2017

M.Sc.

1st Semester Examination

ELECTRONICS

PAPER—ELC-102

Subject Code—27

Full Marks : 50

Time : 2 Hours

The figures in the right-hand margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

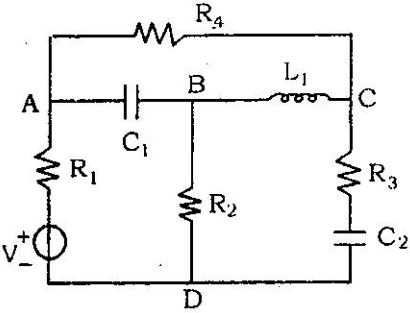
Illustrate the answers wherever necessary.

(Network Analysis and Synthesis)

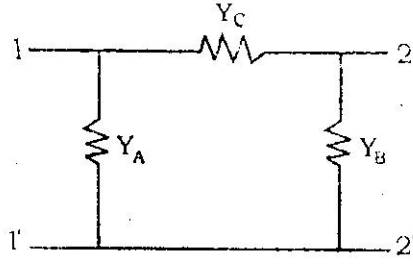
Answer Q. No. *1* and any *three* from the rest.

1. (a) State and explain the Foster's reactance theorem.

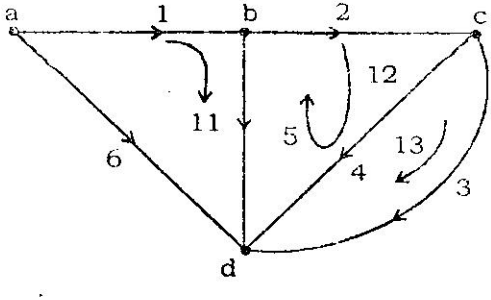
(b) Draw the Network graph of the following circuit.



(c) Determine the Y matrix of the following π Network.



(d) Find the **tie-set matrix** to the following loop carrying currents I, I_2 and I_3 corresponding to the link branches 1, 2 and 3 respectively.



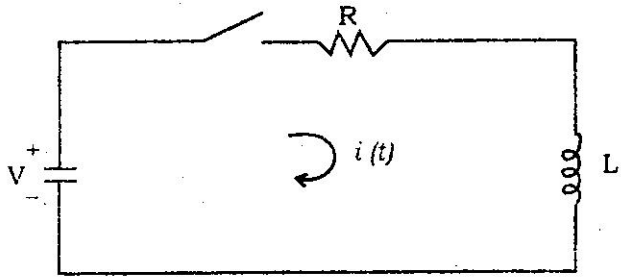
(e) Determine the stability of the following function.

$f(s) = (s+1)(s+2)(s+3)(s+4)$. 5×2

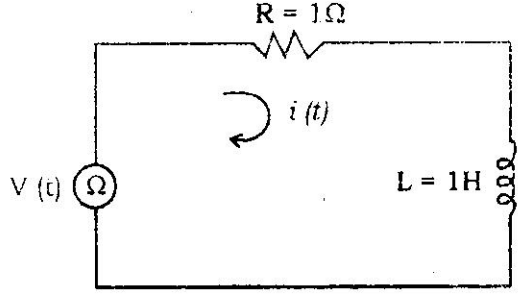
(c) Design a symmetrical T type attenuator to give 40 dB attenuation and characteristic impedance of 100 Ω.

3+4+3

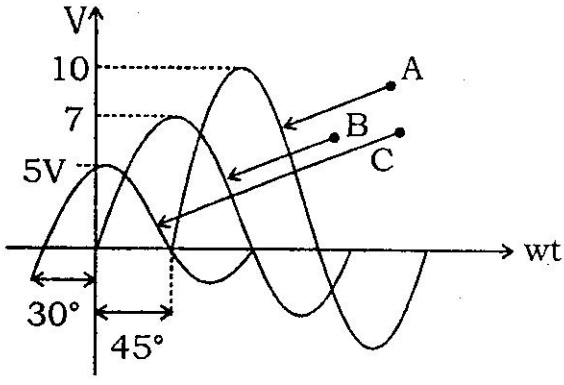
3. (a) Determine the current $i(t)$ in the following circuit using Lap Lau transform method. The switch K is closed at $t = 0$.



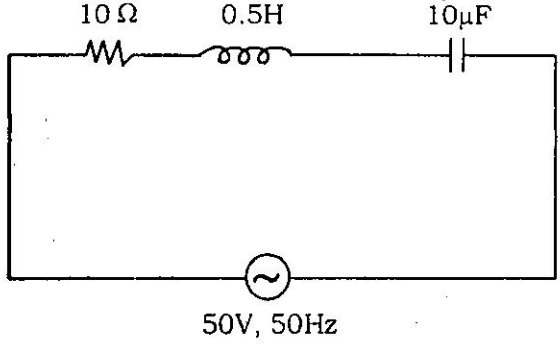
(b) Determine $i(t)$ if V is replaced by a pulse having width a at $t = 0$. 5+5



2. (a) Draw phasor diagram to represent the three sine waves of same frequency shown below.



(b) For the circuit given below, determine the total impedance, current I and the phase angle θ.

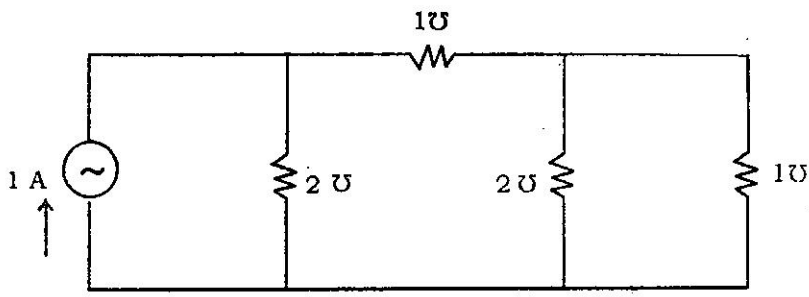


4. (a) The reduced incidence matrix of an oriented graph is

$$[A] = \begin{bmatrix} 0 & -1 & 1 & 1 & 0 \\ 0 & 0 & -1 & -1 & -1 \\ -1 & 0 & 0 & 0 & 1 \end{bmatrix}$$

Draw the graph.

(b) For the following circuit derive the fundamental cut-set matrix and hence find the KCL equations. 4+6



5. (a) The driving point impedance of an LC network is given

by $z(s) = \dfrac{2S^5 + 12S^3 + 16S}{S^4 + 4S^2 + 3}$

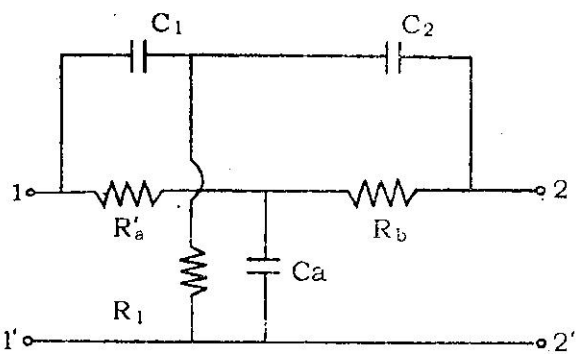
Determine the first Caner form of the network.

(b) Draw the pole zero diagram for the given network function and hence obtain v(t).

$$V(s) = \frac{4(S+2)S}{(S+1)(S+3)}$$ 5+5

6. (a) Prove that for a reciprocal two port Network AD – BC = 1.

(b) Determine Y_{11} for the following twin-T Network. 5+5



[Internal Assessment — 10 Marks]

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