EE210: Analog Electronics - Quiz 3

NAME (in capital)	Roll No

Time: 15 minutes

1) : Consider the circuit in Fig. 1. $V_{DC} = 5\,V$. 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.

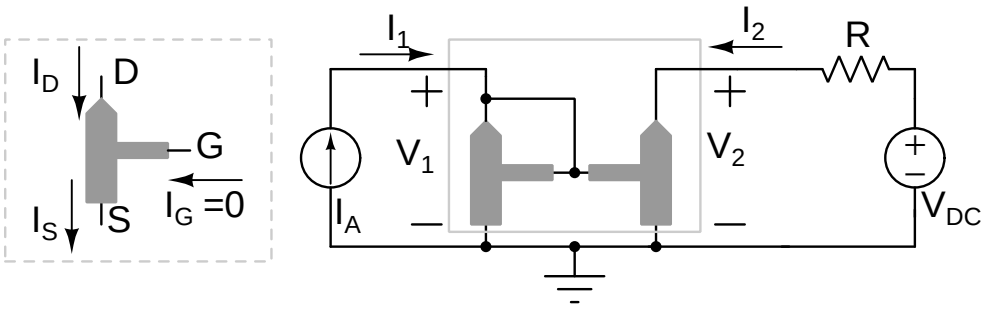

Fig. 1. Problem 1

a) : Assume $I_A = 2\,mA, \alpha = 2\,mA/V^2$ and $R1 = 0.5k\Omega$. 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]**

Approach is same as Set 1.

$y_{11} = 4mS$ $\quad y_{12} = 0$ $\quad y_{21} = 4mS$ $\quad y_{22} = 0$

..contd..

b) : If $I_A = 1\,mA + 0.1mA\sin(\omega t)$, find the small signal voltage across V_1 and V_2. **[4]**

Approach same as set-1

$$v_1 = \frac{i_{in}}{y_{11}} = 250\,mV\ \sin(\omega t)$$

$$v_2 = -y_{21} v_1 R = -0.05V\ \sin(\omega t)$$