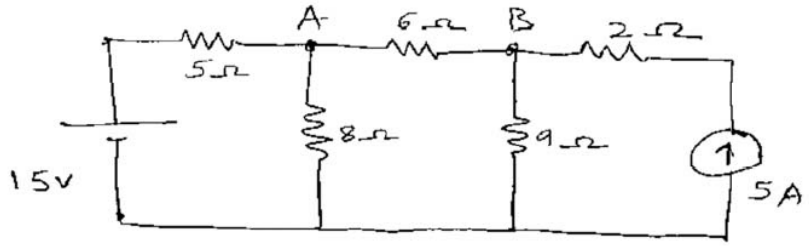


Figure 3

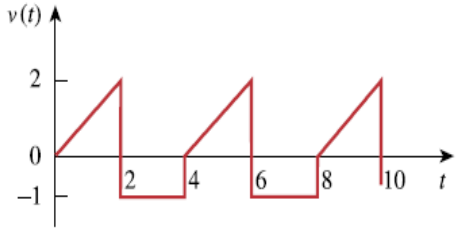
5. Find voltages at nodes A and B in the network shown below.



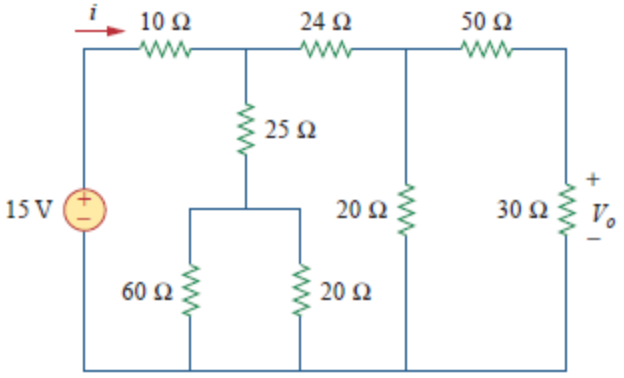
6. Two coils A and B are kept in parallel planes such that 70% of the flux produced by coil A links with coil B. Coil A has 1000 turns and coil B has 1200 turns. A current of 4Amps in coil A produces a flux of 0.4mWb, while a current of 4Amps in coil B produces a flux of 0.08mWb. Calculate a) self inductances La and Lb
b) Mutual inductance Mc) Coefficient of coupling.

7. a) Derive expression for effective inductance in the case of series aiding and series opposing coils.
b) Two similar coils connected in series give total inductance of 600mH and when one of the coil is reversed the total inductance is 300mH. Determine the mutual inductance between the two coils and coefficient of coupling.

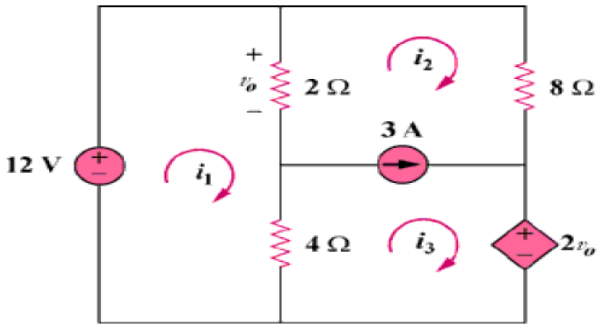
8. Find Average and RMS values, Form factor, peak factor of below waveform



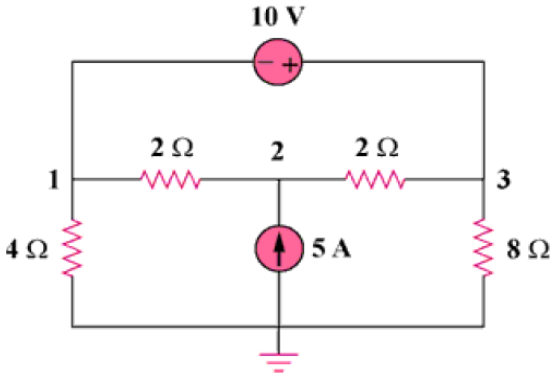
9. (a) Explain the voltage division in series circuit and current division in parallel circuit for a resistive network?
(b) Find *i*and *Vo* in the circuit of Fig.



10. (a) Explain about star-delta transformation concept.
(b). Find currents i_1, i_2, i_3 by using mesh analysis



11. Use node voltages by using nodal analysis



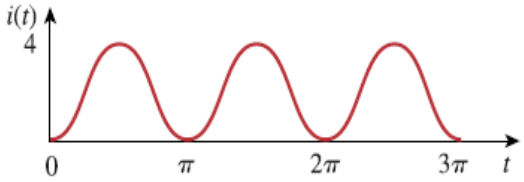
12. a)Based on the Faraday's Laws of Electromagnetism induction explain thevarious types of induced emfs?

b) Two coils connected in series aiding have a total inductance of 250mH. When connected in series opposing, the coils have a total inductance of 150mH. If the inductance of one coil (L1) is three times the other, find L_1,L_2,M. What is the coupling coefficient?

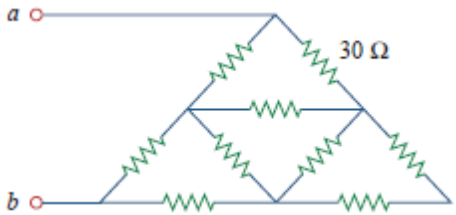
13. a) A flux of 400μWb passing through a150-turn coil is reversed in 40 ms. Find the average
e.m.f. induced.

b) Write the similarities between magnetic circuits and electric circuits.

14. Find Average and RMS values, Form factor, peak factor of below sine wave



15. Obtain the equivalent resistance for the circuit shown if each resistance has 30 ohms.



16. a. Derive the expressions for Star-Delta and Delta-Star transformations.

b. Find the equivalent resistance R23 for the circuit shown in figure 1.

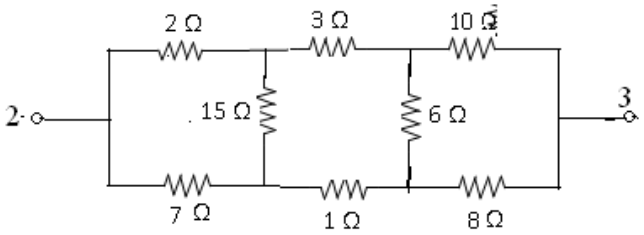


Fig. 1

17. a. Explain source transformation technique.

b. Reduce the network shown in fig.2 to a single loop network by successive source transformation,to obtain the current in 15Ω resistor.

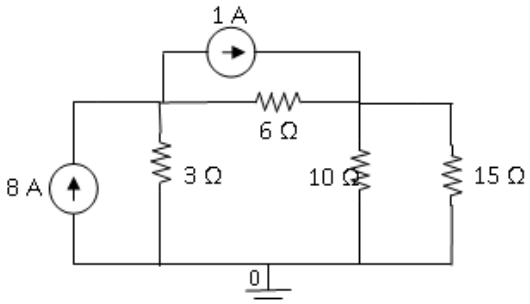


Fig.2

18. For the circuit shown in Fig.3. Determine the current in the 3Ω resistor.

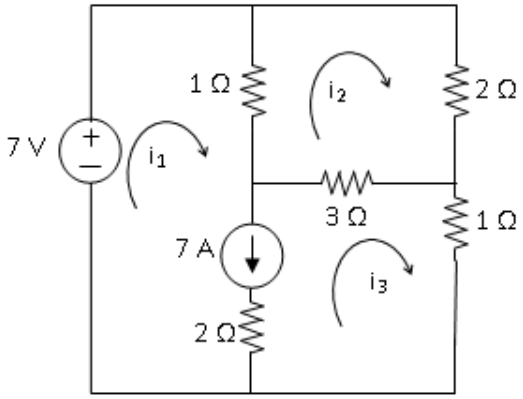
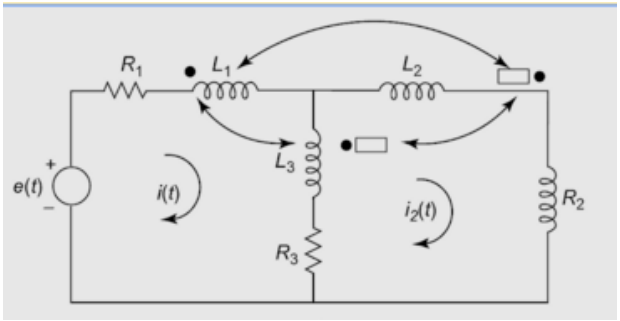


Fig.3.

19. Write the mesh equations for the circuit show below.



20. a. Define the terms average value, RMS value.

21.

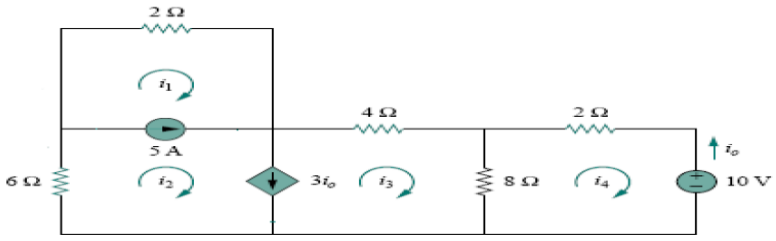
b. Also determine form factor for the output of half-wave rectifier.

22. Define and explain the terms Instantaneous Value, Average Value, RMS value, Form factor, Peak factor for an A.C Input.

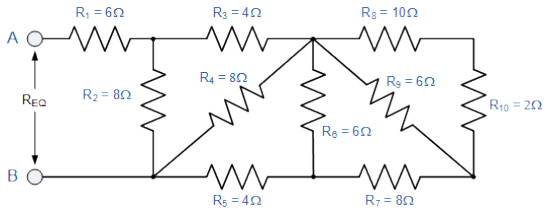
23. (a) Two coils A and B are kept in parallel planes such that 70% of the flux produced by coil A links with coil B. Coil A has 1000 turns and coil B has 1200 turns. A current of 4Amps in coil A produces a flux of 0.4mWb, while a current of 4 Amps in coil B produces a flux of 0.8mWb. Calculate (i) Self inductances L_a and L_b (ii) Mutual inductance M (iii) Coefficient of coupling

(b) An iron ring has a mean diameter of 25cm and an area of cross section of $5cm^2$. It is wound with 1000 turns. If an air gap of 2mm is cut in the ring, determine the current in the coil to establish a flux density of 0.8mwb/m2 in the ring. Take relative permeability of iron as 500.

24. (a) Find i_0 currents using KVL.



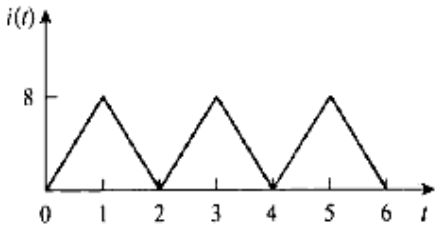
(b) Find equivalent resistance between AB



25. (a) A coil of 500 turns is wound uniformly over a wooden ring having mean circumference of 50cm and cross sectional area of $500mm^2$. If the current through the coil is 3 A (i) Calculate Magnetic field strength (ii) The flux density (iii) The total flux

(b) Define coefficient of coupling and derive the relation between self-inductances and mutual inductance of magnetically coupled coils.

26. (a) Find the peak factor of the following current signal



26) What is Super mesh Analysis, Explain?

27) What is Super node Analysis, Explain?

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