HUST
School of Electrical Engineering

Signature of Department Leader

FINAL EXAMINATION: **LINEAR CIRCUIT 2**
Duration of the exam: ***90 minutes***

Signature of Lecturer

Sheet No. **02**
6/2020

(Documents are allowed to use. Return the question sheet)

Student's name:.....**Student's Code:** .....

Question 1 (2 pts)

Given a circuit as in the figure 1.

Write the system of equations for the given circuit using both KCL and KVL (branch current method)?

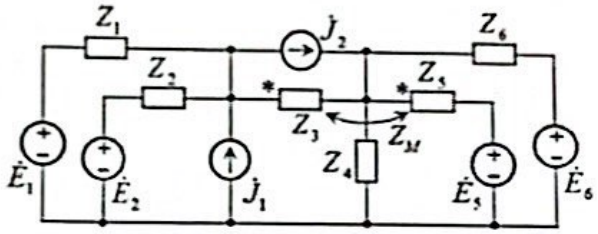

Figure 1

Question 2 (4 pts)

Given a circuit as in the figure 2, where: $Z_1 = 25 + j25\Omega$, $Z_2 = 20 + j20\Omega$, $Z_3 = 40 + j40\Omega$, $Z_4 = 50 + j50\Omega$, $\dot{E}_1 = 50\angle 0^\circ V$ (RMS), $\dot{E}_2 = 80\angle 30^\circ V$ (RMS), $Z_M = j5\Omega$, $\dot{J}_1 = 0.5\angle 0^\circ A$ (RMS), $\dot{J}_2 = 1\angle 45^\circ A$ (RMS)

a) Calculate the effective power delivered by $\dot{E}_1$ and $\dot{J}_2$?

b) Find the value of Z_1 to obtain the maximum effective power on it, then calculate that maximum power?

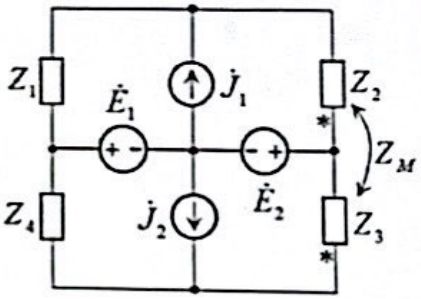

Figure 2

Question 3 (3 pts)

Given a circuit as in the figure 3, where: $R_1 = 50\Omega$, $R_2 = 20\Omega$, $C = 5.10^{-4} F$, $E_1 = 150V$ (DC), $E_2 = 35V$ (DC), two pure resistive two-port networks have the impedance parameters $Z = \begin{bmatrix} 100 & -50 \\ 50 & -100 \end{bmatrix}\Omega$, and the transmission parameters $A = \begin{bmatrix} 2 & 50 \\ 0.02 & 1 \end{bmatrix}$.

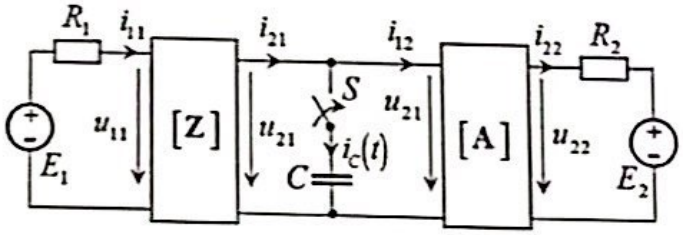

Figure 3

Find the step response $i_C(t)$ when the switch S is closed at the time $t = 0$? (Note that, for $t < 0$, the given circuit was being in steady state)

Note:

Good presentation: 1 pt