2017 – 2018 Spring BoEC Homework 7 **Asst.Prof. Dr. Metin Hüner**

Rules:

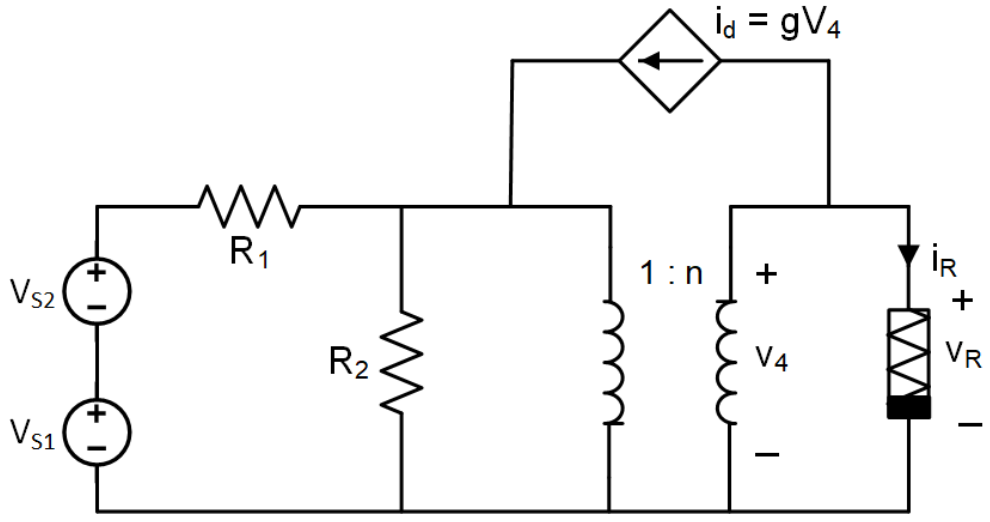
1) Your homework should be hand-written.
2) Don't include a cover page. Use both sides of the paper.
3) Have at least 1,5 cm margin from the edges.
4) The grades of identical or very similar looking homeworks will be divided to the number of such homeworks.
5) Your homeworks will be collected in the class on Wednesdays before the first lecture, till 12:30. If you bring your homework between 12:31 – 13:30 your grade will be multiplied with 0,7. After 13:30 no homework will be accepted.
6) You must sign on a sheet of paper as proof of handing in.

   If you want to hand in your homework before Wednesday, you must contact research assistant Görkem Yazgaç (Office: 8301).

1-a) Find the operating point of the nonlinear resistor. Take the positive root as the solution of the second degree equation. (Hint: First you may find Thevenin equivalent of the linear part of the circuit.) (100 points)

1-b) Find small signal components of the nonlinear resistor and write approximate $V_R(t)$ and $i_R(t)$. (40 points)

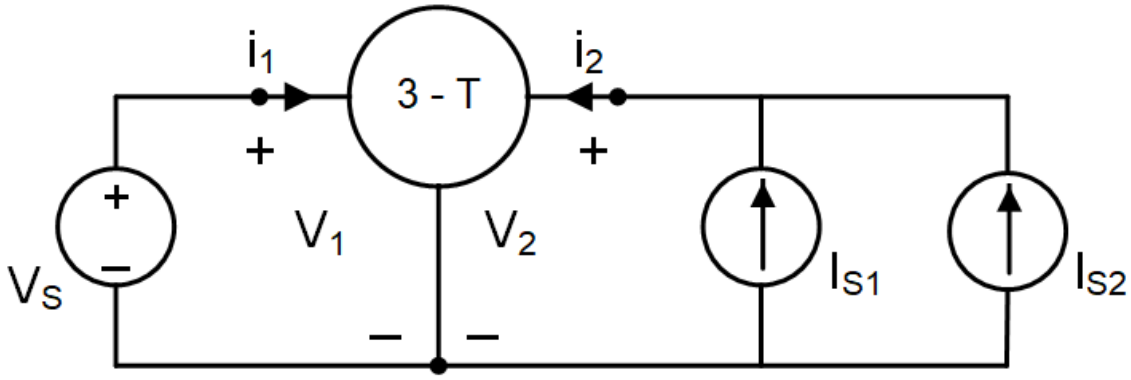
($R_1 = 1\Omega$, $R_2 = 1\Omega$, $V_{S1} = 4V$, $V_{S2} = 0{,}2\sin(5t)$ V, n = 2, g = 3S, $V_R = i_R^2 - \frac{7}{2} i_R - 3$)



2-a) Find the operating point of the nonlinear 3-T element. (30 points)

2-b) Find small signal components of the nonlinear 3-T element. (60 points)

$V_S = 5V$, $I_{S1} = 2A$, $I_{S2} = 0{,}03\cos(3t)$ A, $V_2 = i_2^2 + i_1 V_1$, $i_1 = 0{,}5V_1 - V_2$



Deadline of the 7th HW is **25 April 2018 12:30**.