EE210: Analog Electronics - Quiz 3

NAME (in capital)	Roll No

Time: 15 minutes

1) : Consider the circuit in Fig. 1. A three terminal non-linear element has been used, whose terminals are defined in the inset. The element has the following characteristics.

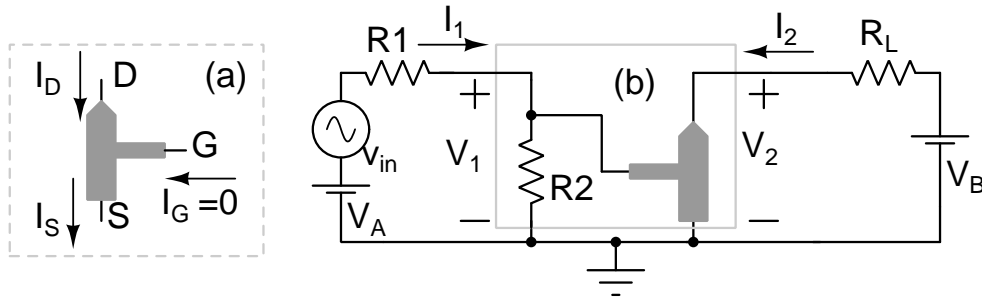$I_D = I_S = \alpha V_{GS}^2$ for $V_{GS} \geq 0$ and $V_{DS} \geq 0$. $I_D = I_S = 0$ otherwise.

Fig. 1. Problem 1

a) : Assume $V_A = 2\,V$, $V_B = 5\,V$, $R_1 = R_2 = 1\,k\Omega$, $\alpha = 2\,mA/V^2$ and $RL = 1\,k\Omega$. Find the small-signal two-port y-parameters of the network within the box (in Fig. 1(b)) and sketch the small-signal two-port network. **[6]**

Same as set in approach

$y_{11} = 1m\,S$ $\qquad y_{12} = 0$

$y_{21} = 4m\,S$ $\qquad y_{22} = 0$

..contd..

b) : If $v_{in} = 10mV \sin(\omega t)$, find the small signal voltage across V_1 and V_2. **[4]**

Approach same as set 1

$$v_1 = 5mV \sin(\omega t)$$

$$v_2 = -20mV \sin(\omega t)$$