* U F - 8 0 7 9 *

UF-8079

B. E. - II (Sem. III) (Ele., EC & IC) Examination

May / June – 2012

Circuits & Networks

Time : **3** Hours] [Total Marks : **100**

Instructions : (1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ B. E. - 2 (SEM. 3) (ELE., EC & IC)

Name of the Subject :

☛ CIRCUITS AND NETWORKS

☛ Subject Code No. : 8 0 7 9 ☛ Section No. (1, 2,.....) : NIL

Seat No. :

Student's Signature

(2) Attempt all questions.

(3) Answer of each section must be written in separate answer book.

(4) Figures to the extreme Right Side indicate full marks.

(5) Assume appropriate data if requires.

(6) Support your answers with neat and clean diagrams and waveforms.

(7) Students may use Casio MS-100, 100-W or equivalent scientific calculators.

1 (a) Do as directed :

(i) While calculating R_{th} constant current source in circuit is replaced by _____. **1**

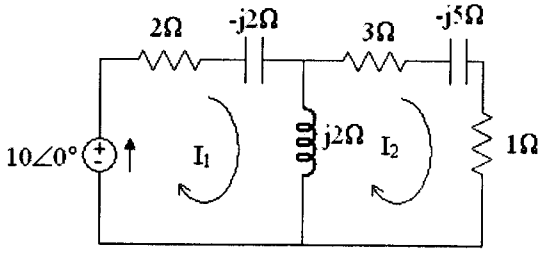
(ii) In electrical network, dual element of capacitor is _____. **1**

(iii) The nodal analysis is primarily based on the application of _____. **1**

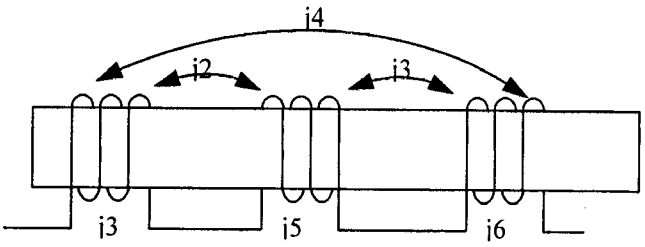
(iv) State max power transfer theorem. **2**

(v) Define and explain with suitable examples (1) Tree (2) Links (3) Twigs. **3**

(vi) Write impedance matrix for the network shown in figure. **2**



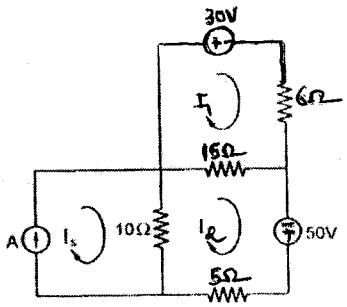
(b) (i) Draw the dotted equivalent of the circuit shown in figure and find the equivalent inductive reactance. **6**



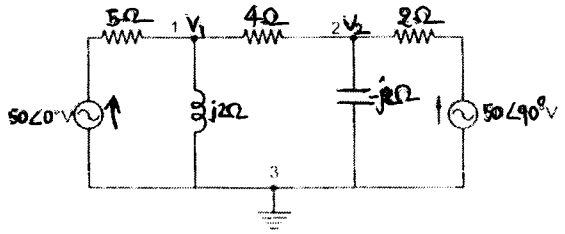
(ii) State and explain the superposition theorem for ac networks. **4**

2 Attempt any two :

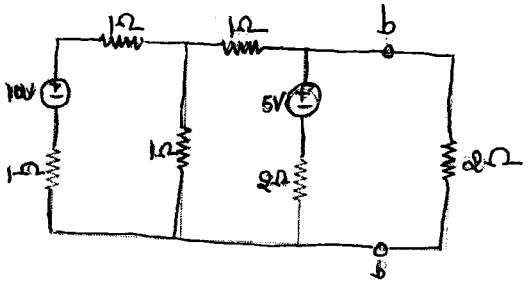
(i) Determine the mesh currents I_1 and I_2 in the network of figure using mesh analysis. **15**



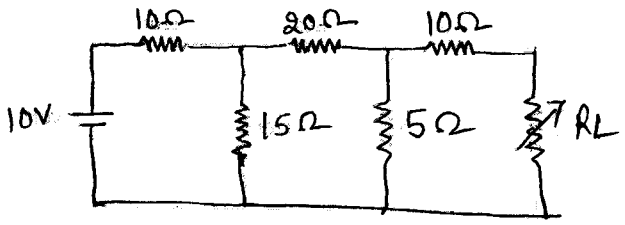
(ii) In the network shown in figure, determine the voltage of nodes 1 and 2 with respect to selected reference.



(iii) Draw the Thevenin's equivalent of the circuit shown in figure and find the current through load resistance (between terminals b-b).

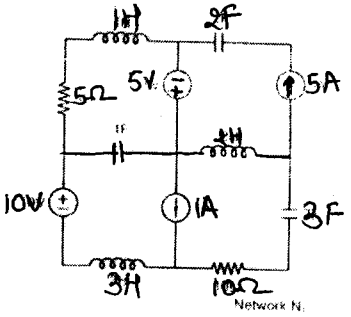


(iv) For the network shown in figure, determine the value of RL for maximum power transfer. What will be the value of power transfer under this condition ?

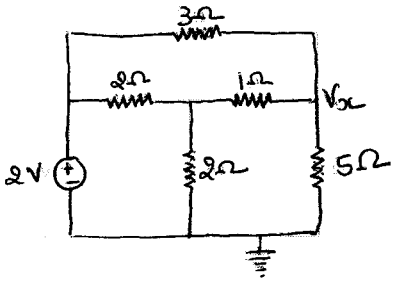


3 Attempt any three : **15**

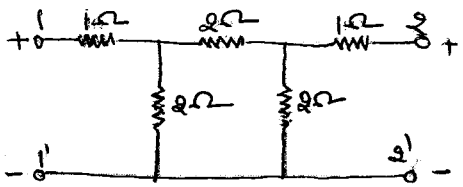
(i) Construct the exact dual of the network shown in figure.



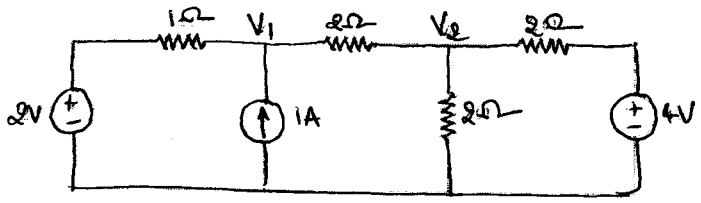
(ii) Using Source transformation, find out the voltage V_x in the figure shown below.



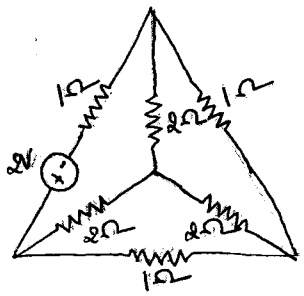
(iii) Obtain z-parameters for the network shown in figure. Draw the z-parameter equivalent model.



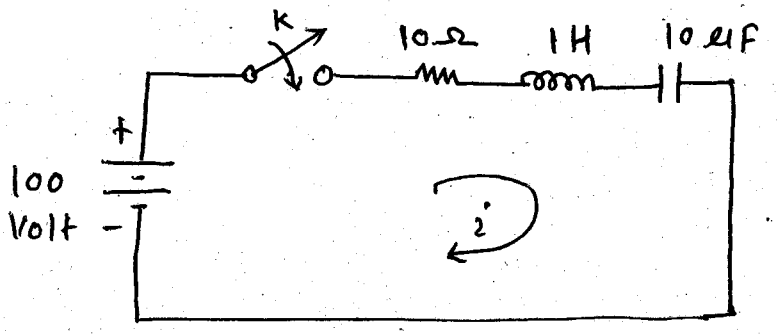
(iv) Determine the node voltage V_1 and V_2 in the network shown in figure by applying the superposition theorem.



(v) For the network shown in figure, write down the tie-set matrix and obtain equilibrium equation in matrix form using KVL. Calculate the loop currents and branch currents.

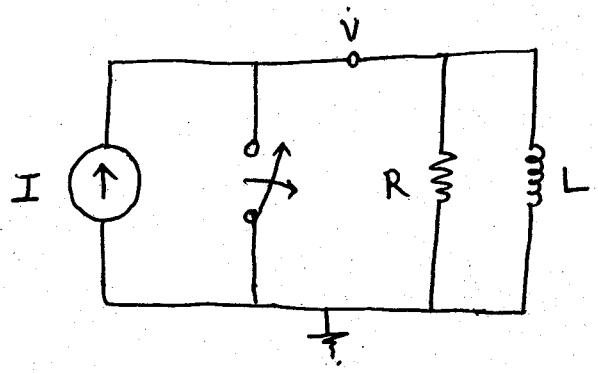


4 (i) In the network of the figure, the switch K is closed at t=0 with the capacitor uncharged and with zero current in the inductor. Find the values of i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t=0^+$.8

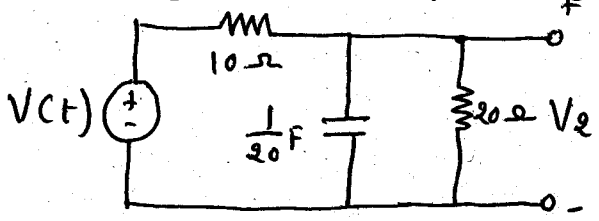


(ii) In the given network, the switch K is opened at t=0. 8

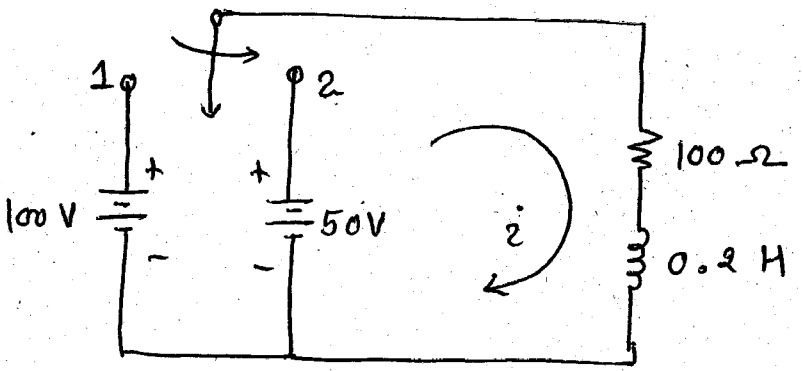
Solve for V, $\frac{dv}{dt}$ and $\frac{d^2v}{dt^2}$ at $t=0^+$ if I = 10 amp, R = $10\,\Omega$ and L = 1H.



5 (i) For the following network, V(t) e^{-t} for $t \geq 0$ and is zero for $t<0$. . If capacitor is initially uncharged, find $V_2(t)$ 8

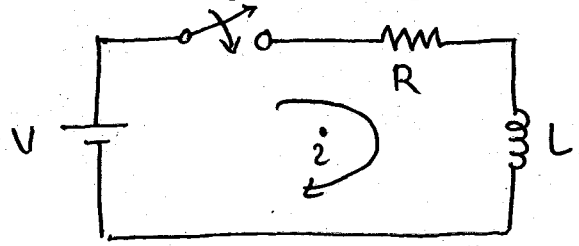


(ii) In the following network, the switch K is closed on position 1 at t=0 there by applying a 100 volt source to an R-L branch and at t=500 μs the switch is moved to position 2. Obtain the equations for the current in both intervals and sketch the current transient. 8

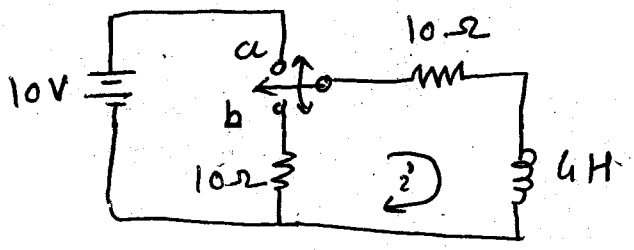


OR

5 (i) Determine step response to R-L series circuit. Initially inductor is uncharged. Use Laplace transform method. 8



(ii) In the given circuit, the switch K is moved from position a to b at time t=0, the steady state having previously established. Find particular solution for the circuit for t $\geq$0. 8



6 Attempt any three : 18

(i) Explain initial value and final value theorem.

(ii) Define following function and find laplace transform for the same.

(a) Unit step function

(b) Ramp function

(iii) For the two port network, obtain relationship between Z-parameters and Y-parameters.

(iv) Determine h-parameters for the following network.