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Department of Electrical Engineering
Assignment
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Course Details

Course Title: Electronic Circuit Design **Module:** 04
Instructor: Sir Mujataba ihsan **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

Q No 1

a) Discuss the darlington connection for multistages amplifiers.

Ans: Multistage Amplifiers:-

Two or more amplifiers can be connected to increse the gain of an AC signal The overall gain can be calculated by simply multiplying each gain together

$$A_v = A_{v_1} A_{v_2} A_{v_3} \text{ ----}$$

DARLINGTON CONNECTION:-

The main feature is that the composit transistor act as a single unit with a circuit gain that is the product of the current gains of the individual transistors

→ It provide high current gain Than a single BJT

→ The connection is made by using two separate transistor having current gain of β_1 and β_2

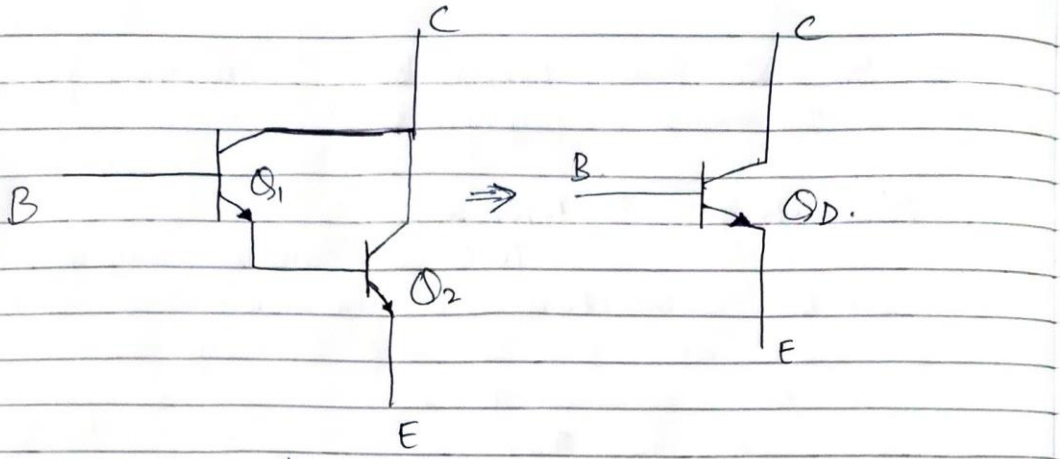
So the current gain

$$\beta_D = \beta_1 \beta_2$$

If $\beta_1 = \beta_2 = \beta$

The Darlington connection provides a current gain of

$$\beta_D = \beta^2$$



Darlington transistor

Part (b) The input of the certain ~~voltage~~ regulator increse by 4.5 V as a result the output voltage incresed by 0.062V the nominal output is 40V evaluate line regulation in both % and in %/V

Sol:-

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

$$= 1.377\%$$

and

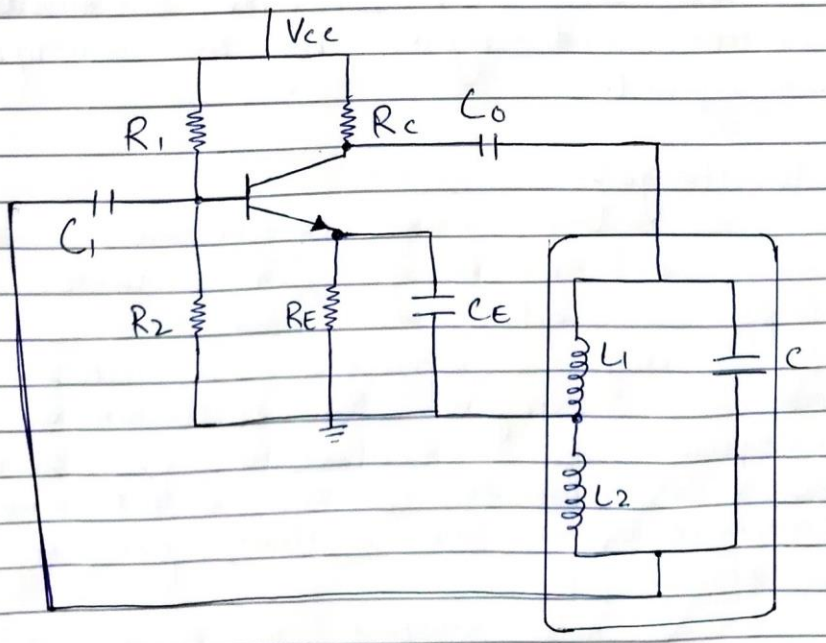
$$\text{Line Reg} = \frac{\frac{0.062}{40}}{4.5} \times 100$$

$$= 0.034\%/V.$$

Q.No2:- Explain Colpitts and Hartley Oscillator.

Ans:- Hartly Oscillators:-

It is an electronic oscillator circuit in which the oscillation frequency is determine by a tuned circuit consisting of capacitors and inductors that is an LC oscillator the distingishing feature of the Hartly Oscillator is that the tuned circuit consists of a single capacitor in parallel with two inductor in series (or a single tapped inductor) and the feedback signal needed for oscillation is taken from the center connection of the two inductors.



The circuit diagram of a Hartely Oscillator consist of single stage inverting amplifier and LC phase shift network the phase shift network consist of two series inductors L_1 and L_2 connected in parallel to a capacitor C the output of the amplifier is applied across inductor L_1 and the voltage across the inductor L_2 from the feedback voltage the coil L_1 is instinctively coupled to coil L_2 the combination functions as an auto-transformer.

Resistor R_1 and R_2 gives a potiental a potiental divider bias for the transistor Q and parallel combination of Re and Ce provide terminal stability and bypas the amplified AC signal.

Advantages:-

→ Very few components are needed including fix inductors or tapped coil.

→ By using a variable capacitor or by varying the inductance frequency of oscillation can be varried.

→ The amplitude of the output remain constand over the working frequency Range.

Disadvantage:-

The output is Rich in harmonics and therefore not suitable where a pure sin wave is required.

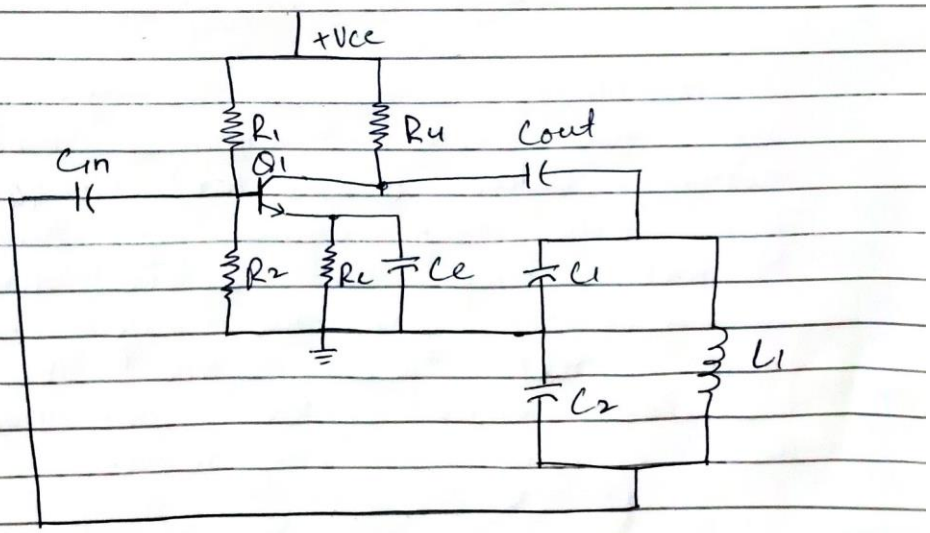
Applications:-

→ Used a local oscilation in radio receiver.

→ It is suitable for Oscilations in RF range upto 30 MHz

COLPITTS OSCILLATOR:-

The electronic circuit that produces periodically oscillating electronic signal such as sine wave square wave or any other wave is termed as electronic Oscilator. Oscillator can be classified into different types generally based on their output frequency Electronic oscilator can be termed as voltage controled Oscillators as their freqency of oscilation can be controlled by their input voltage.



Applications of colpitts Oscillator:

It is ~~used~~ used for generation of sinusoidal output signal with very heigh frequny.

→ It frequently used for the application in which very wide range of frequnies are involved.

→ Used for applications in which undamped and countineaus oscillation are desired for a function.

→ It used for ~~mobile~~ the development and radio communication.

Q No 3

a) Describe the idea behind the the class B amplifiers.

Class B amplifier is the typer of the power amplifier where the active device (transistor) conduct only for one half cycle of the input signal since the active device is switched off for the half for the input signal the active device dissipates less power and hence the effieny is improved.

Advantages and disadvantages of class B.

Advantages:
Very low standing bias current. Negligible power consumption with out signal.
-> Can be used for much more powerful outputs then class A
-> More efficient then class A.

Disadvantages:
It creates crossover distortion.
-> Supply current changes with signal stabilised supply may be needed
-> More distortion then class A.

Q No 3 b) Explain the type of voltage regulator and their purpose.

Ans Voltage regulator:-
It is used to regulate a voltage levels. When a steady reliable voltage is needed then the voltage regulator is the prefered device it generates a fixed output voltage that remain constant for any changes in an input voltage or load condation it acts as a buffer for predecting components for damage

The main two types.
Linear voltage regulator.
Switched voltage regulator

The purpose of the voltage regulator is to keep the voltage in a circuit relatively closed to desired value voltage regulator is one of the most common electronic component since a power supply frequently produces Raw current that would otherwise damage one of the componet in the circuit.

Q No 4:-
Explain the working of ~~Flas~~ Flash ADC.

Ans. Analog voltage is applied to non inverting terminals for all comprators using a single line Referenee voltage is applied to inverting terminals of comprator using ~~divert~~ divider circuit.
Each comprator produces digital output in the form of 0 or 1 if unknown analog voltage is gredter then reference voltage comprator produces high logic. If analog voltage is less then reference voltage then comprator produces low logic ie

Thus all the paralled comprator produes digital representation of analag voltage in the form of zeros and one The enceoder converts those zeros and ones into binary number and produce digital binary output.
e.g when unknown voltage is 5 that is lies between 4.375 & 5.625 is applied to the flash ADC first four enceeder produces output 1 and the last three enceeder produces output 0 encoder convert this 1111000 comprator output into 100 binary number as digital output.

Q No 5:- Differentiate between the following.

a) Low pass and high pass filter.

Ans:- Low pass

It is the circuit which allows the frequny below the cutt off frequny to pass through it.

-> It consist of resistor followed by capacitor

->It is sigificant in removing aliasing effeect.

high pass.

It is a circuit which allows the frequnies above cut off frequny to pass through it.

It consist of capacitor followed by resistor.

It is significant when the distortion due to low frequny signal such as noise is to be removed.

→ operating frequency is lower than the cutoff frequency.

→ It used in communication circuit as anti aliasing filter.

operating frequency is higher than cut off frequency.

It used in audio amplifiers low noise amplifiers etc.

Q No 5

b) Active and passive filter.

Ans: Active:-

Active filter are those filter circuit that are designed using transistor and op-amp as their basic components along those elemt circuit of active filters also contain resistor and capacitor but not indutor. The active filter circuit use transistor and op-amp to pass only the selective band of frequny while attenuating rest of the frequnies

PASSIVE FILTER:-

Passive filter are the filter that are formed using only resistor indutor and capacitor as their major components As no amplifying elemnts is present in it thus passive filter offer low signal gain.