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Module	4th
Subject	Electronic Circuit Desing
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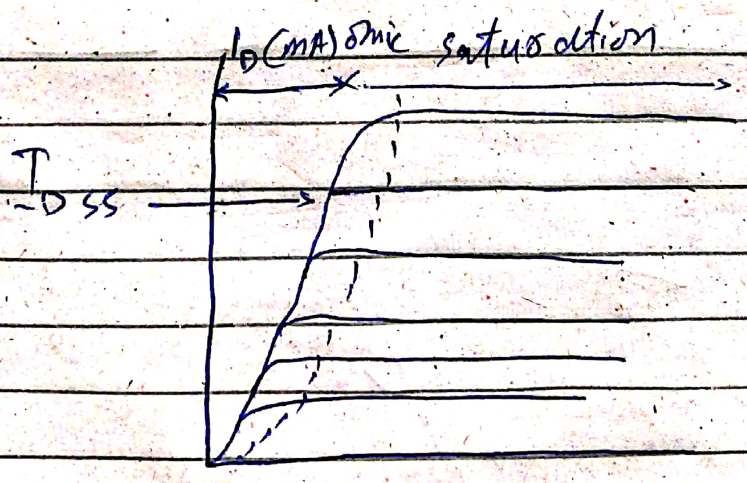
Q No : 1 (Part (A))

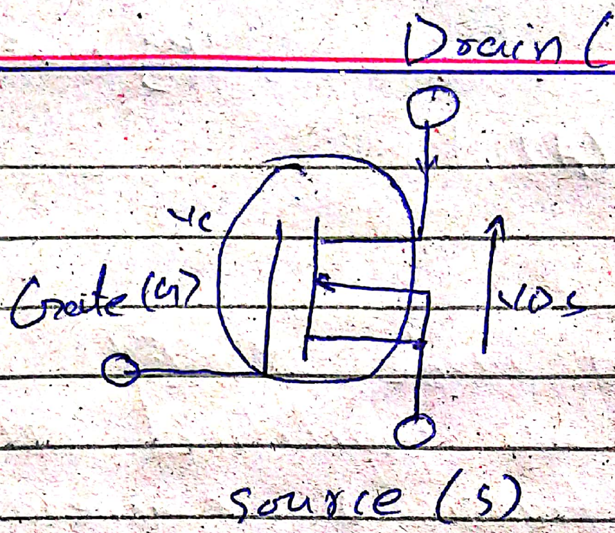
Ans :

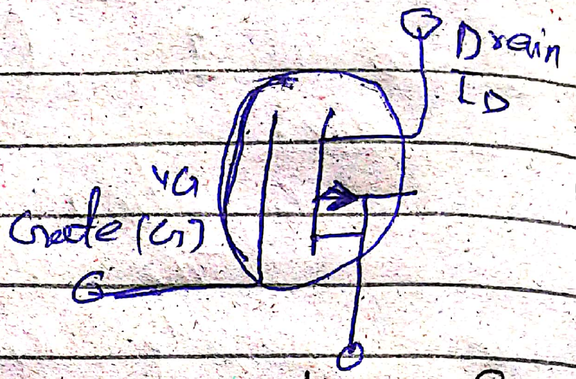
Depletion Mode :-

The depletion mode MOSFET are generally known as 'switched ON' device because these transistor are generally closed when there is no bias voltage at the gate terminal. If the gate voltage increases in positive then the channel width increase in depletion mode.

As a result the drain current I_D through the channel increases. If the applied gate voltage more negative then the channel width is very less and MOSFET may enter into the cutoff region. The depletion mode MOSFET is rarely used type of transistor in the electronic circuits.







N- channel

p- channel.

This characteristic of ~~the~~ mainly gives The relationship between drain source voltage (V_{DS}) and drain current (I_D). The small voltage at The gate controls the current flow through the channel.

The channel width and drain current increases if The gate voltage is positive and those two (channel width and drain current) decreases if The gate voltage is negative.

P.T.O

Q No 1

part (B)

Transistor Hybrid model CE configuration

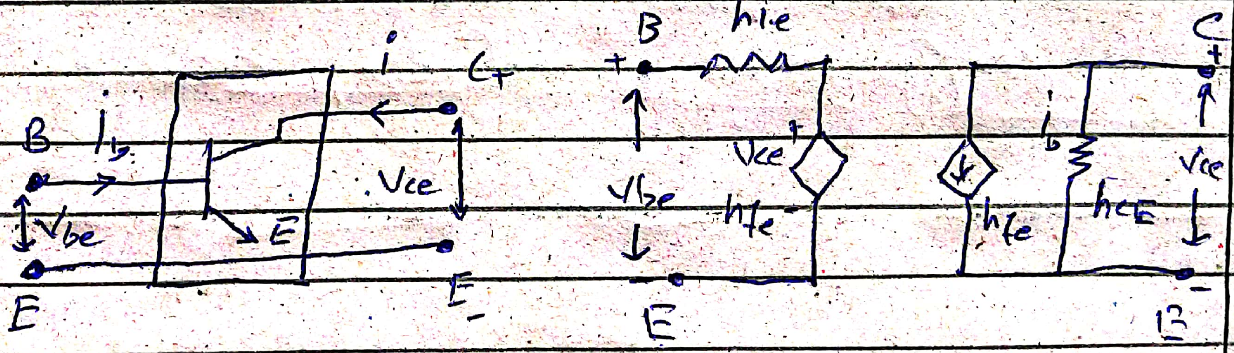
Ans.

The input signal is applied between the base and emitter terminals of the transistor and output appears between the collector and emitter terminals. The input voltage (v_{be}) and the output current (i_c) are given by the following equation.

$$v_{be} = h_{ie} \cdot i_b + h_{re} \cdot v_c$$

$$i_c = h_{fe} \cdot i_b + h_{oe} \cdot v_c$$

Hybrid Model



(equation)

where

$$h_{ie} = (\partial f_1 / \partial i_B)_{V_C}$$

$$= (\partial V_B / \partial i_B)_{V_C} = (\Delta V_B / \Delta I_B)_{V_C} = (v_b / i_b)_{V_C}$$

$$h_{re} = (\partial f_1 / \partial V_C) I_B = (\partial V_B / \partial V_C) I_B$$

$$= (\Delta V_B / \Delta V_C) I_B = (V_b / V_c) I_B$$

$$h_{fe} = (\partial f_2 / \partial i_B)_{V_C} = (\partial i_C / \partial i_B)_{V_C}$$

$$= (\Delta i_C / \Delta I_B) V_C = (i_c / i_b)_{V_C}$$

$$h_{oe} - (\partial f_2 / \partial V_C) I_B = (\partial i_C / \partial V_C) I_B$$

$$= (\Delta i_C / \Delta V_C) I_B = (i_c / v_c) I_B$$

The same Theory iextendded to other configuration including CB and CC.

P.T.O

Q No - 3(2)

A certain operational amplifier ---

Ans:

solution.

Given data =

$A_{cm} = 0.6$

$A_{ol} = 400,000$

Required Data

CMRR = ?

So we know that

$A_{cm} = 0.6$

formula is

$CMRR = A_{ol} / A_{cm}$

6666666.667

Put value in formula.

$$CMRR = \frac{400,000}{0.6} = ~~666666.166667~~$$

~~666,666.666667~~

20.

CMRR in decible formula.

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

$= 20 \log (666,666.667)$

$=$ ~~116.47 db~~

$= 136.4781748$

QNo 3

part (A)

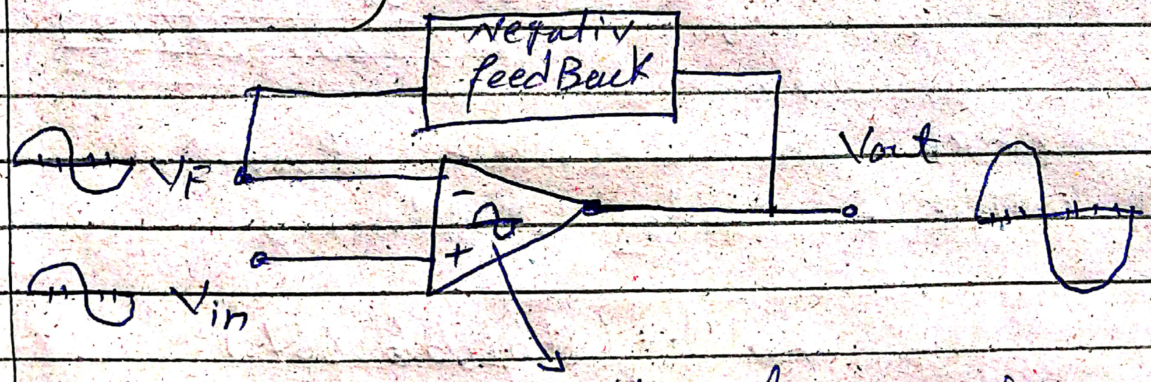
Explain the concept bhind Negativ ———

Ans:

"Negative feedback is the process whereby a portion of the output voltage of an amplifier is returned to the input with a phase angle That opposes (or subtracts from) The input signal"

Inverting (−) input effectively makes the feedback signal 180 out of phase with the input signal.

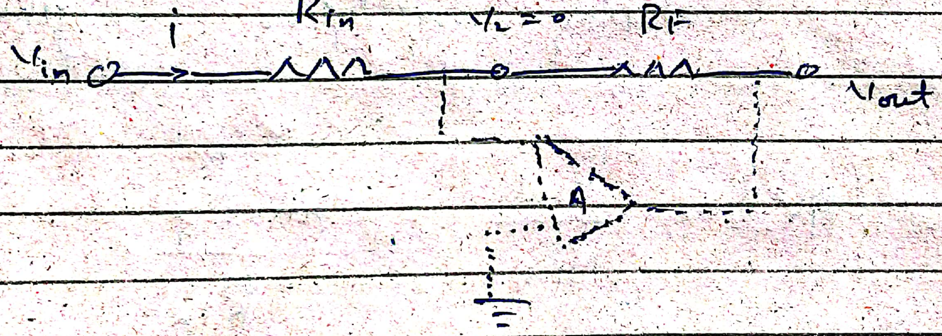
(Diagram)



internal inversion makes V_F 180 out of phase with V_{in}.

This effect produces a closed loop circuit to The amplifier resulting in The gain of The amplifier now being called its closed-loop Gain : Then a closeed loop inverting amplifier use nagative feed back to accuratly control The overall gain of amplifier. but at a cost in The reduction of The amplifier gain.

current (I) flows Through The resister network as shown.



$$i = \frac{V_{in} - V_{out}}{R_{in} + R_f}$$ Therefor

$$i = \frac{V_{in} - V_2}{R_{in}} = \frac{V_2 - V_{out}}{R_f}$$

$$i = \frac{V_{in}}{R_{in}} - \frac{V_2}{R_{in}} = \frac{V_2}{R_f} - \frac{V_{out}}{R_f}$$

So

$$\frac{V_{in}}{R_{in}} = V_2\left[\frac{1}{R_{in}} + \frac{1}{R_f}\right] - \frac{V_{out}}{R_f}$$

and as, $i = \frac{V_{in} - 0}{R_{in}} = \frac{0 - V_{out}}{R_f}$

$$\frac{R_f}{R_{in}} = \frac{0 - V_{out}}{V_{in} - 0}$$

The closed Loop Gain (Av) is given as

$$\frac{V_{out}}{V_{in}} = -\frac{R_f}{R_{in}}$$

The closde Loop voltey Gain of an Inverting Amplifier is give as.

$$Gain\,(Av) = \frac{V_{out}}{V_{in}} = -\frac{R_f}{R_{in}}$$

and This can be transposed to give Vout as:

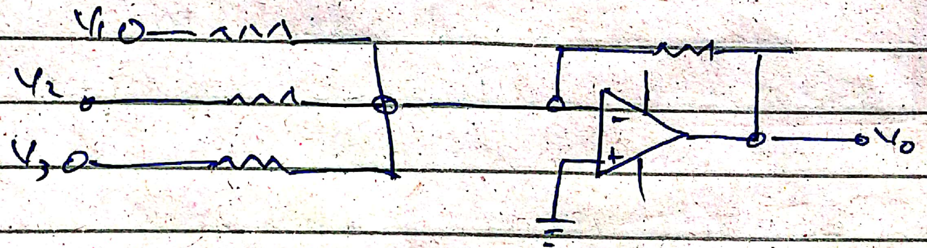
$$V_{out} = -\frac{R_f}{R_{in}} \times V_{in}$$

Q No 3
" part (b)

Ans:

" summing amplifier is a type of operational amplifier circuit which can be Used to used to sum signal. The sum of The input signal is amplifier by certain factor and made available at the at output."

→ Any number of input signal can be summed using an op-amp. The circuit shown below is a Three input summing amplifier in The inverting mode



" Summing amplifier is an application of inverting op-amp configuration That has two or more inputs and its output voltage is proportional to the negative of The algebraic sum of its input voltage.

Note:

" No This is False The output of summing ~~am~~ amplifier is positiv becuse ~~This~~ The output of summing is negative.