Code No: OR210452 **OR**

II B.Tech I Semester Supplementary Examinations, May 2005
NETWORK THEORY
(Common to Electronics & Communication Engineering,Electronics & Instrumentation Engineering,Bio-Medical Engineering and Electronics & Control Engineering)

Time: 3 hours **Max Marks: 70**

Answer any FIVE Questions
All Questions carry equal marks

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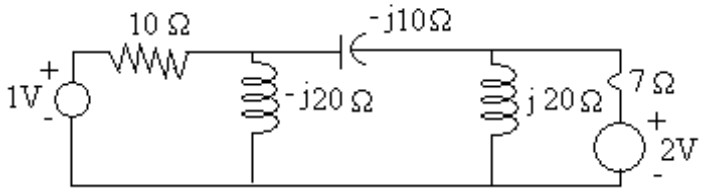
1. (a) Explain Kirchoff's laws, source transformations, independent sources and dependent sources.
   (b) Explain the concept of duality and mention the dual quantities. Draw the dual network for the circuit below:



2. (a) Explain Miller's theorem with example.
   (b) Verify Tellegen's theorem for the following network if V_1=4V, V_2= -2V, V_3=2V, V_4=8V, V_5=6V, i_1=2A, i_2=2A, i_3= -6A, i_4=4A, i_5=5A. (figure.1)
   (c) Obtain Thevenin's equivalent circuit for the network below figure 2.

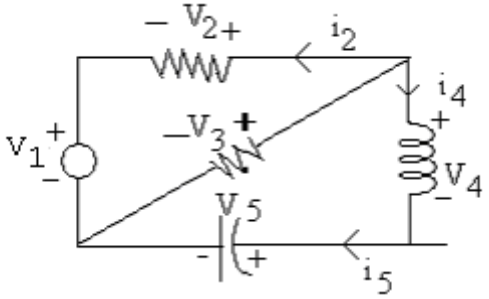


Figure .1

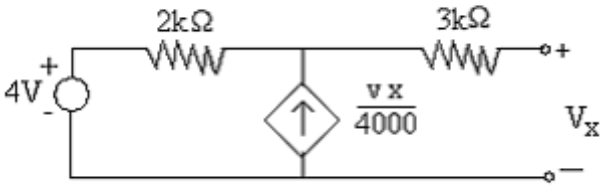


Figure .2

3. (a) Define resonance, anti resonance, quality factor. Deduce the resonant frequency of parallel RLC circuit.

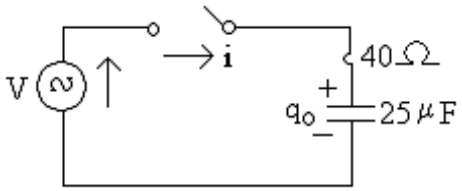
   (b) Compare series resonance and parallel resonance circuits. An RLC circuit consists of R=1kΩ, L=100mH, C=10μF. If a voltage of 100V is applied across the combination, determine resonant frequency, Q factor and bandwidth.

4. (a) Define circuit transient, time constant, natural response and forced response.

   (b) An exponential voltage v(t)=e^{-t} is suddenly applied at t=0 to a series RC circuit with $R = 9\Omega$, C=0.25F. Obtain particular solution for current i(t) through the circuit if the initial charge across the capacitor C is zero.

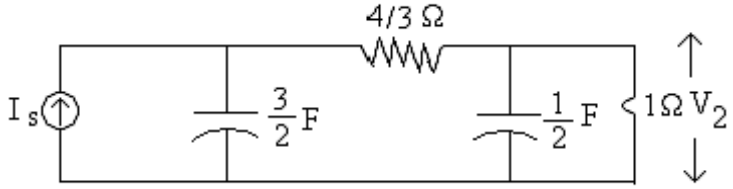
5. (a) Explain Laplace transform, initial value theorem and final value theorem.

   (b) The series RC circuit has a sinusoidal voltage source V=180 sin (2000 t + ϕ) volts and an initial charge on the capacitor q_o=1250C. Determine the current if the switch is closed at a time corresponding to ϕ=90^0.



6. (a) Obtain open circuit and short circuit parameters. Obtain relation between them.

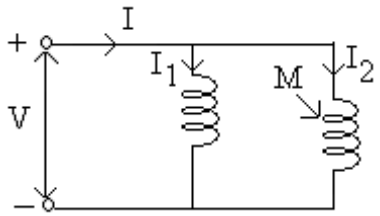
   (b) Determine $\frac{V_2}{I_s}$ by node analysis for the circuit shown below:



7. (a) Explain the necessary and sufficient conditions for a function to be a positive real function and discuss the properties of positive real function.

   (b) Determine whether the function. $P(S) = \frac{S^2+S+6}{S^2+S+1}$ is positive real function.

8. (a) Explain briefly single tuned and double tuned coupled circuits.
   (b) Find the equivalent inductance of the following circuit when two inductances are (i) parallel aiding (ii) parallel opposing.



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