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

II B. Tech II Semester Supplementary Examinations April/May – 2013
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 balanced Δ-connected load with phase impedance of 23.7+j 17.1 Ω at 50 Hz is supplied from a 400 V, 50Hz balanced Y- connected source through connection impedance of 0.1+j0.3Ω in each line.
   i) Find the line current and load voltage
   ii) Find the load-branch currents
   iii) Find the active and reactive power delivered by the source and delivered to the load.

2. a) Explain two wattmeter method for measurement of three phase power
   b) A three phase, three-wire, 208 V, ABC systems supplies a delta-connected load where $Z_{AB} = 5\angle 0^0\,\Omega$, $Z_{BC} = 4\angle 30^0\,\Omega$ *and* $Z_{CA} = 6\angle -15^0\,\Omega$. Find the line currents and the readings of watt-meters in lines A and C.

3. a) Solve for *i* and *v* as functions of time in the circuit shown in Figure1.

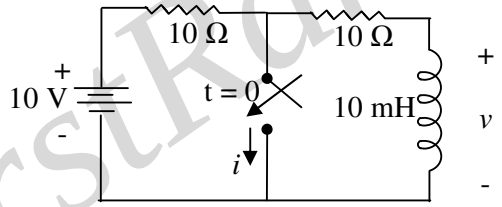

Figure 1

   b) A Capacitor C is initially charged to 500 V and is left open for 120 s. The voltage across the capacitor at the end of this time interval is seen to be 400 V. A resistor of 100 kΩ is connected across this capacitor at 120 s. The voltage across the capacitor is found to reach 100 V in 216.4 s after this connection has been made. Find the value of C and its leakage resistance.

4. A sinusoidal voltage V(t) = $V_m \sin(wt+\theta)$ is applied to a series RLC circuit at time t =0. Find the complete solution for the current i(t) using Laplace transform method.

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5. a) Derive the relationship between transmission parameters and admittance parameters.
   b) Find the open circuit impedance parameters for the two-port network shown in Figure 2?

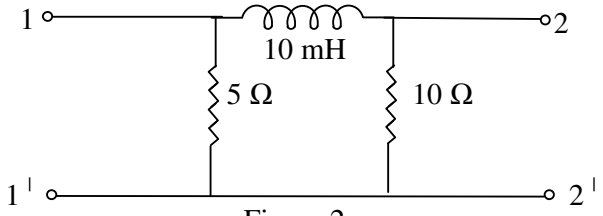

Figure 2

6. Determine the Y parameters of the overall network, considering two identical sections of the network shown in Figure 3, are connected in parallel.

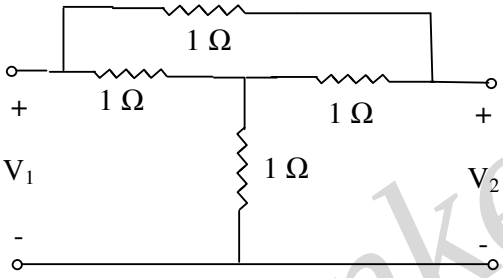

Figure 3

7. a) A square wave has a value 10 from $\frac{-\pi}{2}$ *to* $\frac{\pi}{2}$, zero from $\frac{\pi}{2}$ *to* $\frac{3\pi}{2}$, 10 from $\frac{3\pi}{2}$ *to* $\frac{5\pi}{2}$, and so on. Find the Fourier series expansion of the wave
   b) If V(t) = [10+6 cos (t + 45^0)+ 1.8 cos (2t-10^0)] V and i(t) = [3+1.4 cos (t+20^0)+0.5 cos2t] mA, calculate the average power in watt. Determine also the effective voltage and effective current.

8. a) Define Fourier's transform. How does Fourier transform differ from Laplace transform?
   b) Find the response voltage in the network shown in Figure 4, by using Fourier transform method.

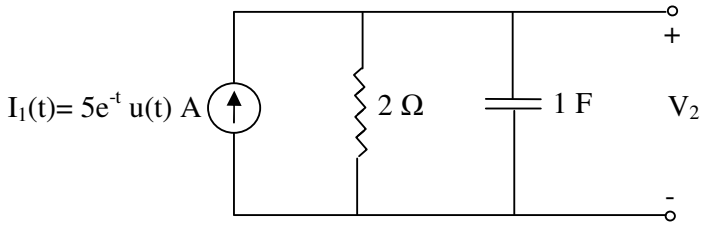

Figure 4

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Code No: R22025 **R10** SET - 2

II B. Tech II Semester Supplementary Examinations April/May – 2013
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 star-connected three-phase load consists of three similar impedances. When the load is connected to a three-phase 400V, 50 Hz supply it takes 30A line current at 0.8 (Lagging) power factor.
   i) Calculate the total power taken by the load.
   ii) The resistance and reactance of each phase of the load.
   iii) If the power is measured by the two wattmeter method, then calculate the reading of each wattmeter.

2. A 3-phase, 4-wire system having a 254-V line to-neutral has the following loads connected between the respective lines and the neutral:
   $Z_R = 10\angle 0^0\,\Omega;\quad Z_Y = 10\angle 37^0\,\Omega;\quad Z_B = 10\angle -53^0\,\Omega;$
   Calculate the current in the neutral wire and the power taken by each load when the phase sequence is i) RYB and ii) RBY.

3. a) In a series RL circuit, the application of a dc voltage results in a current of 0.741 times the final steady-state value of current after one second. However, after the current has reached its final value, the source is short-circuited. What would be the value of the current after one second?
   b) A series RLC circuit with R = 3Ω, L = 1H and C = 0.5 F is excited with a unit step voltage. Obtain an expression for the current using Laplace transform. Assume that the circuit is relaxed initially.

4. a) What do you understand by transient and steady state response? How can they be identified in a general solution?
   b) In the circuit shown in Figure 1, the applied voltage is $V(t) = 10\sin(10t + \pi/6),\ R = 1\Omega,\ C = 1F$. Using Laplace transformation, find complete solution for current i(t). Switch K is closed at time t = 0. Assume zero charge across the capacitor before switching.

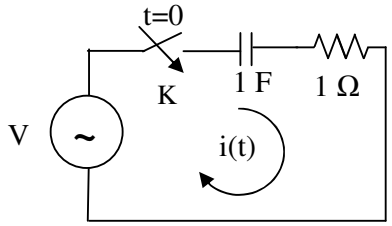

Figure 1

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Code No: R22025 **R10** SET - 2

5. a) The currents I_1 and I_2 at the input port and the output port respectively of a two-port network are given by $I_1 = 6V_1 - V_2$ and $I_2 = -V_1 + 2V_2$ Find the equivalent π- network.
   b) Express Z- parameters in terms of ABCD parameters.

6. a) Two two-part networks are connected in cascade. Prove that the overall transmission parameter matrix is the product of individual transmission parameters matrices.
   b) Two identical sections of below Figure 2 are connected in series. Obtain the Z-parameters of the resulting network.

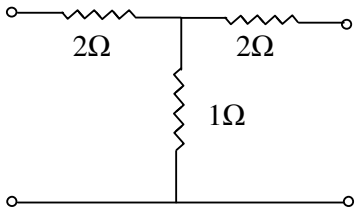

Figure 2

7. a) Show that the Fourier series expansion of a periodic function with odd symmetry contains only the sine terms.
   b) The current in an RL Circuit with R = 12Ω, and L = 6H is i(t) = [12 sin 900t + 7 sin 2700t + 4 sin 4500t] A. Determine the effective applied voltage and average power.

8. a) Discuss any four properties of Fourier transforms.
   b) Find the Fourier transform of signum function and unit step function.

Code No: R22025 **R10** SET - 3

II B. Tech II Semester Supplementary Examinations April/May – 2013
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) For a Δ-connected purely resistive balanced load, sketch the phasor diagram for the load voltages and currents. Show that the phasor sum of the load currents is zero
   b) A balanced three-phase star connected load of 200 kW takes a loading current of 150 A with a line voltage of 1200 V, 60 Hz, What are the circuit constants of the load per phase?

2. Draw the circuit diagram of the two-wattmeter method for measuring power in a three-phase load. Show that the sum of the meter readings equals the total power dissipated in the load, whether the load is balanced or unbalanced, Y-connected or Δ-connected.

3. a) Derive an expression for the decay current in an RC circuit excited by a unit step voltage. What is the time constant of the circuit?
   b) For the circuit shown in Figure 1, find the expression for transient current when the switch is closed at t = 0.

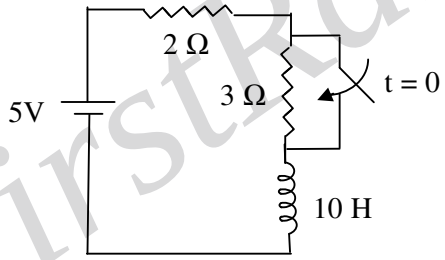

Figure 1

4. a) A sinusoidal voltage of 12 sin 8t volts is applied at t=0 to a series circuit of R=4Ω and L =1H. By Laplace transform method determine the circuit current i(t) for t ≥0. Assume zero initial conditions.
   b) An AC voltage source of v(t) = V_m sin wt is applied to a series RL circuit from t=0. The circuit current is found to be i(t)=0.7 sin $\left(wt - \frac{\pi}{3}\right)$ A. Was there any initial current is the inductor? If yes, what is its magnitude.

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Code No: R22025 **R10** SET - 3

5. a) Express ABCD parameters in terms of Z-parameters.
   b) The Y-parameters for a two-port network N are given as Y_{11}= 4 mho, Y_{22}= 5 mho, Y_{12}=Y_{21}=4 mho. If a resistor of 1Ω is connected across port-1 of N then find the output impedance.

6. a) Two two-port networks are connected in parallel. Prove that the overall Y-parameters are the sum of corresponding individual Y-parameters.
   b) Two identical sections of the circuit shown below Figure 2 are connected in series obtain the Z-parameters of the combination

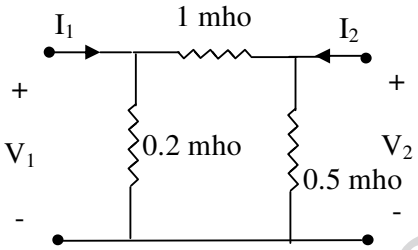

Figure 2

7. a) Outline the general procedure of determining Fourier series of periodic waveform.
   b) The current in an RL circuit with R=12Ω and L=6H is i(t) =12 sin 900t+7 sin2700t + 4 sin 4500 t. Determine the effective applied voltage and average power.

8. a) Obtain the Fourier transform of signum function.
   b) Determine the output voltage response across the capacitor to a current source excitation $i(t) = 5e^{-t}\,u(t)$, as shown in Figure 3.

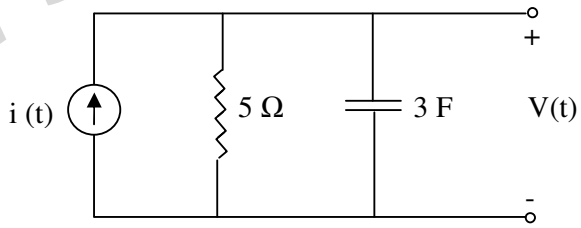

Figure 3

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II B. Tech II Semester Supplementary Examinations April/May – 2013
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) Sketch the phasor diagram of line voltages, phase currents, and line currents for a balanced Δ - connected load with $Ø = 40^0$ lagging.
   b) The current coil of a wattmeter is connected in series with are of the lines of a balanced star connected load. Whereas the pressure coil of the wattmeter is connected between other two lines. Show that reactive power can be measured by the wattmeter with this arrangement.

2. An unbalanced Y- connected load has a three wire supply with a line voltage of 200V and frequency 60 Hz. The load components are $R_1 = R_2 = R_3 = 50\Omega$, *and* $L_3 = 398mH$. Calculate the line currents and load currents.

3. a) Define the term 'time constant' of a circuit. What is the physical significance of 'time constant' of a circuit? Find its value for R-L series circuit.
   b) For the circuit show in Figure 1, find an expression for the current supplied by the source. How much time it will take for the current to reach 25mA. Assume the circuit to be initially relaxed.

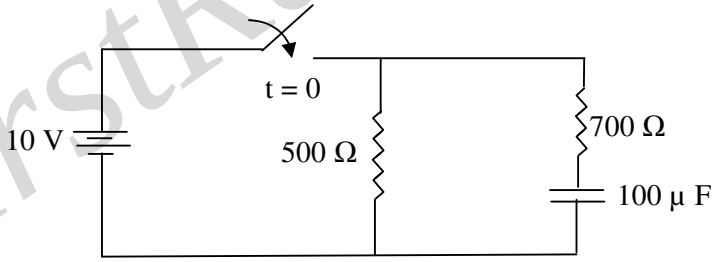

Figure 1

4. A series RLC circuit with R = 100 Ω, L = 0.1 H and $C = 50\mu F$ has a sinusoidal voltage source V = 100 sin (100t+Ø). With switch being closed when $Ø=90^0$. Find the current assuming no initial charge on the capacitor.
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Code No: R22025 **R10** SET - 4

5. a) The following equations give the voltage V_1 and V_2 at the two ports of a two – port network. $V_1 = 5I_1 + 2I_2$, $V_2 = 2I_1 - I_2$. A load resistor of 3Ω is connected across port-2, calculate the input impedance.
   b) Currents I_1 and I_2 entering at port 1 and port 2, respectively of a two-port network are given by the following equations:
   $I_1 = 0.5\ V_1 - 0.2\ V_2$
   $I_2 = -0.2\ V_1 + V_2$
   Where V_1 and V_2 are the voltage of port 1 and port 2, respectively. Find Y and ABCD parameters of the network.

6. a) Two – port networks N_1 and N_2 with series – parallel connection, where input of N_2 is connected in series with N_1 and output of N_2 is connected in parallel with N_1. Show that overall h – parameters are the sum of corresponding individual h – parameters.
   b) Explain briefly the concept of transformed network.

7. a) A voltage V(t) = 1000 sin (314t) + 500 sin ($942t + 90^0$) is applied to a series combination of a resistance 100Ω and an inductor of 0.5H. Find the RMS value of v(t), i(t). Find the power delivered to the load and hence power factor.
   b) Find the trigonometric Fourier series for the half – ware rectified sine – ware shown in Figure 2.

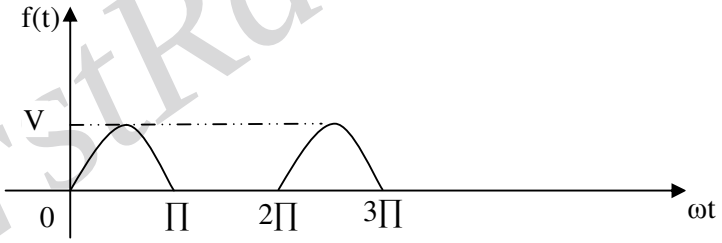

Figure 2

8. a) Obtain the Fourier transform of one – sided exponential function.
   b) Determine the Fourier transform of a triangular function shown in Figure 3.

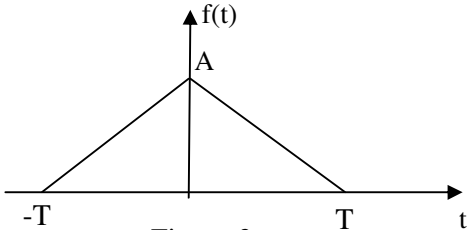

Figure 3

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