Department of Electrical Engineering
Sessional Assignment
Date: 04/05/2020

Course Details

Course Title: Electronic Circuit Design **Module:** 04
Instructor: Engineer Mujtaba Ehsan **Total Marks:** 20

Student Details

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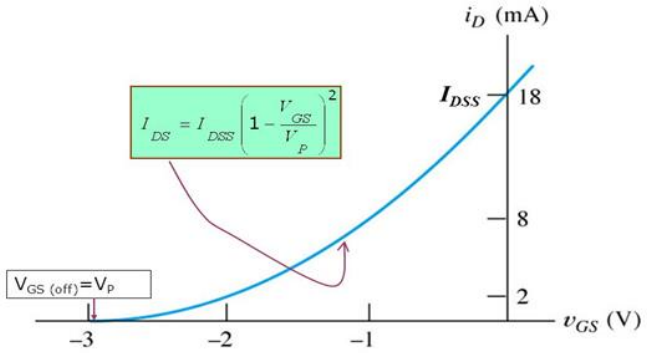
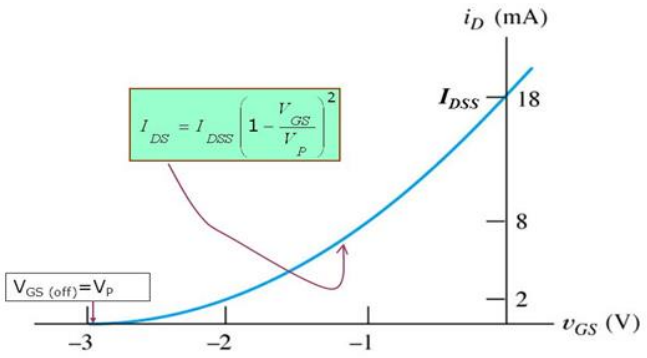
Q1.		**Explain** the trans conductance curve for n-channel JFET given below 	Marks 04 CLO 1
Q2.		**State** the characteristics of a practical operational amplifier.	Marks 04 CLO 1
Q3.		**Calculate** output voltage for summing amplifier if V_1 = 0.2V, V_2 = 0.5V and V_3 = 2V and $R_1=R_2=R_3=R_f$ = 6kΩ	Marks 05 CLO 2
Q4.	(a)	You are working on an audio circuit in the lab. Which class of power amplifier will you not consider for your work? **Justify** your answer with reason.	Marks 04 CLO 2
	(b)	**Outline** the differences between an amplifier and a rectifier.	Marks 03 CLO 2

Q1 ANSWER:



The relationship between the current ID and Vgs is called transfer curve. This relation is non linear as it is evident from the graph. And mathematically the relationship can be explained by the equation shown in graph. In the equation Idss is the maximum value of the drain current where as Vp is the pinch-off voltage of this JFET. Whenever Vgs=0 the value of drain current is maximum i.e. Id=Idss. Similarly in the expression whenever we put Vgs=Vp at that time Id will be 0. By putting these values we will get two extreme points of this curve. By the given expression we can find the value of Id at different values of Vgs and Vd. If we put Vgs=-2v Vp=-3v and Idss =18amp we will get Id=2ma.

Similarly through this expression we can find the values of vgs as well.

Q2 ANSWER:

Characteristics of practical operational amplifier:

- The open loop voltage gain is maximum and finite, a typical value for the practical op-amp is considered to be 200,000.
- The input impedance is maximum and is finite i.e. in the order of 100k or more.
- The output impedance is minimum, not zero, in the order of 100 or less.
- The CMPR is maximum and finite.
- Bandwidth is maximum and finite i.e. it can amplify dc to 1MHz signal.
- A slight drift of characteristics due to the charge in temperature, not null.
- Two terminals may be virtually ground, not Vd=0 exactly, for all conditions.
- Maximum slow rate and has the finite value.
- The output is negligible due to dc-bias when the input is zero

Q3 ANSWER:

DATA:

V1=0.2V

V2=0.5V

V3=2V

R1=R2=R3=Rf=6k ohms

Vout=?

Solution:

Vout=-(RF/R) *(V1+V2+V3)

=-(6K/6K) *(0.2+0.5+2)

=-2.7V.

Q4(a) ANSWER:

I would never consider a class C power amplifier for an audio circuit because class C amplifiers operate the output transistor in a state that results in tremendous distortion (it would be totally unsuitable for audio reproduction).

The class C amplifier is heavily biased so that the output current is zero for more than one half of an input sinusoidal signal cycle with the transistor idling at =its cut-off point. In other words, the conduction angle for the transistor is significantly less than 180 degrees, and is generally around the 90 degrees area.

While this form of transistor biasing gives much improved efficiency of around 80% to the amplifier, it introduces a very heavy distortion of the output signal. Therefore, class C amplifiers are not suitable for use as audio amplifiers.

Q4(b) ANSWER:

AMPLIFIER: An amplifier is used to increase the amplitude of a signal waveform without changing other parameters of the waveform such as frequency or wave shape. They are one of the most commonly used circuits in electronics and perform a variety of functions in a great many electronics systems.

RECTIFIRE: A rectifier is an electronic device that converts alternating current, which periodically reverses direction, to direct current, which flows in only one direction. The process is known as rectification, since it straightens the direction of current.

An amplifier is used to increase the strength of an electric signal whereas a rectifier allows current to pass in only one direction and is used to produce DC from AC.