

Department of Electrical Engineering

Assignment

Date: 14/04/2020

Course Details

Course Title: Electronic Circuit Design
Instructor: sir mujtaba ihsan

Module: 04
Total Marks: 30

Student Details

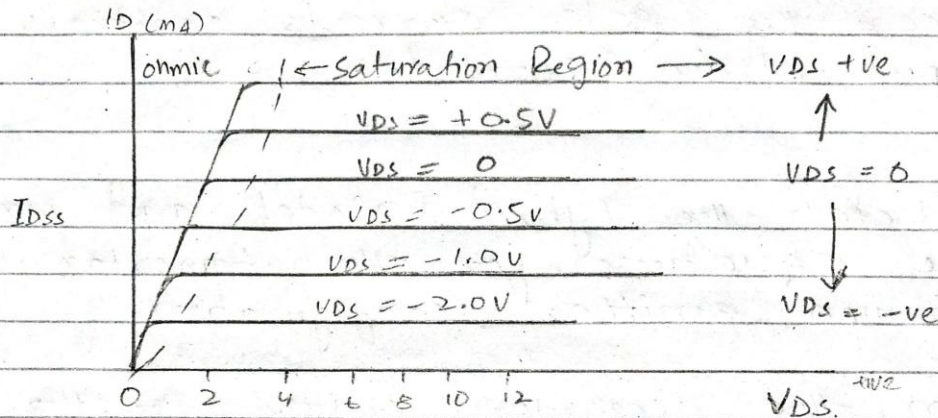
Name: Rafi ud din

Student ID: 12401

Q1.	(a)	<p>Explain the drain characteristic curve of D-MOSFET given below.</p> <div style="text-align: center;"> </div>	Marks 07
			CLO 1
	(b)	<p>Sketch the hybrid model and write equations for the transistor in common emitter configuration.</p>	Marks 06
			CLO 1
Q2.		<p>A certain operational amplifier has a common mode gain of 0.6 and an open loop differential voltage gain of 400,000. Evaluate the CMRR & express it in decibels.</p>	Marks 05
			CLO 2
Q3.	(a)	<p>Explain the concept behind negative feedback in operational amplifiers.</p>	Marks 06
			CLO 2
	(b)	<p>State the following statement as True or False and also give the reason for your answer: "The output of a summing amplifier is positive"</p>	Marks 06
			CLO 2

Q No 1

a) Explain the drain characteristic curve of D-MOSFET given below.

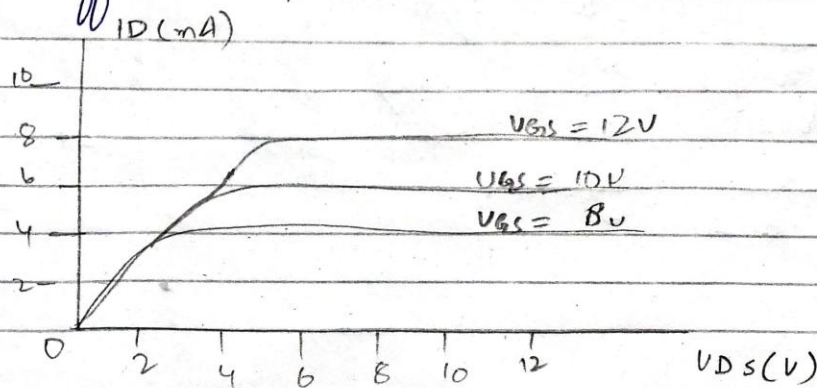


Ans:- D-MOSFET:-

A D MOSFET is a depletion MOSFET means that the threshold voltage is negative instead of positive and its also called a "normally on" MOSFET because it is on at a gate source of zero voltage.

Drain Characteristic Curve of D MOSFET:-

The Drain characteristic of the MOSFET are drawn between the Drain current I_D and the Drain source voltage V_{DS} . The characteristic curve shown below for different inputs.



When V_{DS} is increased, the Drain current I_D should increase. but due to the applied V_{GS} the drain current is controlled at certain level. Hence the gate current controls the output drain current.

QNO 1

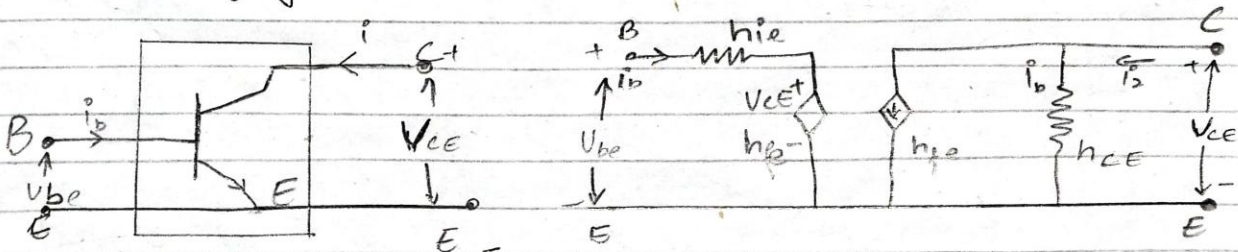
b) Sketch the hybrid Model and write the equations for the transistor in common emitter configuration.

Ans:- In the common emitter of the configuration the input signal is applied between the base and emitter terminals of the transistor and the output appears between the collector and emitter terminals. The input voltage (V_{be}) and the output voltage current (I_e) are given by the following equations.

$$V_{be} = h_{ie} \cdot i_b + h_{re} \cdot V_c$$

$$i_e = h_{fe} \cdot i_b + h_{oe} \cdot V_c$$

The Hybrid Model of Common Emitter Configuration:-



QNO 2:- A certain operational Amplifier has common mode gain of 0.6 and an open loop differential voltage gain of 400000. Evaluate the CMRR & express it in decibels.

Sol:- Given that

$$\begin{aligned} \text{Common mode gain} &= A_{cm} = 0.6 \\ \text{Open loop differential voltage gain} &= A_{ol} = 400000 \end{aligned}$$

To Find:-

$$\text{CMRR in decibels} = ?$$

So we know that

$$\text{CMRR} = 20 \log (A_{ol} / A_{cm})$$

$$\text{As } A_{ol} / A_{cm} = \frac{40,000}{0.6}$$

$$= 66,666.66$$

$$= 20 \log (66,666.66)$$

$$\text{CMRR} = 94.47 \text{ dB. Ans.}$$

QNO3

a) Explain the concept behind the negative feedback of the operational Amplifier.

Ans: Negative feedback:-

It is the process where by a portion of the output voltage of an amplifier is returned to the input with a phase angle that opposes (or subtract from) the input signal.

Concept behind the negative feedback:-

Negative feedback is the process of feedback. A fraction of the output signal back to the input but to make the feedback negative we must feed it back to negative or inverting output terminal of the op-amp using an external feedback resistor called R_f . This feedback connection between the output and the inverting input terminal forces the differential input voltage toward zero.

QNO3

b) state the following statement as True or false and also give the reason for your answer. The output of summing amplifier is positive.

Ans: The statement is false because when the summing point is connected to the inverted input of the op-amp the

The circuit will produce the negative sum of any number of input voltages. Likewise when the summing input is connected to the non-inverting input of the op-amplifier it will produce the positive sum of the input voltages.