Date _____

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Assignment ≠ 1

Subject ≠ Electronic Circuit Device.

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Date Page (i) ASAD SHOAIB KHALIL ID# 13095 (i)

Electronic circuit Device

Question # 1

Answer :-

* JFET characteristic Curve :-

You can see that for a given value of Gate voltage, the current is very nearly constant over a wide range of source-to-Drain voltages. The control element for the JFET comes from depletion of charge carries from the n-channel. When the gate is made more negative, it depletes the majority carriers from a larger depletion zone around the gate. This reduces the current flow for a given value of Source-to-Drain voltage modulates the current flow through the device.

The Transfer characteristic for the JFET is used for visualizing the gain from the device & identifying the region of linearity. The gain is proportional to the slope of transfer curve. The current value IDSS represents the value of when the Gate is shorted to ground, the maximum current for the device. The value will be part of data supplied by the manufacturer. The Gate voltage at which current reaches zero is called the "pinch voltage" Vp

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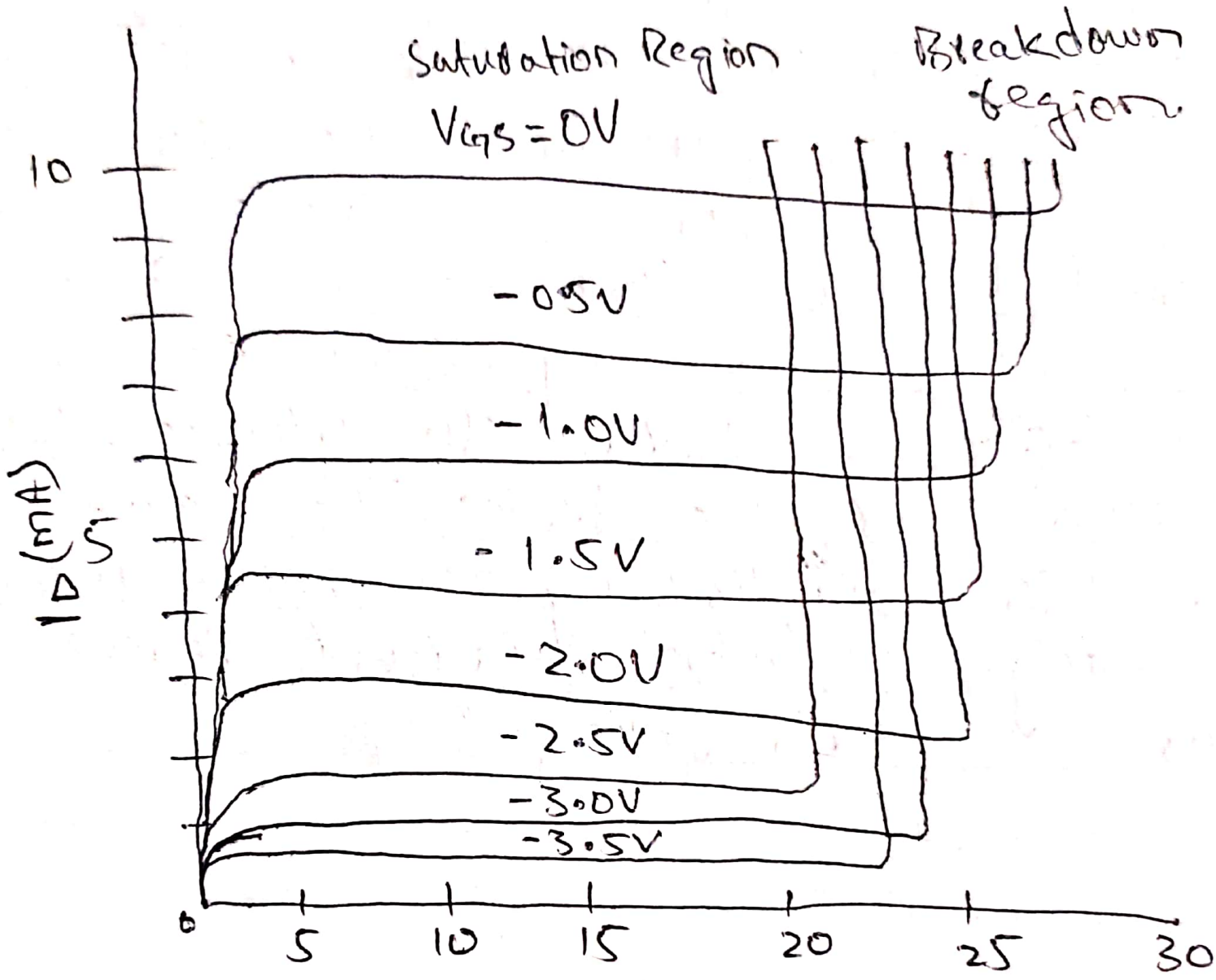

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Question # 2.

Answer:-

* Pratical OP Amp characteristics:-

The Pratical OP Amp characteristics can be approximated closely enough, for many pratical op-Amp But Basically the OP Amp characteristics are little bit different then the ideal op-amp characteristics.

The various characteristics of Pratical OP-Amp are below.

(i). Open loop gain:- It is the voltage gain of the op-amp when no feedback is pratically it is several Thousands

(ii). Input Impedance:- It is finite & typically greater than 1MΩ. But using FETs for the input stage it can be increased upto several hundred MΩ.

(iii) Output Impedance:- It is typically few hundred ohms. with the help of negative feedback, it can be reduced to a very small value like 1 or 2 ohms.

(iv) Bandwith:- The bandwidth of Pratical op-amp in open loop configuration is very small. By application of negative feedback, it can be increased to a desired value.

(v) Input offset voltage:- When ever both the I/p terminals of the op-amp are grounded, ideally the output voltage should be zero. However, in this condition the pratical op-amp shows a small non zero output voltage. To make this output voltage zero, a small voltage in millivolts

SM Notes

is required to be applied to one of the input such as voltage make the output exactly zero. The d.c voltage, which make the output voltage zero. When the other terminal is grounded is called input offset voltage. denoted as V_{ios}.

(vi) Input current bias:- For ideal op-amp, no current flows into the input the pratical op-amps have some input currents current are very small of the order of $10^{-6}A$ to $10^{-16}A$.

Mathematically it is expressed as.

$$I_b = \frac{|I_{b1}| + |I_{b2}|}{2}$$

(g) Input offset Current:- The difference in magnitudes of I_{b1} & I_{b2} is called I/P offset currents and is denoted as IQ Thus,

$$I_{ios} = |I_{b1} - I_{b2}$$

The magnitude of this current is very small. of the order of 20 to 60 nA. It is measured under the condition of that input voltage to op-amp is zero.

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13095

Question #3.

Answer:-

Solution:-

* To find:
  output voltage for summing amplifier.

* solution:-

According to ohms law. $V = IR$

$V_1 = IR_1$.

Therefore

$I_1 = V_1/R_1$

$I_2 = V_2/R_2$

$I_3 = V_3/R_3$

Put these values in eq. 3.

$$V_{out} = -\left[\frac{V_1}{R_1} + \frac{V_2}{R_2} + \frac{V_3}{R_3}\right] R_F \longrightarrow eq\,(4)$$

$$V_{out} = -\left[\frac{V_1}{R} + \frac{V_2}{R} + \frac{V_3}{R}\right] R.$$

$$V_{out} = -\left[V_1 + V_2 + V_3\right] \longrightarrow eq\,(5)$$

$$V_{out} = -\left[V_1 + V_2 + V_3 \cdots V_n\right]$$

So putting the value in eq,

$$V_{out} = -\left[V_1/R + V_2/R + V_3/R\right] R$$

$$V_{out} = \left[0.2/6 + 0.5/6 + 2/6\right] 6$$

$$\boxed{V_{out} = 2.116}$$

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Question #4.

Part (a).

Answers-

(i) Class C amplifiers are never used for audio circuits
(ii) They are commonly used in RF circuit.
(iii) Class C amplifier operate the O/P transistors in a state that results in tremendous distortion
(iv) How ever the RF circuit where class C amplifier are used employ filtering so that the final signal is completely acceptable
(v) Class C amplifiers are quite efficient.

Reasons- Class-C.

output devices conduct for less than 180 degrees (100 to 150 degree)- Radio frequencies only - cannot be used for audio. This is the sound heard when one of the output devices goes open circuit in an audio amp!

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Question # 4.
Part (b).
Answers:-

(i) Amplifiers:- It is an electronic device that increases or boosts voltage, current or power of a signal.

Applications of Amplifier:- hearing aids, music system, Audio Amplifier, operational Amplifier.

(ii) Rectifiers:- The purpose of the rectifier section is to convert the incoming AC signal signal from a transformer or other AC power source to some form of pulsating DC.

Applications of Rectifiers:- The primary application of rectifier is to derive DC power from an AC supply. Rectifier are used inside the power supplies of virtually all electronic equipment. AC/DC power supplies may be broadly divided into linear power supplies & switched-mode power supplies.