* K C - 8 0 7 9 *

KC-8079

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

November / December – 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) (ELECTRICAL, EC & IC)

Name of the Subject :

☛ CIRCUITS & NETWORKS

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

Seat No. :

Student's Signature

(2) Attempt all questions.
(3) Figures to the extreme right side indicate full marks.
(4) Assume appropriate data if requires.
(5) Support your answers with neat and clean diagrams and waveforms.
(6) Students may use Casio MS-100, 100-W or equivalent scientific calculators.

1 (a) Do as directed :

(1) The mutual inductance in a coupled circuit is given by _____. **1**

(2) An ideal voltage source should have infinite source resistance. **1**
(True / False)

(3) For the graph shown in figure, The no. of branches and nodes in the graph are. **1**

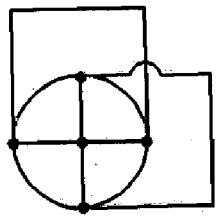

Fig.

(a) 5, 10 (b) 10, 5
(c) 10, 10 (d) 6, 10

(4) Define the following terms : **3**

(i) Loop

(ii) Connected graph

(iii) Fundamental cut-set

(5) Define Unilateral and Bilateral Network. **2**

(6) Find Thevenin's equivalent resistance (R_{TH}) **2**

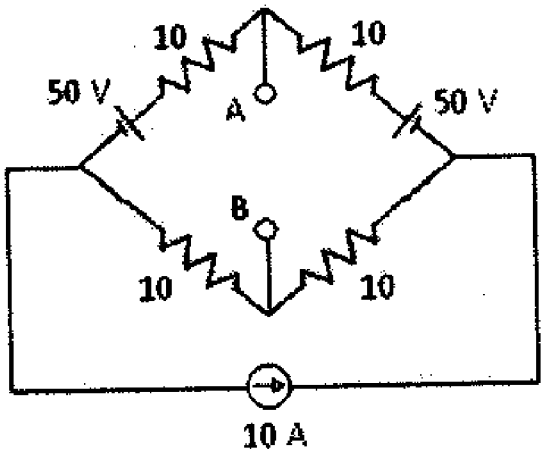

Fig.

(b) (1) Obtain the Y-parameters in terms of Z-parameters. **6**

(2) Determine equivalent inductance at terminals A-B. **4**

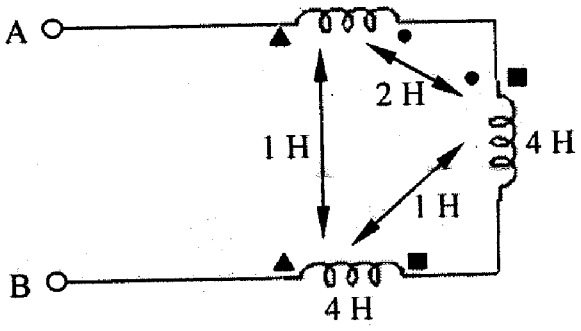

Fig.

2 Attempt any **two** : **15**

(1) For the network shown in figure determine the current in 4Ω resistor using mesh analysis.

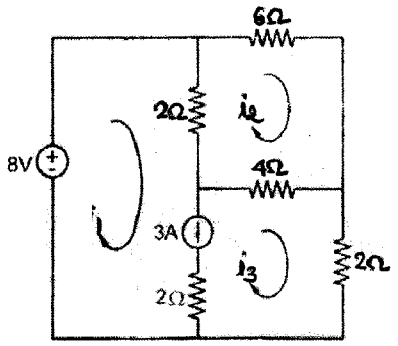

Fig.

(2) Write the equilibrium equations for the network shown in figure on the node voltage basis and compute the node voltages.

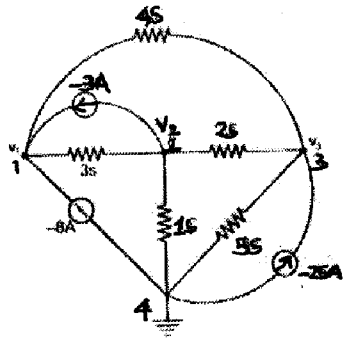

Fig.

(3) Determine the current through the branch AB of the network shown in figure using Thevenin's theorem. All the resistance values are in ohms.

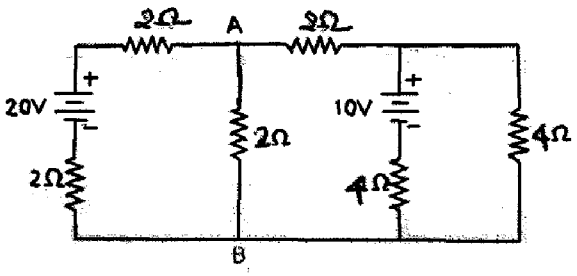

Fig.

(4) Find the current in the 5Ω resistor for the circuit shown in figure using Norton's theorem.

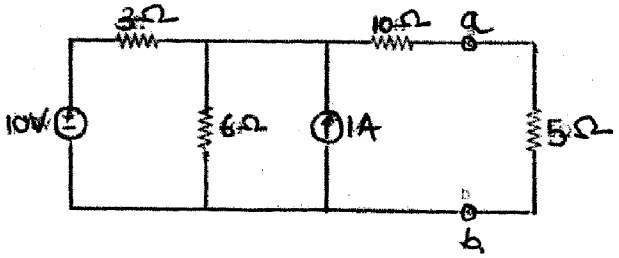

Fig.

3 Attempt any **three** : **15**

(1) In the given network of figure, all sources are invariant. Determine the branch current in the 2Ω resistor using source transformation method.

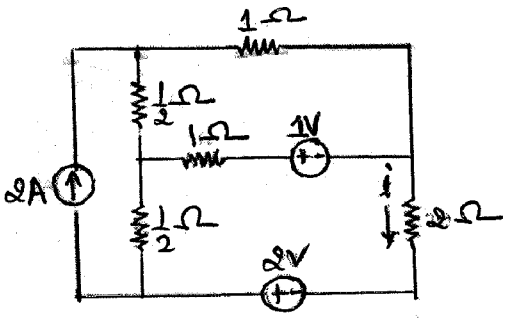

Fig.

(2) Draw the exact dual of the network shown in figure.

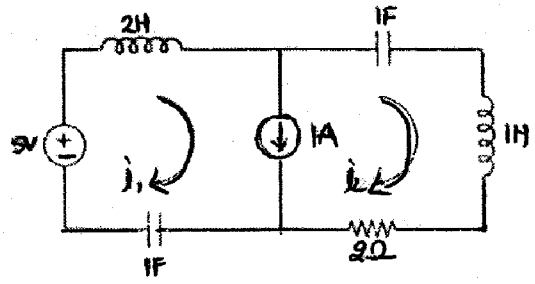

Fig.

(3) Find the Y-parameters for the resistive network shown in figure below.

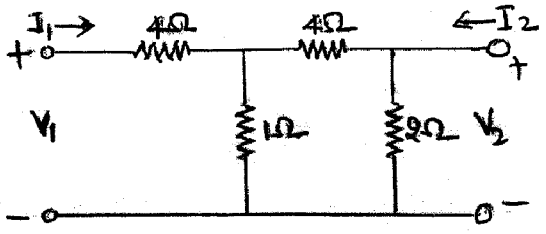

Fig.

(4) Find the voltage across 1 $k\Omega$ resistor in the circuit shown in figure, using superposition theorem.

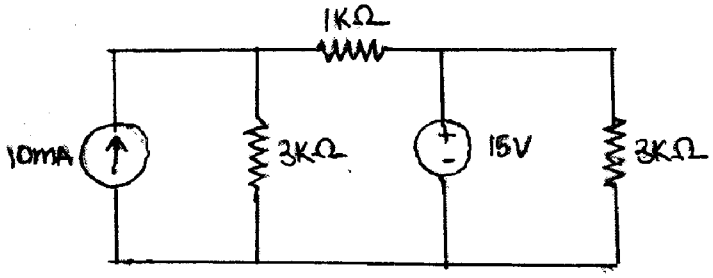

Fig.

(5) For the network shown in figure, write down the Tie-set matrix and obtain the network equilibrium equation in matrix form using KVL. Calculate the loop current.

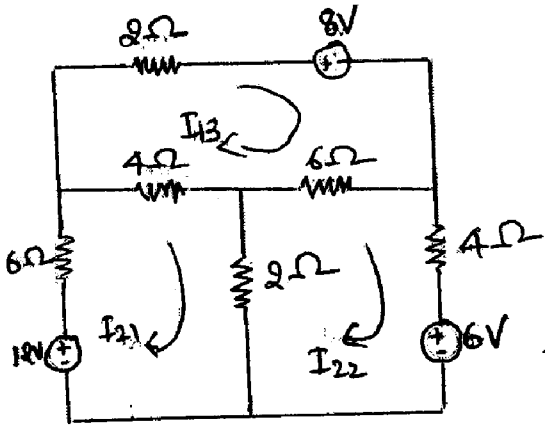

Fig.

4 (1) Determine Y-parameters for the following network. 8

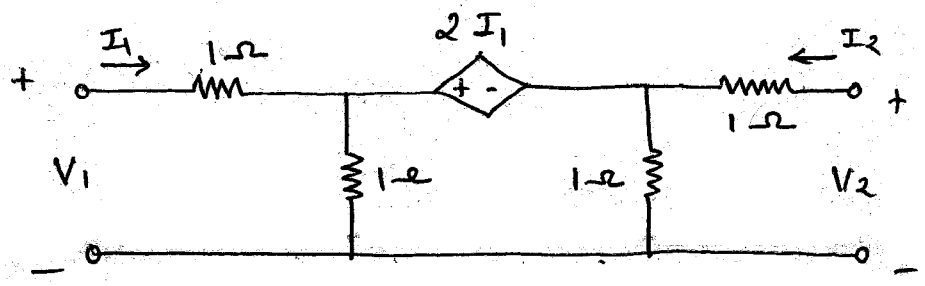

Fig.

(2) In the network shown in figure, the switch is moved from position-1 to 2 at $t=0$, steady state having previously been attained. Find the voltage $V_c(t)$. 8

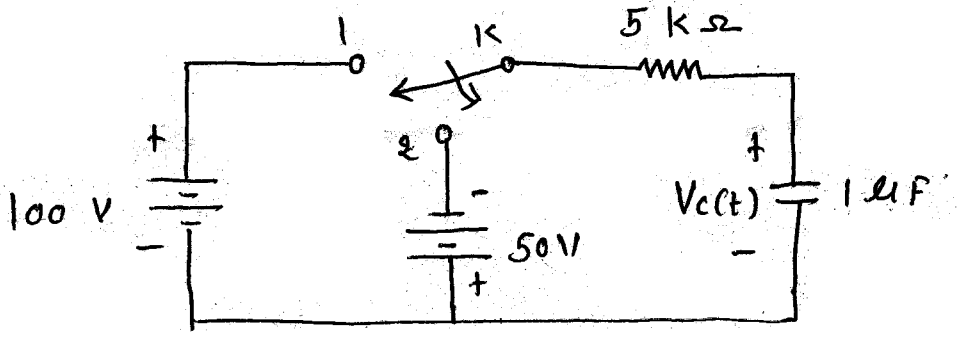

Fig.

5 (1) 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. Determine $i, di/dt$ and d^2i/dt^2 at $t=0^+$. 8

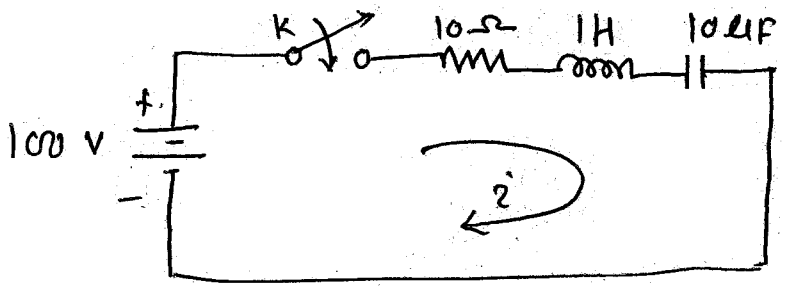

Fig.

(2) For the following network, steady state is reached with the switch k open. At $t=0$ the switch is closed. 8

Determine the values of $Va(0^-)$ and $Va(0^+)$.

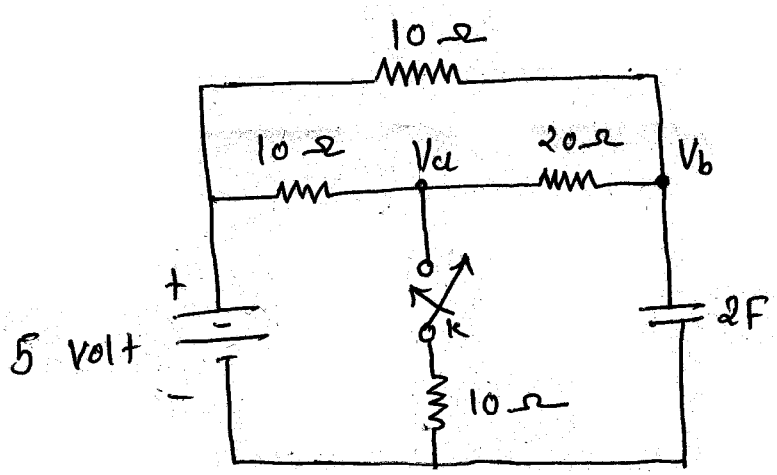

Fig.

OR

5 (1) Determine the Laplace transform of the following function **6**

(i) $f(t)=\cos wt$

(ii) $f(t)=t\cdot e^{-at}$

(2) Determine Inverse Laplace transform of the following equation. **5**

$$F(S)=\frac{1}{S^2+4S+5}$$

(3) Determine the particular solution of the R-L series circuit with D.C. excitation. Use Laplace transformation. **5**

6 Attempt any **two** : 18

(1) Determine the z and y parameters for the following network.

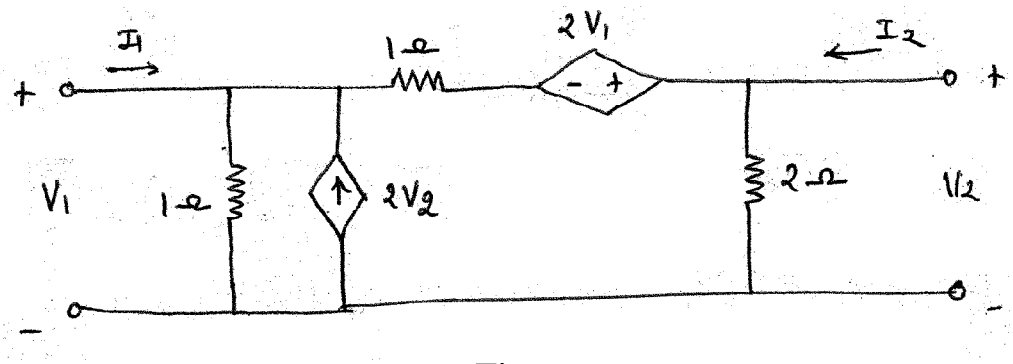

Fig.

(2) Develop relationship between y-parameters and h-parameters.

(3) Define the following function and also determine Laplace transform for the same :

(i) Unit step function

(ii) Ramp function

(iii) Shifted unit step function.