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

Course Details

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

Student Details

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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

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Q1 (a) Discuss The darlington Connection for multistage amplifiers.

Ans The main feature is That The composite transistor acts as a Sigle unit with a current gain That is The product of The current gains of The individual Transistors.

Provides high Current gain Than a Single BJT

The Comection is made using two Separate transistors having Current gains of β_1 and β_2

So The Current gain

$\beta_D = \beta_1 \beta_2$

If $\beta_1 = \beta_2 = \beta$

The Darlington Connection provides of Current gain of

$\beta_D = \beta^2$

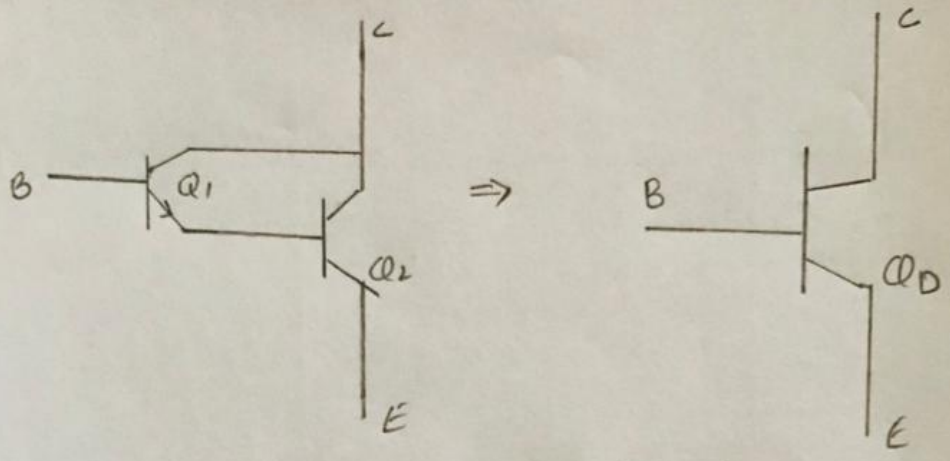


Fig:- Darlington transistor

(12)

(b) The Input of the a certain regulator Increases by 4.5V. As a result the output voltage Increases by 0.062V. The nominal output is 40V. Evaluate the line regulation in both % and in %/V

Solution

Given Data

$\Delta V_o = 0.062V$

$\Delta V_i = 4.5V$

Find

Line Regulation - %

Line Regulation = %/V

Solution:-

As we know That

$$\text{Line Regulation} = \frac{\Delta V_o}{\Delta V_i} \cdot 100\%$$

Putting The Value

$$= \frac{0.062V}{4.5V} \times 100\%$$

$$= 1.377\%$$

and

$$\text{Line Regulation} = \frac{\Delta V_o}{\Delta V_i \cdot V_o} \cdot \%\,/V$$

Putting The Value

$$= \frac{0.62V}{\frac{40}{45}} \times 100\%$$

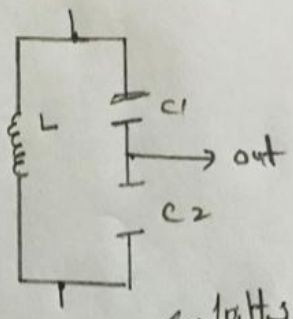
$$= 0.034\%/V \quad \text{Ans}$$

(12) Explain colpitts and Hartely oscillators:

Ans Colpitts Oscillator:

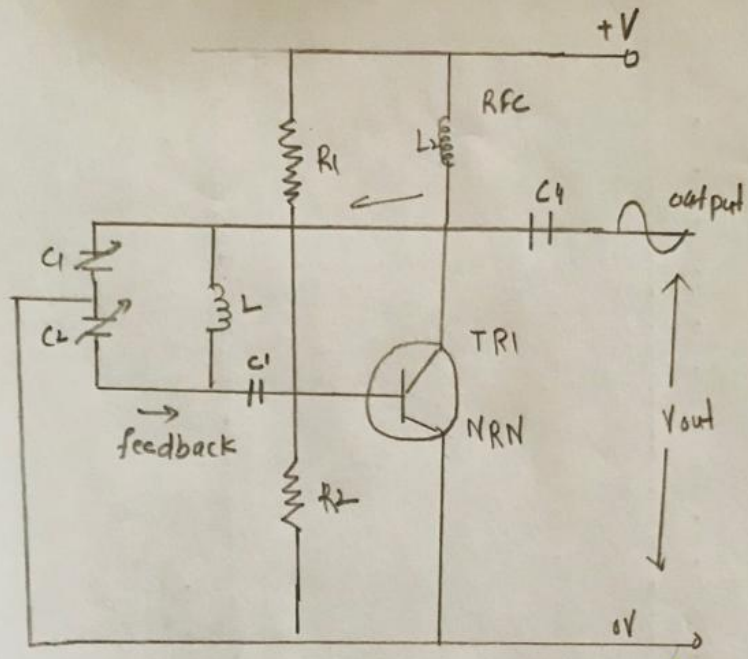
Oscillator is an amplified with the Positive feedback and it converts Dc Input Signal into Ac output waveform with certain variable frequency drive and certain shape of output waveform (like Sin wave or Square wave, etc) by using the positive feedback instead of Input Signal. oscillators which utilizes the L and capacitor C in their circuit are Lc oscillator which is a types of linear oscillator.

The colpitts oscillator design uses two centre tapped capacitors in series with a parallel inductor to form its resonance tank circuit producing sinusoidal oscillations.



Colpitts oscillator

Circuit :-

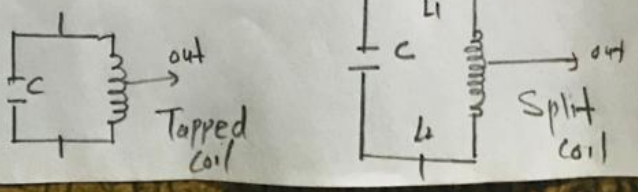


The frequency of oscillation for colpitts oscillator is determined by the resonant frequency of LC tank circuit and given as

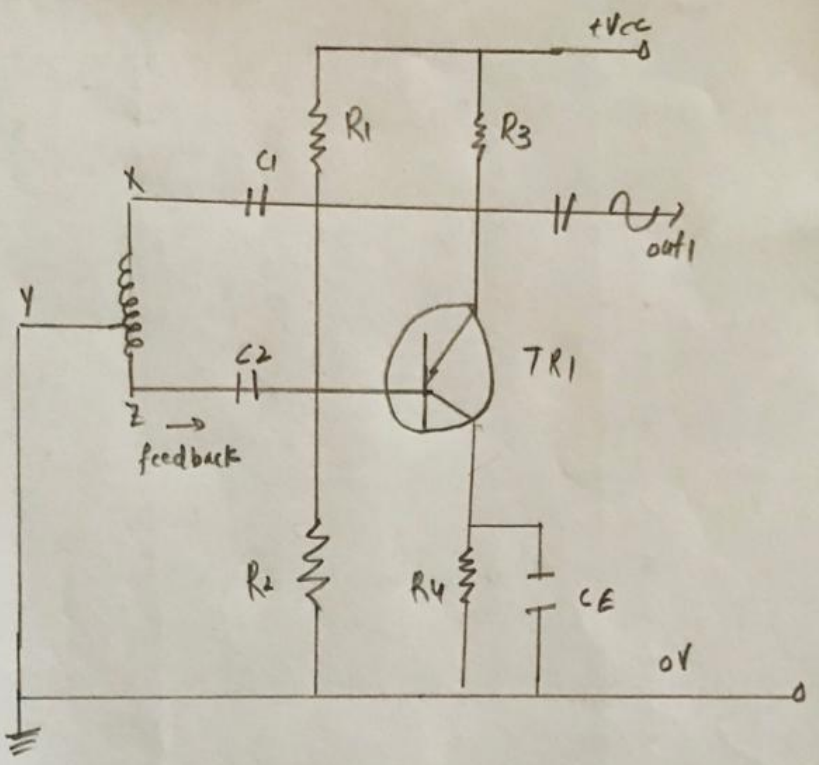
$$f_r = \frac{1}{2\pi\sqrt{LCT}}$$

Hartley oscillators :-

The Hartley oscillators design uses two Inductive coil in Series with a parallel capacitor to form its resonance tank circuit producing sinusoidal oscillations.



Circuit:



The frequency of oscillation of the hartley oscillator being give as

$$f = \frac{1}{2\pi\sqrt{L_T C}}$$

(3) (a) Describe the idea behind class B amplifiers:

Ans:

Class B amplifier is types of Power amplifier where the active device (transistor) conducts only for one half cycle of input signal. That the conduction angle 180 for a B amplifier.

* A class B output stage can be far more efficient than a class A stage (78.5%) max efficiency compared with 25%
* It also requires twice as many output transistors
* It isn't very linear: cross-over distortion can be significant
* Class B amplifiers are used low cost designs or designs where sound quality is not that important
* Class B is used most often where economy of design is need.

* No DC Components in output (ideal case)
* It is difficult to find ideal Transformer.

5) Explain the types of Voltage regulators and their purposes.

Ans° Voltage regulators take an Input Voltage and creates a regulated output at either a fixed or adjustable level. This automatic regulated of the output voltage level is handled differently by various types of Voltage regulators.

Types

Linear Voltage regulators:

The are very compact and often used in low voltage, low-power System.

Switching Voltage Regulators:

The are much more efficient Than linear Voltage regulators but they are harder to work and more Expensive.

Zener Diodes

The are inexpensive and simple to use. but they less efficient than linear regulators.

(9) Explain the working of flash ADC?

Ans. A flash (also know as a direct-conversion ADC) is a type of analog-to-digital converter that uses a linear voltage a comparator at each "rung" of the ladder to compare the Input voltage the successive reference voltage. often these reference adders are constructed of many resistors however modern implementation show that capacitive voltage ~~division~~ division is also possible. The output of these comparators is generally fed into a digital encoder, which converts the Inputs into a binary value (the collected output from the comparators can be thought of as a unary value).

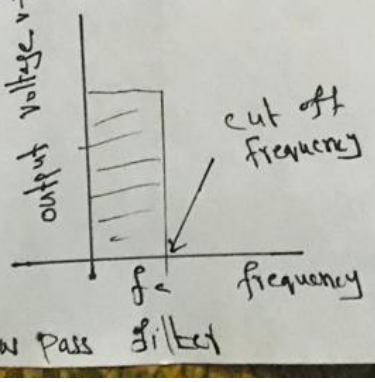
(05) b) Differentiate between the following:

a) Low pass and high pass filters.

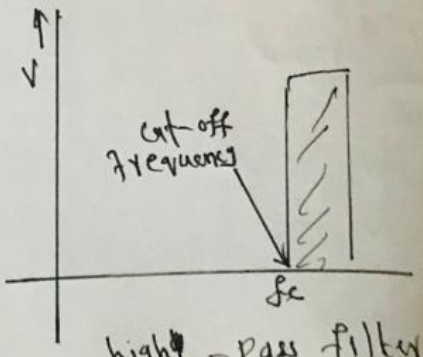
① The low pass and high pass filter is that. The high pass filter circuit passes signals of the frequency higher than the cut off frequency while the low pass filter passes signals of the frequency lower than the cut off frequency.

② The high pass and low pass filter also vary in circuit designing high pass filter consists of capacitor followed by resistance in parallel while low pass filter circuit consists of resistor followed by the capacitor

③ The low pass filter is used as anti-aliasing while the high pass filter is used in audio amplifier for coupling or removing distortions due to low frequency signal such as noise



Low pass filter



high - pass filter

(5) Active and Passive filters:

Ans: (1) Due to the presence of active components active filter are expensive However, the low cost of passive filter is the result of the presence of passive components in it.

(2) The circuit orientation of active filter is quite complex. while comparatively passive filter have a less complex circuit

(3) Active filter possess a high value of quality factor as compared to passive filters.

(4) Active filter need as external supply of power for circuit operation. But passive filters do not require external energy source because it drives the energy for it operation from the applied input signal

(5) The weight of active filters is low while it is comparatively high for passive filters.

(6) Active components show greater sensitivity towards temperature change However - passive components are comparatively less sensitive towards the same.

⑦ As Inductor is the basic component used in passive filter and it generates problem at low frequencies. Thus passive filter are suitable for RF rang operation. while active filters provide a batter response at low frequency