Unit 4 - Week 2 - Nonlinear two ports; MOS transistor; Common source amplifier

Assignment 2

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-02-12, 23:59 IST.

1)

The equations below describe the currents of the nonlinear two port in the above figure.

$$I_2 = \left[I_s \exp\left(\frac{V_1}{V_t}\right)\right]\left(1+\frac{V_2}{V_A}\right)$$
$$I_1 = \frac{I_2}{\beta}$$

Thermal voltage $V_t = 25\,\text{mV}$, parameters $V_A = 25\,\text{V}$, $\beta = 40$. At the operating point, $I_2 = 6\,\text{mA}$, $V_2 = 5\,\text{V}$. Determine the small signal $y-$ parameters at this operating point.

$y_{11} =$

(The answer must be in **millisiemens (mS)**. Round off fractional answers to one decimal place.)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 6

1 point

2) $y_{12} =$ _____(Answer must be in microSiemens(μS). Round off fractional answers to one decimal Place)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 5

1 point

3) $y_{21} =$

(The answer must be in **millisiemens (mS)**. Round off fractional answers to one decimal place.)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 240

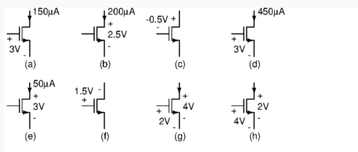
1 point

4) $y_{22} =$ _____(Answer must be in microSiemens(μS). Round off fractional answers to one decimal Place)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 200

1 point

5)



1 point

$\mu_n C_{ox} = 100\mu\text{A/V}^2$, $W/L = 1, V_T = 1\,\text{V}$. The figure above shows the MOS transistor in various bias conditions. Pick the ones that are in triode (linear) region. (There may be more than one).

- (a)
- (b)
- (c)
- (d)
- (e)
- (f)
- (g)
- (h)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(a)
(f)
(h)

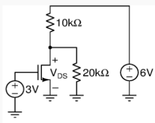
1 point

6) $\mu_n C_{ox} = 100\mu\text{A/V}^2$, $W/L = 1, V_T = 1\,\text{V}$. In the figure above, identify the cases which are *impossible* in any region of operation. (There may be more than one).

- (a)
- (b)
- (c)
- (d)
- (e)
- (f)
- (g)
- (h)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(d)

7)



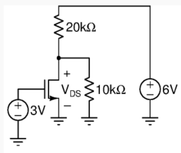
$\mu_n C_{ox} = 100\mu\text{A/V}^2$, $W/L = 1, V_T = 1\,\text{V}$. Determine V_{DS}. (The MOS transistor could be in any region. You have to guess the region, solve the problem, and see if the guess is correct).

(The answer must be in **volts (V)**. Round off fractional answers to two decimal places.)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 2.66,2.67

1 point

8)



$\mu_n C_{ox} = 100\mu\text{A/V}^2$, $W/L = 1, V_T = 1\,\text{V}$. Determine V_{DS}. (The MOS transistor could be in any region. You have to guess the region, solve the problem, and see if the guess is correct).

(The answer must be in **volts (V)**. Round off fractional answers to one decimal place.)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 1

1 point

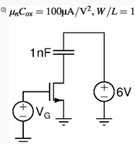
9) In the above problem, determine the drain current I_D of the MOS transistor.

(The answer must be in **microamperes (μA)**. Round off fractional answers to one decimal place.)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 150

1 point

10) $\mu_n C_{ox} = 100\mu\text{A/V}^2$, $W/L = 1, V_T = 1\,\text{V}$.



In the figure above, V_G jumps from 0 to 2 V at $t = 0$. The capacitor voltage is zero at $t = 0-$. Determine the time at which the MOS transistor enters triode region.

(The answer must be in **microseconds (μs)**. Round off fractional answers to one decimal place.)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 100

1 point