

Code No: R22025 **R10** SET - 1

II B. Tech II Semester Supplementary Examinations Dec – 2012
ELECTRICAL CIRCUIT ANALYSIS - II
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 75

Answer any FIVE Questions
All Questions carry Equal Marks
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1. A delta load has $45\angle 0^0\,\Omega$, $10\angle -60^0\,\Omega$, $20\angle 45^0\,\Omega$ load between 1-2, 2-3, and 3-1 of a three phase system. If the supply is 100V, 3 phase, 50Hz, find the phase currents, line currents and line voltages. Show that the line currents add up to Zero.

2. For the unbalanced delta connected load shown in below Figure 1 Find the phase currents, line currents and the total power consumed by the load when the phase sequence is a) abc, and b) acb.

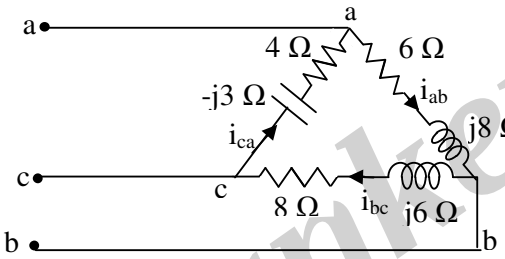

Figure 1

3. For the circuit depicted in Figure 2, a) write the differential equations that describes the resistor voltage V_R for t > 0. b) Solve the characteristic equation. c) Compute V_R just before the switch opens, Just after the switch opens and at t= 1 sec.

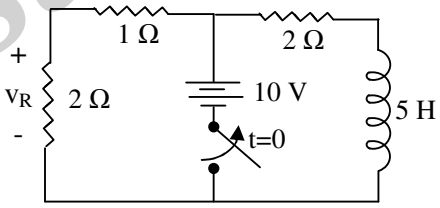

Figure 2

4. In the figure 3 given below with switch open, steady state is reached with V = 100 sin314t volts. The switch is closed at t = 0. The circuit is allowed to come to steady state again. Determine the steady state current and complete solution of Transient current.

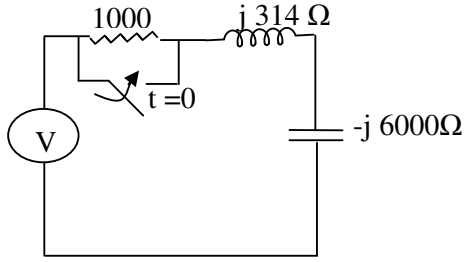

Figure 3
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5. a) Find Z parameters for the two-port network shown below in Fig. 4.
   b) If $I_1 = I_2 = 1A$ in Fig. 4, find the voltage gain G_V.

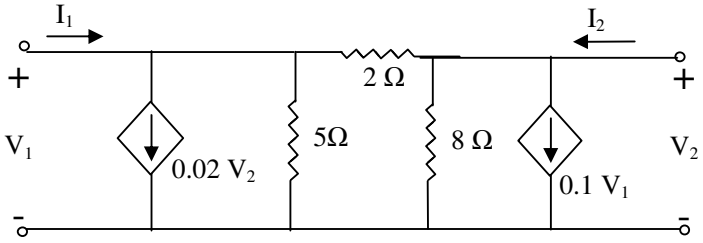

Figure 4

6. Find the transmission parameters for the network shown in Figure 5 below considering two networks connected in cascade.

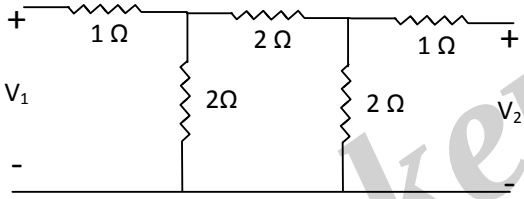

Figure 5

7. Find the Fourier series expansion of the rectified sine waveform shown in Figure 6 below.

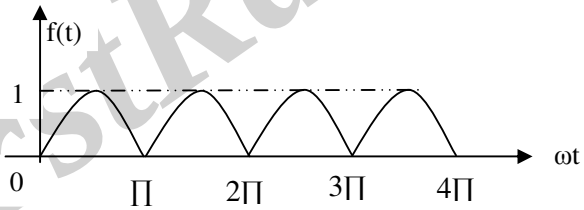

Figure 6

8. a) Find the response voltage in the network shown below (Fig. 7) using Fourier transform method.

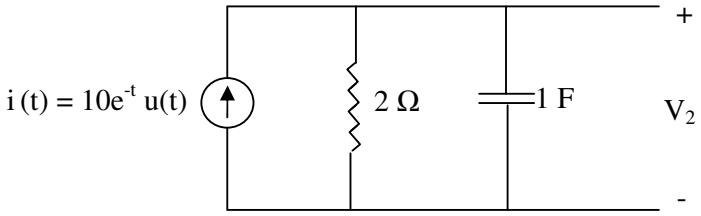

Fig. 7

   b) Obtain the Fourier transform of i) Signum function ii) $f(t) = \sin(w_0 t)$

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1. A star connected 3-phase load has a resistance of 8Ω and a capacitive reactance of 10Ω in each phase. It is fed from a 400-V, 3-phase balanced supply.
   a) Find the line current, total VA, active and reactive power.
   b) Repeat the problem if the same impedances are connected in delta. Draw the phasor diagram showing phase voltages, line voltages and line currents.

2. In the given circuit (figure 1), the loads connected to the three phase power source are unbalanced. If V_P=220V, Find I_A, I_B, I_C and the power delivered to each resistor.

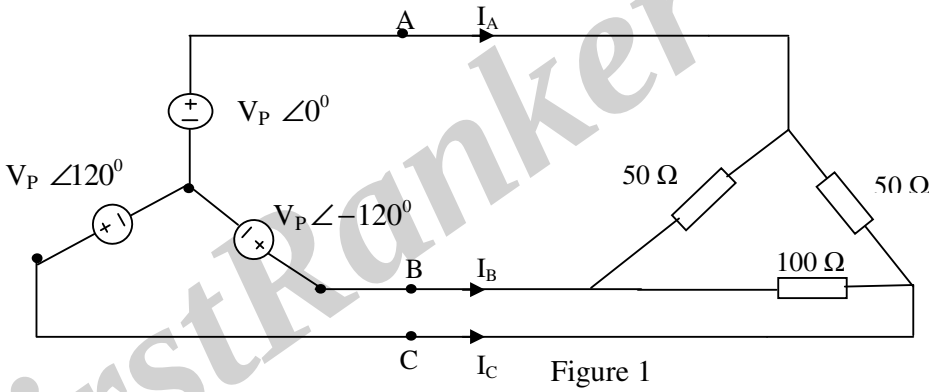

Figure 1

3. The circuit given in Figure 2 was initially in the steady state with the switch's' in the position 'a'. At t=0, the switch goes from a to b. Find an expression for the voltage $V_0(t)$ for t > 0. Take the initial current in the inductor L_2 to be zero

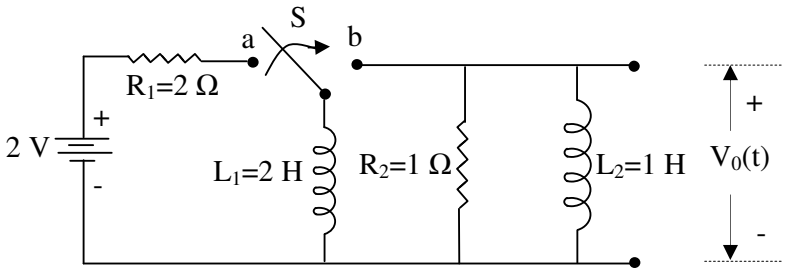

Figure 2
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4. Find the voltage expression V when switch in the Figure 3 is opened after a long time

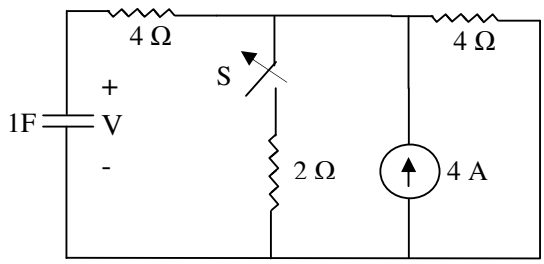

Figure 3

5. For the two-port shown below in Figure 4 and find (a) h_{12}, (b) Z_{12} and (c) Y_{12}

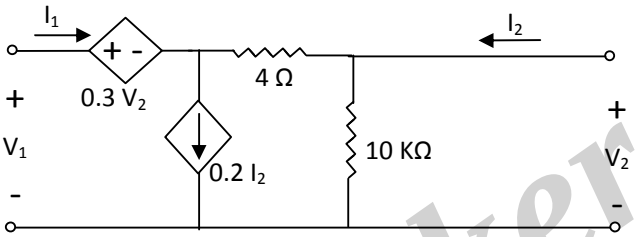

Figure 4

6. a) Define Z and Y parameters of typical four terminal networks. Determine the relationship between Z and Y parameters.
   b) Express H parameters in terms of Z parameters for a 2port network.
   c) Derive expression for the Y parameters in terms of ABCD parameters of a 2 port network.

7. Find the trigonometric Fourier series for the half-wave rectified sine-wave shown in Figure 5 and sketch the spectrum.

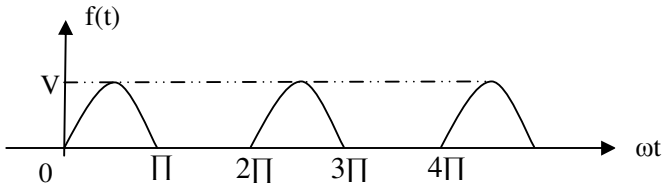

Figure 5

8. Find the response voltage in the network shown below in Figure 6, use Fourier transform method.

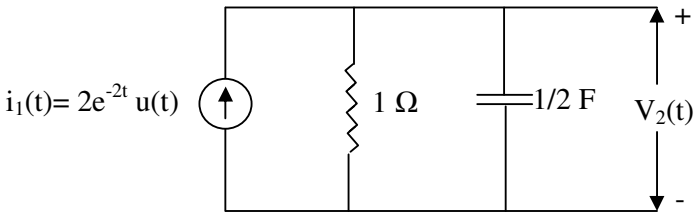

Figure 6

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1. Star connected alternator supplies a delta connected load. The impedance of load branch is (8+j6)Ω/phase. The line voltage is 230V. Determine a) The current in the load branch; b) power consumed by the load; c) power factor of the load; and d) Reactive power of the load.
2. A Y connected load is supplied from a 400-V, 3-phase, 3-wire symmetrical system RYB. The branch circuit impedances are
   $Z_R = 10\sqrt{3}$ +j10; Z_Y= 20+j20$\sqrt{3}$; Z_B = 0-j10
   Determine the current in each branch. Phase sequence is RYB
3. a) In the series R-L-C circuit as shown in Figure 1, there is no initial charge on the capacitor. If the switch is closed at t = 0, Determine the resulting current i(t).

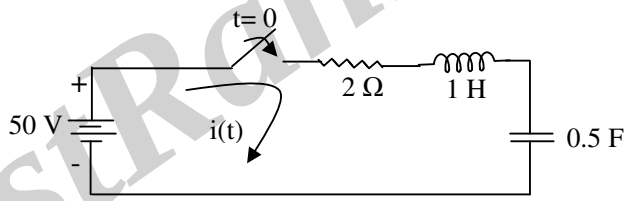

Figure 1

b) In the two mesh network shown below in Figure 2, there is no initial charge on the capacitor. Find the loop currents $i_1(t)$ and $i_2(t)$ which results when the switch is closed at t = 0.

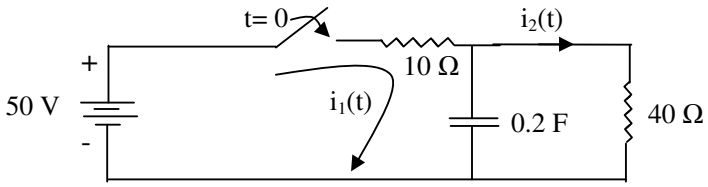

Figure 2

4. An RC series circuit with R = 20Ω and C = 100μF is excited by a voltage $V = 200\sin 314t$ at t = 2.14msec. Obtain an expression for $i(t)$. Also find the value of current after time 1msec from the switching instant.
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5. (a)Find the open circuit impedance parameters of the circuit given in Figure 3 Also find the h-parameters of the circuit.
   (b) Calculate the ABCD parameters of the network shown below in Figure 4.

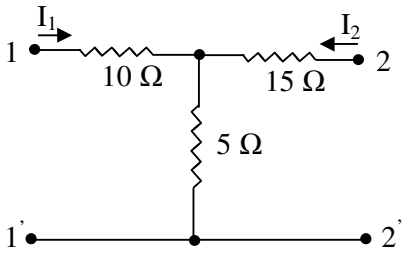

Figure 3

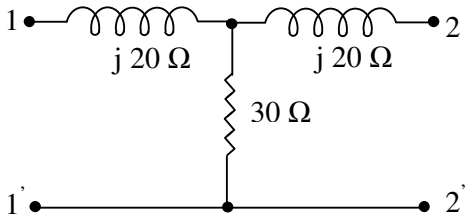

Figure 4

6. A T- network shown in figure 5 is cascaded with the same T-network. Find Z,Y and h-parameters of the combined network.
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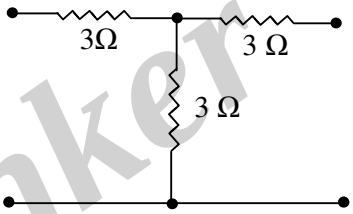

Figure 5

7. Evaluate Fourier exponential series for the tooth wave of shown below in Figure 6 and plot the amplitude and phase spectra.

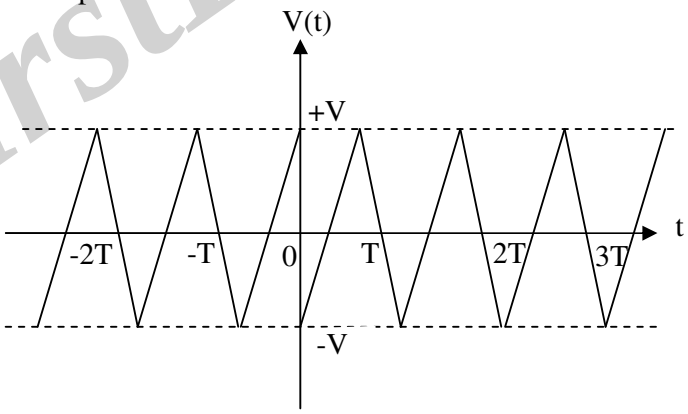

Figure 6

8. Find the Fourier transform of the following functions.
   i) $f(t)= e^{-at} u(t)$, a>0 ii) $f(t)= e^{-a|t|} u(t)$, for all values of t
   iii) f(t)=1 iv) Unit impulse function, $\delta(t)$
   v) Signum function, sgn(t) vi) Unit step function, u(t)

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1. A star connected load has an impendence of (6+j8)Ω in each phase and is connected across a balanced 400V, 3-phase supply. Obtain the line currents, p. f, and total power and reactive power consumed by the load .

2. A symmetrical three-phase, three-wire 440V supply is connected to a star connected load as shown in Figure 1. The impedance in each branch are Z_R = 2+j3 Ω, Z_Y = 1-j2 Ω and Z_B =3+j4 Ω. Find its equivalent delta-connected load phase currents and line currents. The phase sequence is RYB.

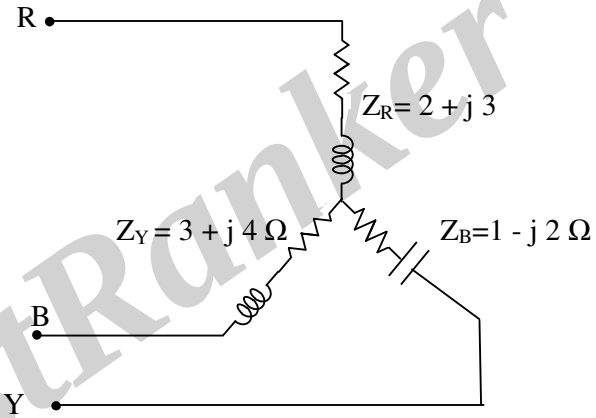

Figure 1

3. The switch in given circuit opens at t=0 after having been closed for an interminable long time. Find i_L and i_x at (a) t = 0^- ; (b) t = 0^+ ; (c) t = 300μs

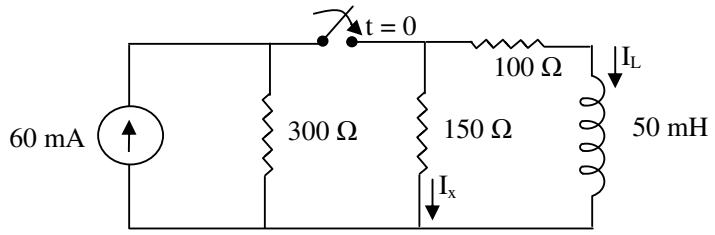

Figure 2

4. A series RLC circuit, with R = 5Ω, L= 0.1H, and C = 500μF, has a sinusoidal voltage source, V=1000 Sin 250t. Derive the expression for current and the resulting current if the switch is closed at t=0.
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5. By applying the appropriate 1V source and short circuits to the circuit shown in Figure 3 below find (a) y_{11}; (b) $y_{21;}$ (c) y_{22} ; (d) y_{12}

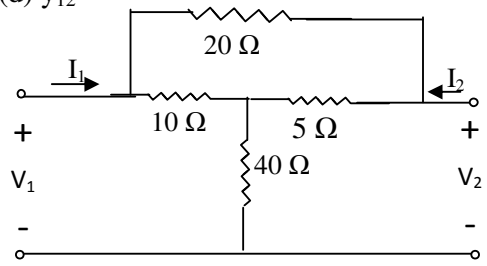

Figure 3

6. Find the ABCD parameters of the network shown in Figure 4 by treating the circuit as a cascade interconnection of elements.

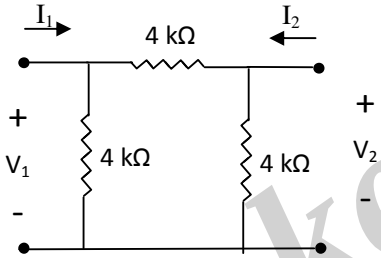

Figure 4

7. a) Determine the Fourier series for the saw tooth function shown in Figure 5.
   b) Determine the Fourier series expansion of the functions shown in Figure 6.

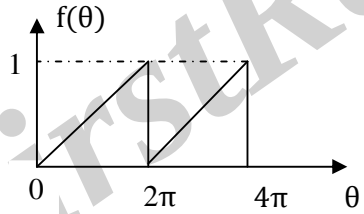

Figure 5

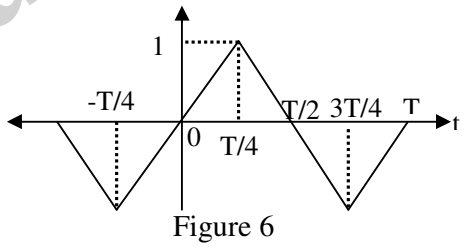

Figure 6

8. a) Write the properties of Fourier transform and explain
   b) Find the Fourier transform of single triangular pulse shown in Fig.7, draw the continuous spectra.

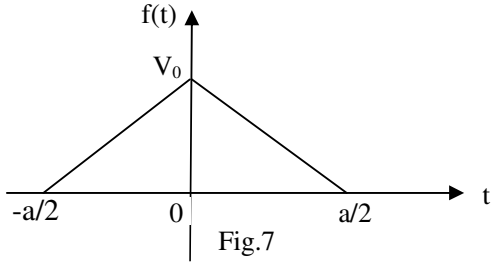

Fig.7