Department of Electrical Engineering
Assignment
Date: 24/06/2020

Course Details

Course Title: Electronic Circuit Design **Module:** 04
Instructor: **Total Marks:** 50

Student Details

Name: Mnasoor Khan Jadoon **Student ID:** 16637

Q1.	(a)	**Discuss** the darlington connection for multistage amplifiers.	Marks 05+10
	(b)	The input of a certain regulator increases by 4.5 V. As a result, the output voltage increases by 0.062 V. The nominal output is 40 V. **Evaluate** the line regulation in both % and in %/V	CLO 2
Q2.		**Explain** Colpitts and Hartley oscillators.	Marks 10
			CLO 2
Q3.	(a)	**Describe** the idea behind class B amplifiers.	Marks 06+06
	(b)	**Explain the** types of voltage regulators and their purposes.	CLO 2
Q4.		**Explain** the working of Flash ADC.	Marks 05
			CLO 2
Q5.		**Differentiate** between the following:	Marks 04+04
	(a)	Low pass & high pass filters	
	(b)	Active and passive filters	CLO 2

Q1 a) Ans:

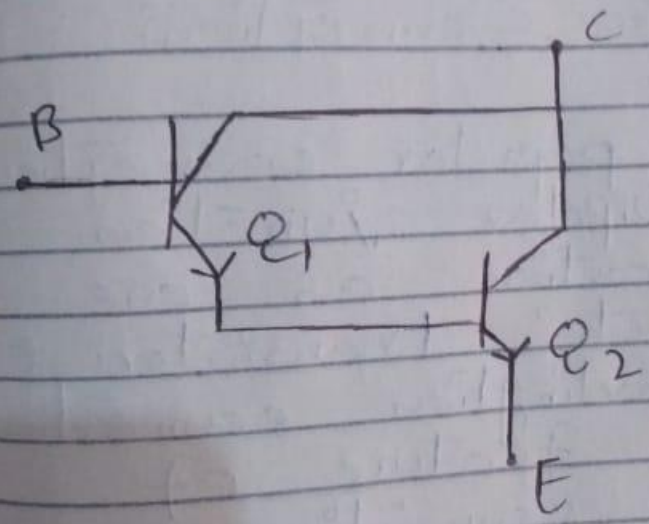
Darlington Connection:

A very popular connection of 2 bipolar junction for operation as one 'superbeta' transistor is the darlington connection. The main feature of darlington connection is that the composite transistor act as a sigle unit with a current gain that product of current gain of indivial transistor if the connection is made using 2 separate transistor having current gain of β_1 and β_2 the darlington connection provide

(2)

a current gain

$$\beta_0 = \beta_1 \beta_2$$



(2)

Q# 1 (b)

Given:

input certain regulator = 3 to 4.5V.

Output voltage = 0.062V

The nominal output = 40

Sol: Line Reg in '%':

$$\text{Line Reg} = \frac{0.062}{4.5} \times 100$$

$$= 0.0137 \times 100$$

$$\boxed{\text{Line Reg} = 1.3\%}$$

Now Line Reg in % V:

(4)

$$\text{Line Reg} = \frac{0.062/40}{4.5} \times 100$$

$$= \frac{0.0015 \times 100}{4.5}$$

$$= \frac{0.15}{4.5}$$

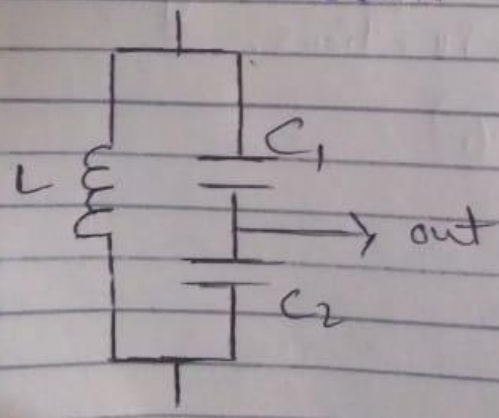
$$\boxed{\text{Line Reg} = 0.033\ \%V}$$

(4)

Q2 Ans

Colpitts Oscillators:

The colpitts oscillator design use 2 center tapped capacitor in series with a pawalled inductor to form its resonance tank circuit producing sinusoidal oscillations. The colpitts oscillator uses a capacitive voltage divider network as its feedback source. The 2 capacitors C_1 and C_2 are placed across the single common inductor L as shown.



Tuned tank circuit with the condition for oscillations being:

$$X_{C_1} + X_{C_2} = X_L$$

Hartley Oscillator:

The hartley oscillator is an electronic oscillator circuit in which the oscillation frequency is determined by tuned circuit consisting of capacitors and inductors that is an LC oscillator Hartley oscillator design uses 2 inductive coils in series with a parallel capacitor to form its resonance tank circuit producing sinusoidal oscillations.

Q#3 @ Ans

Idea Behind Class B Amplifier:

Class B amplifier is a type of power amplifier where the active device conducts only for one half cycle of input signal. That means the conduction angle is 180° for a class B amplifier. Class B amplifier is to use a pair of active devices that is transistor arranged in push pull mode where one transistor conducts one half cycle and the other transistor conduct the other half cycle. The ouput of both transistor are combined together to get a scaled replica of the input.

Series Voltage Regulator:

Series voltage regulator uses a variable element placed in series with load. By changing the resistance of series element the voltage dropped across it can be changed and the voltage across the load remains constant. The amount of current drawn is effectively used by load.

Q# 4 Ans

Working of Flash ADC:

It is formed of a series of comparators. each one comparing the input signal to a unique reference voltage. The comparator output connect to the input of a priority encoder circuit which then produces a binary output. As the analog input voltage exceeds the reference voltage at each comparator the comparator outputs will sequentially saturate to a high state. The priority encoder generates a binary number based on highest order active input ignoring all other active input.

(8½) (10)

Q#5 Ans

(a)

Low Pass Filter:

A low pass filter is a filter that passes signal with a lower frequency than selected cutoff frequency and attenuates signals with frequenies higher then the cutoff frequency. The exact frequency responce of the filter depends on the filter design.

High Pass Filter:

In other hand high pass filter is an electronic filter that passes signals with higher frequency than certain cutoff frequency and attenuates signals with frequency lower than the cutoff frequency. The amount of attenuation for each frequency depends on the filter design.

(b)

Q#5 (b) Ans

Active Filters:

Active filters is a type of analog circuit impelementing an electronic filter using active components typically an amplifier. Amplifier includes in a filter design can be used to improve the cost performance and predictability of a filter. These filters have complex poles and zeros without using a bulky or expensive inductor.

Passive Filters:

Passive filter made up of passive components such as resistors, capacitors and inductors and have no amplifying element so have no signal gain therefore their output level is always less than the input.