[05 – 2111]

II/IV B.E. DEGREE EXAMINATION.

First Semester

Electronics and Communication Engineering

NETWORK THEORY

(Common with Dual Degree program in EEE)

(Effective from the admitted batch of 2006 – 2007)

Time : Three hours Maximum : 70 marks

Question No. 1 is compulsory.

Answer any FOUR from the remaining.

All questions carry equal marks.

1. (a) State Norton's theorem.

(b) A voltage wave is represented by $v = 200 \sin 314t$. Find

(i) Rms value

(ii) Average value

(iii) Instantaneous value after 0.05 sec.

(c) Obtain Laplace transform of $f(t)=1-e^{-at}$, 'a' being constant.

(d) Write the expression for resonance frequency of parallel RLC circuit.

(e) Give equation for star to delta to star transformation.

(f) Express ABCD parameter intervals of z-parameter.

(g) Find the Laplace transform $e^{-at}\cos\omega t$.

2. (a) Define and explain Kirchoff's laws with examples.

(b) Find 'i' and 'V_a' in figure 1.

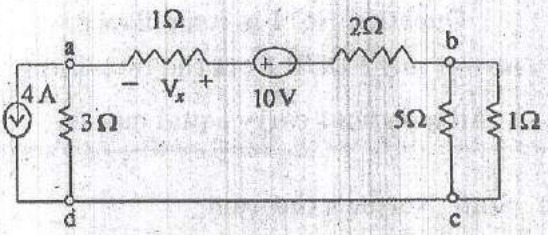

Figure 1

3. (a) State and explain maximum power transfer theorem with suitable example.

(b) Find the current in the 10 Ω resistor in the circuit of figure 2, using Thevinin's theorem. What is the power loss in that resistor?

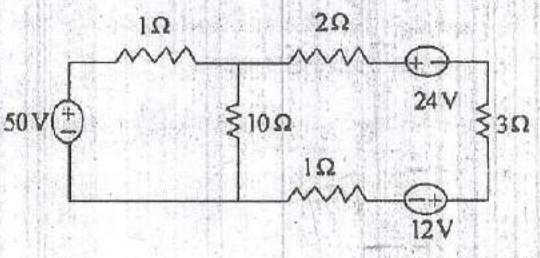

Figure 2

4. (a) A D.C. voltage of 100 V is suddenly applied in the network shown in figure 3, find the transient currents in both the loops and obtain the transient voltage across the capacitor.

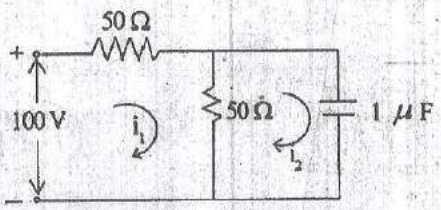

Figure 3

(b) Explain the transient response in series RL circuit.

5. (a) In the circuit shown in figure 4, switch S is closed on position 1 at $t = 0$, at $t = 0.1$ s, the switch is moved to position 2. Obtain the equations for the current in both intervals and draw the current curve.

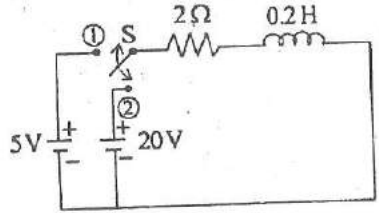

Figure 4

(b) For the circuit shown in figure 5, find the current in $(4 + j2)\,\Omega$ by superposition principle.

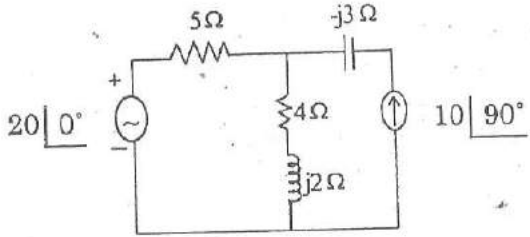

Figure 5

6. (a) A balanced three-phase Δ connected load has per phase impedance of $(15 + j10)\Omega$. If 400 V, three-phase supply is connected to this load find

   (i) the phase currents

   (ii) line currents

   (iii) power supplied by the load.

   (b) Explain Bandwidth, Q-factor of series RLC circuit.

7. (a) Determine ABCD parameters for the network shown in figure 6.

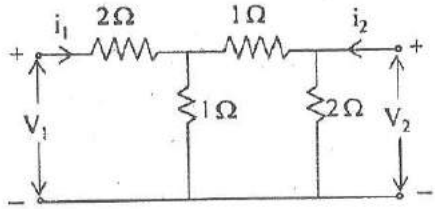

Figure 6

   (b) A coil having an inductance of 200 mH is magnetically coupled to another coil having an inductance of 500 mH. The coefficient of coupling between the coils is 0.65.Calculate the equivalent inductance if the coils are connected in

(i) series aiding

(ii) series opposing

(iii) parallel aiding and

(iv) parallel opposing.

8. (a) State and explain initial value and final value theorems.

(b) Determine impulse response of series RC circuits in Laplace domain.