SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR
(AUTONOMOUS)
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (DESCRIPTIVE)

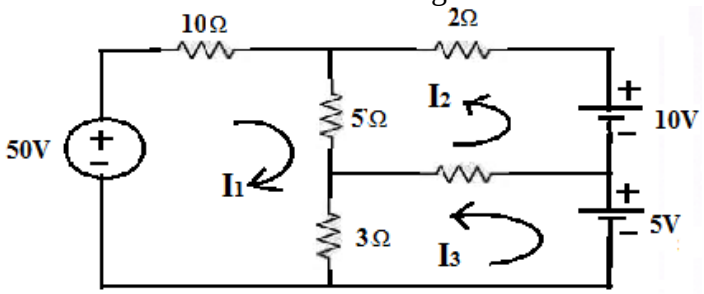
Subject with Code : NETWORK THEORY(18EE0242) **Course & Branch**: B.Tech - ECE

Year & Sem: II-B.Tech & I-Sem **Regulation:** R18

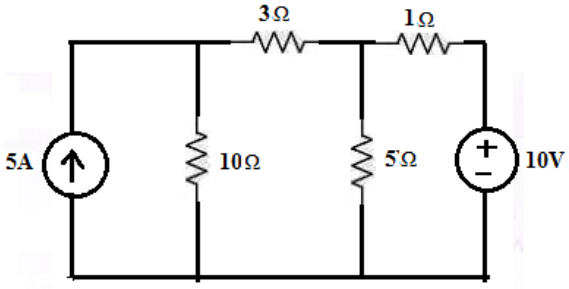
UNIT –I

CIRCUIT ANALYSIS TECHNIQUES

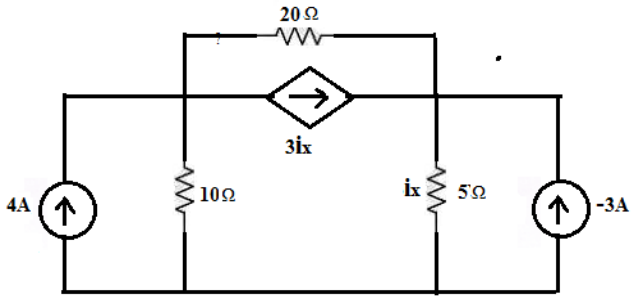
1. a) Explain about Nodal analysis and write the steps for applying nodal analysis. [5M]
   b) Determine the mesh currents for the following network. [5M]



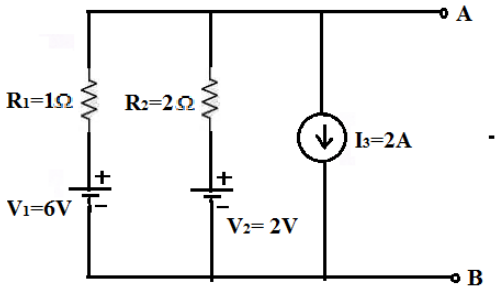
2. a) Explain about Mesh analysis and write the steps for writing mesh analysis. [5M]
   b) Determine the current in 10Ω resistor for the following network by using nodal analysis. [5M]



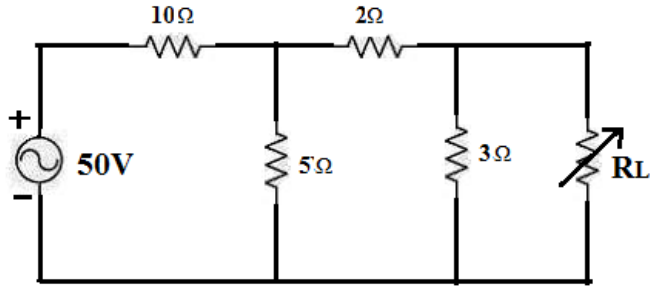
3. a) Determine i_x for the following network. [5M]



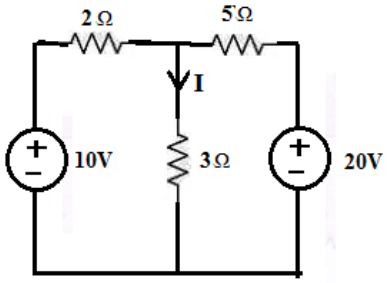
   b) Explain about source transformation briefly. [5M]
4. a) State and prove Tellegen's theorem. [5M]
   b) Determine the equivalent current source between the terminals A and B. [5M]



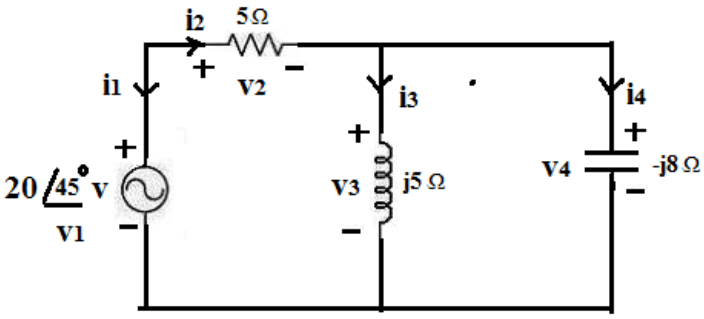
5. a) State and prove Reciprocity theorem. [5M]
   b) Determine the maximum power delivered to the load in the circuit shown in below figure. [5M]



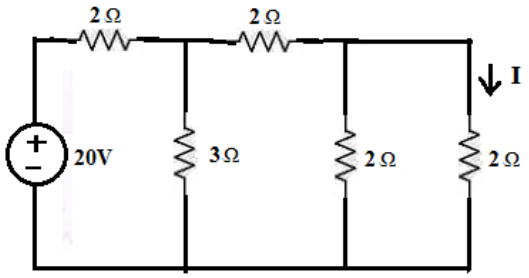
6. a) State and prove Maximum power transfer theorem. [5M]
   b) Calculate the current 'I' shown in below figure by using Milliman's theorem. [5M]



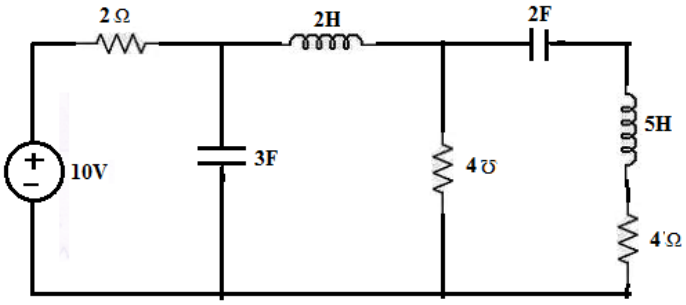
7. a) State and prove Compensation theorem. [5M]
   b) Verify Tellegen's theorem for the circuit shown in below figure. [5M]



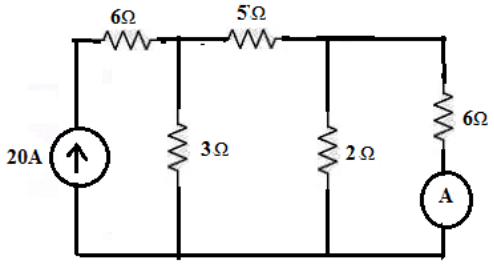
8 .a) State and prove Milliman's theorem. [5M]
   b)Verify reciprocity theorem for the network shown in below figure. [5M]



9. a) Draw the dual circuit of the figure shown below. [5M]



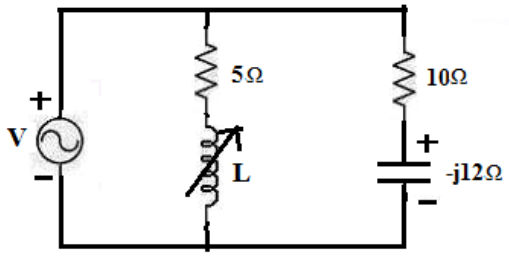
b) Determine the ammeter reading where it is connected to 6Ω resistor as shown in below figure. The internal resistance of the ammeter is 2Ω.,by using compensation theorem. [5M]



10. a) Define Duality & Dual networks.
b) Define Super node and Super mesh.
c) Write statement of Reciprocity theorem.
d) Write statement of Tellegen's theorem.
e) Write the procedure to obtain Dual network.

UNIT-II
RESONANCE AND FILTERS

1. a) A series RLC circuit has R=10Ω, L=0.1H and C=50μF. The applied voltage is 100V. Find Resonant frequency & Quality factor of a coil. [5M]
   b) Explain about Series resonance with phasor diagrams. [5M]
2. a) Explain about Parallel resonance with phasor diagrams. [5M]
   b) Find the value of 'L' at which the circuit resonates at a frequency of 1000 rad/sec in the circuit shown in figure. [5M]

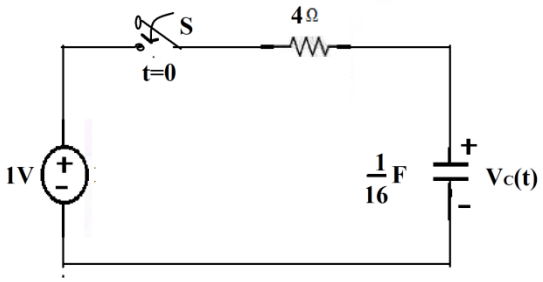


3. a) Explain about Quality factor and Band-width of Series resonance. [5M]
   b) Design constant-K band pass filter having a design impedance of 500Ω and cut-off frequencies f_1= 1kHz and f_2= 10 kHz. [5M]
4. a) Design a High –pass filter having a cut-off frequency of 1kHz with a load resistance of 600Ω.
   b) Design a Band-elimination filter having design impedance of 600Ω and cut-off frequencies f_1= 2kHz and f_2= 6 kHz. [5M]
5. a) Explain about classification of filters.
   b) Explain about Propagation constant and Characteristic impedance in T-network filters. [5M]
6. a) Explain about Propagation constant and Characteristic impedance in Π-network filters. [5M]
   b) Design Low Pass Filter in both T& Π section having a cut off frequency of 2KHz to operate with a terminated load resistance of 500 Ω [5M]
7. Explain about Constant-K low-pass filter in detail. [10M]
8. Explain about Constant-K high-pass filter in detail. [10M]
9. Explain about Constant-K band -pass filter in detail. [10M]
10. a) Define Quality-factor and Selectivity. [2*5=10M]
    b) Define Neper and Decibel.
    c) Draw the block diagram of band-pass and band-elimination filters.
    d) Draw the characteristics of Low-pass and High-pass filters.
    e) Define Resonance and Resonant frequency.

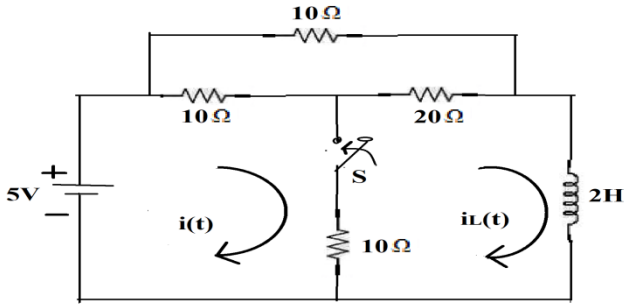
UNIT-III

TRANSIENT ANALYSIS

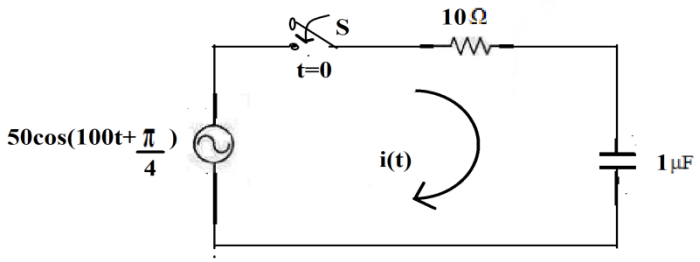
1. a) Derive the Transient Response of series RL-circuit with D.C excitation. [6M]
   b) Using classical method of solution of differential equations, find the value of $V_c(t)$ for t>0 in the circuit shown in figure. Assume $V_c(0^-) = 9v$. [4M]



2. a) Derive the Transient Response of series RC-circuit with D.C excitation. [5M]
   b) The circuit shown in below figure, the switch 'S' is open and the circuit reaches a steady state. At t=0, the 'S' is closed. Find the current in the inductor for t>0. [5M]



3. Derive the Transient Response of series RLC-circuit with D.C excitation. [10M]
4. a)Derive the Transient Response of Series RL with Pulse excitation. [5M]
   b) A series RC circuit consists of a resistor of 10Ω and capacitor of 0.1 F with a constant voltage of 20v, is applied to the circuit at t=0.Obtain the current equation. Determine the voltage across the resistor and the capacitor. [5M]
5. Derive the Transient Response of Series RL circuit with Sinusoidal excitation. [10M]
6. a) In the circuit shown in figure, determine the complete solution for the current when switch is closed at t=0,applied voltage is $V(t)= 50 \cos(10^2t+ \Pi/4)$, resistance R=10Ω and capacitance C= 1μF. [5M]



   b) A voltage V=300sin(314t). is applied at t=2.14msec to a series RC circuit having resistance of 10Ω and a capacitance of 200μF. Find an expression for current. Also, find the value of current 1msec after Switching-On. [5M]
7. Derive the Transient Response of Series RLC circuit with Sinusoidal excitation. [10M]

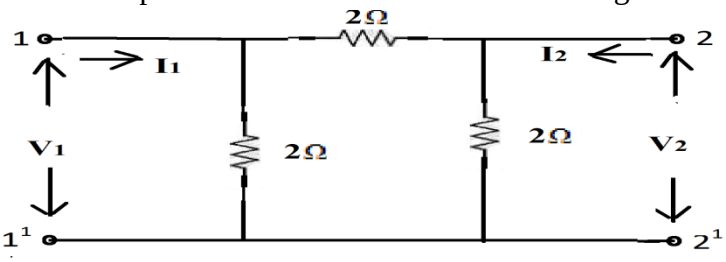
8. a) Derive the Transient Response of Series RC circuits with Pulse excitation. [5M]
   b) A series RL circuit with R=30Ω and L= 15H has a constant voltage V=60v applied at t=0. Determine the current "I", voltage across resistor and voltage across inductor. [5M]
9. Derive the Transient Response of Series RC circuit with A.C excitation. [10M]

10. a) Define steady state and transient state [2*5=10M]
    b) What area the initial conditions? Explain briefly.
    c) What is the transient response of series RL and RC circuits with D.C excitation?
    d) What is the behavior of Inductor in Initial and Steady state conditions?
    e) What is the behavior of Capacitor in Initial and Steady state conditions?

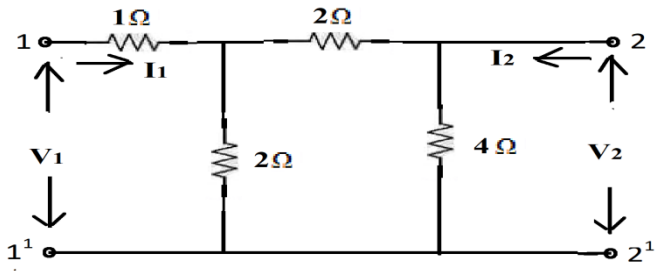
UNIT-IV

TWO PORT NETWORKS

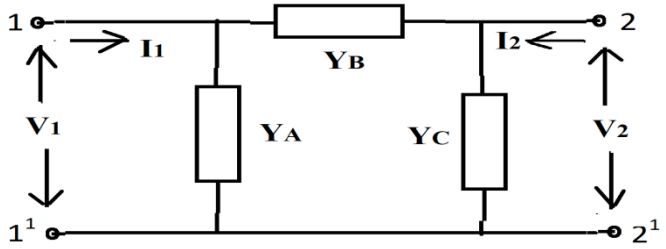
1. a) Explain about Impedance parameters. [5M]
   b) Find the transmission parameters for the circuit shown in figure. [5M]



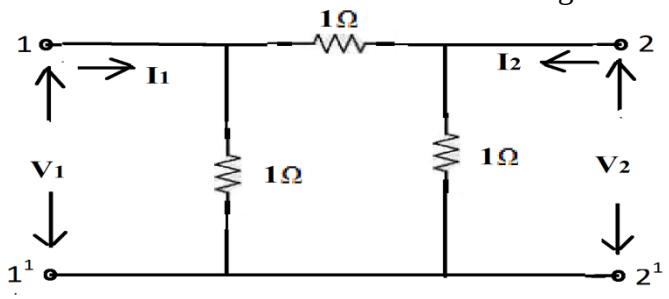
2. a) Explain about short-circuit parameters. [5M]
   b) Find the h-parameters of the network shown in figure. [5M]



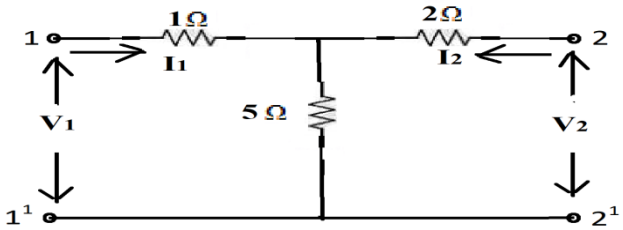
3. a) Explain about h-parameters in terms of y-parameters. [5M]
   b) Find the Short-circuit parameters for the circuit shown in figure. [5M]



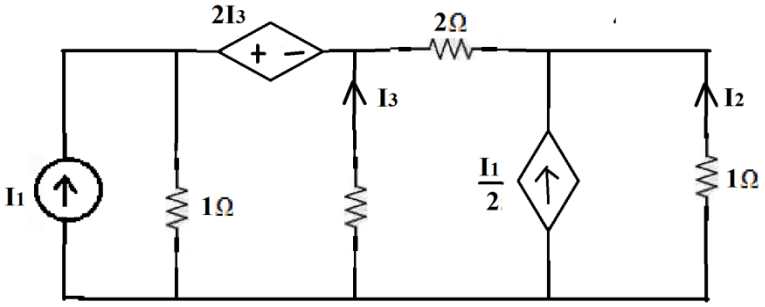
4. a) Explain about ABCD-parameters. [5M]
   b) Find the Z-parameters of the network shown in below figure. [5M]



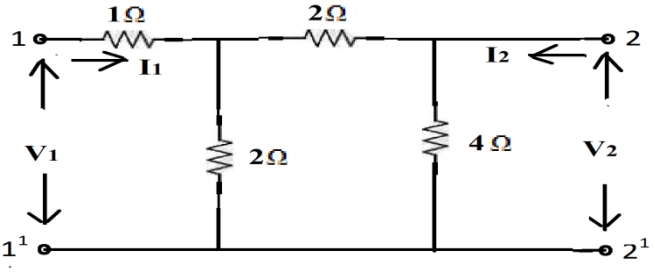
5. a) Derive the expressions for Chain parameters in terms of Z-parameters. [4M]
   b) The Z-parameters of a two-port network are Z_{11}= 10Ω, Z_{22}= 15Ω Z_{12}= 5Ω and Z_{21}= 5Ω .Find the equivalent T-network and ABCD parameters. [6M]
6. a) Find the transmission parameters for the circuit shown in figure. [5M]



   b) The hybrid parameters of a two-port network is shown in figure are, h_{11}= 1K, h_{12}=0.003, h_{21}= 100 and h_{22}= 50μ℧.Find $V_2$and Z-parameters of the network. [5M]
7. a) Derive the expressions for Z-parameters in terms of ABCD-parameters. [5M]
   b) Find the current transfer ratio I_2/I_1 for the network shown on figure. [5M]



8. a) Derive the expressions for Y-parameters in terms of ABCD parameters. [5M]
   b) Determine the y-parameters of the following network. [5M]

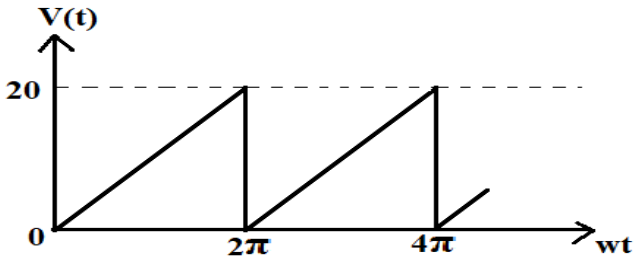


9. a) The given ABCD parameters are, A=2, B=0.9, C=1.2, D= 0.5. Find Y-parameters. [5M]
   b) The given Y-parameters are, Y_{11}= 0.5, Y_{12}= Y_{21}= 0.6, Y_{22}= 0.9.Find Impedance parameters. [5M]
10. a) Define Two-port network. [2*5=10M]

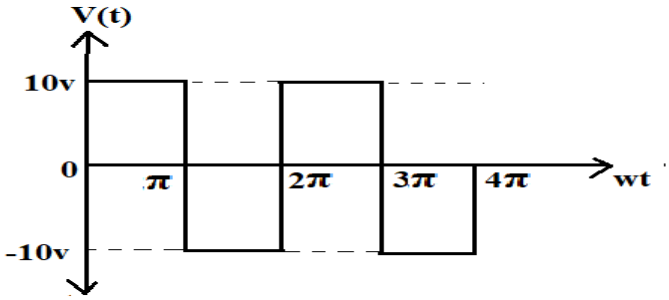
b) Draw the equivalent circuit of Z-parameters.
c) What is the condition for Symmetry in Z and Y parameters?
d) What is the condition for Reciprocity in Z and Y parameters?
e) Write the equations for Z-parameters in terms of Y-parameters.

UNIT-V
FOURIER TRANSFORMS

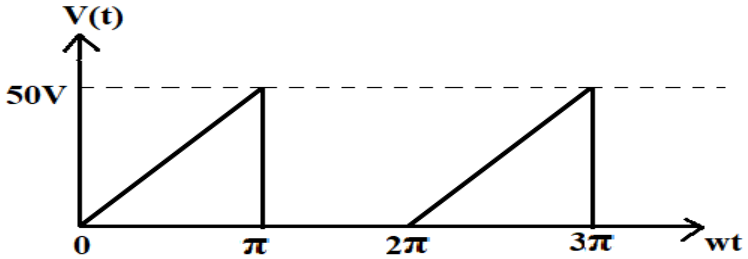
1. a) Derive the Trigonometric form of Fourier series. [5M]
   b) Find the Fourier series for the following waveform. [5M]



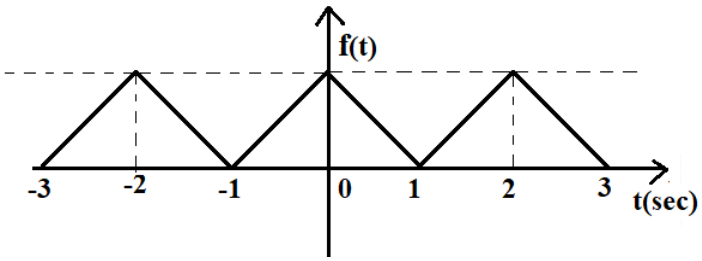
2. a) Derive the Exponential form of Fourier series. [5M]
   b) Obtain the Fourier series for the following waveform shown in figure. [5M]



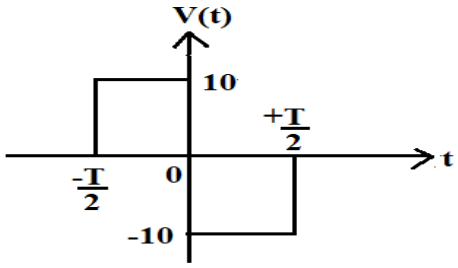
3. a) Find the Trigonometric Fourier series for the following waveform shown in figure. [5M]



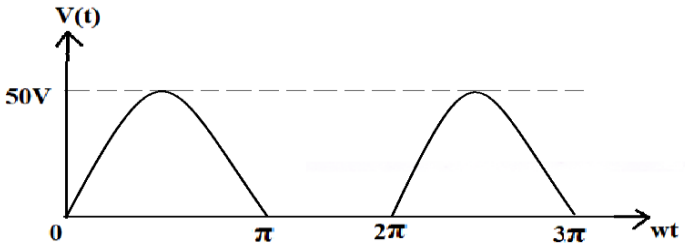
   b) Find the Exponential Fourier series for the following waveform shown in figure. [5M]



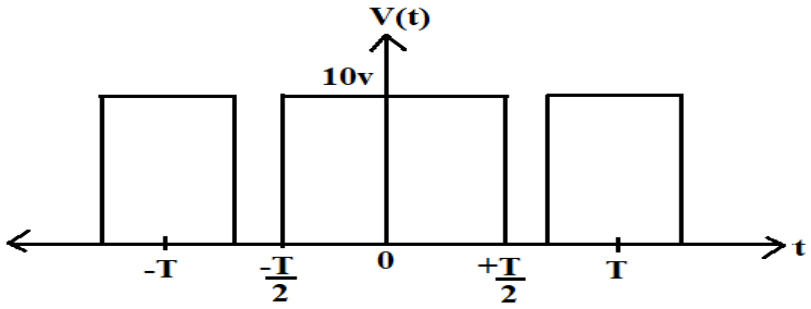
4. Write and prove the properties of Fourier transforms. [10M]
5. a) Explain about Line spectrum and Phase spectrum. [6M]
   b) Obtain the magnitude and phase spectrum of the waveform shown in figure. [4M]



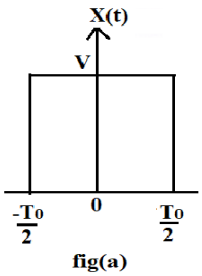
6. a) Find the Trigonometric Fourier series for the waveform shown in figure and sketch the spectrum. [6M]



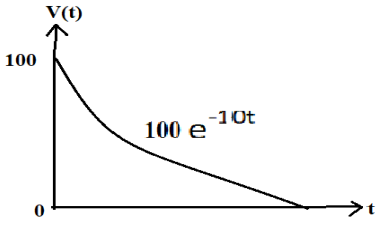
   b) Find the Fourier transform of a periodic pulse train shown in figure. [5M]



7. Determine the Fourier transforms of the following waveforms shown in figure(a) and figure(b). [10M]

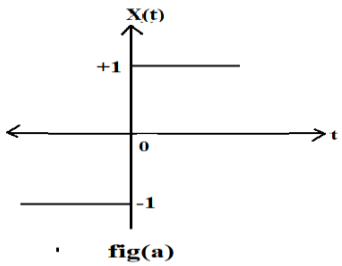


fig(a)

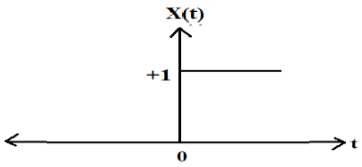


fig(b)

8. Determine the Fourier transforms of the following waveforms shown in figure (a) and figure (b). [10M]

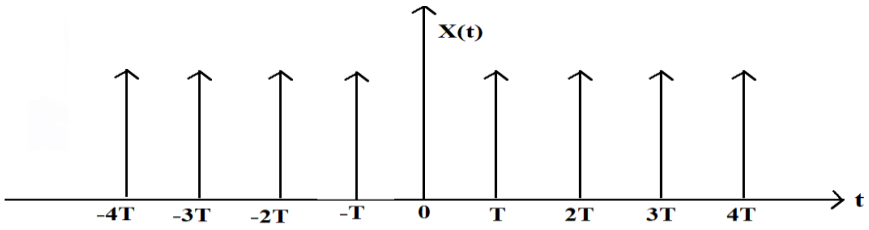


fig(a)



fig(b)

9. a) Find the Fourier Transform of a periodic unit impulse train shown in figure [5M]



b) Explain about waveform symmetry for even and odd functions. [5M]

10. a) Define Fourier series. [2*5=10M]

b) Define Fourier transform.

c) Write the expression for trigonometric form of Fourier series.

d) Write the expression for exponential form of Fourier series.

e) Write any two properties of Fourier transforms.

Prepared By

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