

B.Tech I Year (R05) Supplementary Examinations, December 2010
ELECTRICAL CIRCUITS

(Common to Electrical & Electronics Engineering and Electronics & Control Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE questions
All questions carry equal marks

1. (a) What is the difference between an ideal source and a practical source? Draw the relevant characteristics of the above sources.
- (b) Explain the difference between active elements and passive elements with suitable examples.
- (c) Determine the current through 6Ω resistor and the power supplied by the current source for the circuit shown in figure 1.

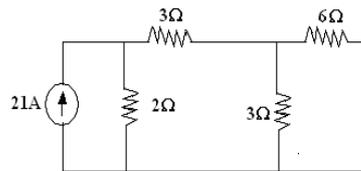


Figure 1:

2. (a) Explain the Faraday's Law of electromagnetic induction?
- (b) A cast steel ring has a circular cross section 3cm in diameter and a mean circumference of 80cm. The ring is uniformly wound with 600 turns.
 - i. Estimate the current required to produce a flux of 0.5 mcb in the ring.
 - ii. If a saw cut 2mm wide is made in the ring, find approximately the flux produced by the current found in (i).
 - iii. Find the current value which will give the same flux as in (i). Assume the gap density to be the same as in the iron and neglect fringing.
3. (a) Define the following:
 - i. RMS value
 - ii. Average Value and
 - iii. Form factor of an alternating quantity.
- (b) A series circuit consisting of a 10 ohm resistor, a $100\ \mu\text{F}$ capacitance and a 10mH inductance is driven by a 50Hz a.c. voltage source of max. value 100 volts. Calculate the equivalent impedance, current in the circuit, the power factor and power dissipated in the circuit. Also, draw the vector diagram.
4. (a) What is phase sequence? Explain its significance.
- (b) A star connected three phase load has a resistance of 8 ohms and a capacitive reactance of 10 ohms in each phase. It is fed from a 400v, 3- ϕ balanced supply.
 - i. Find the line current, total volt-amperes, active and reactive power
 - ii. Draw phasor diagram showing phase voltages, line voltages and currents.
5. (a) Explain the procedure for obtaining fundamental tie-set matrix of a given network.
- (b) Draw the oriented graph of the network shown in figure 2 and write the incidence matrix.

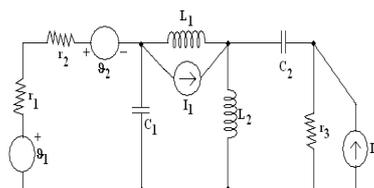


Figure 2:

6. (a) State and explain Thevenin's theorem.
 (b) Estimate the power loss in the 8Ω resistor using Thevenin's theorem. as shown in figure 3

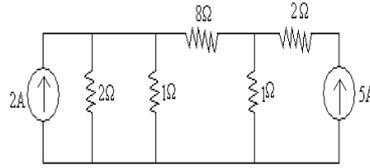


Figure 3:

7. In the figure 4, the switch is close at position 1 at $t = 0$. At $t = 0.5$ m sec. The switch is moved to position 2. Find the expression for the current in both the conditions and sketch the transient.

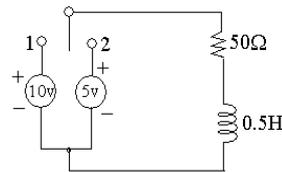


Figure 4:

8. (a) Determine the Z-parameter of the network shown in figure 5.

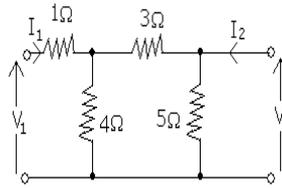


Figure 5:

- (b) The y-parameters of a two port network are $y_{11}=0.6$ mho, $y_{22}=1.2$ mho and $y_{12}=-0.3$ mho.
 i. Determine the ABCD Parameters and
 ii. Equivalent Π network.
