-: COURSE DETAILS:-

Course tittle :- E C D

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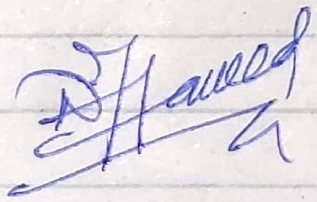
Student Signature :- 

Q No. one part (A)

(A) Discuss the darlington connection for multistage amplifiers.

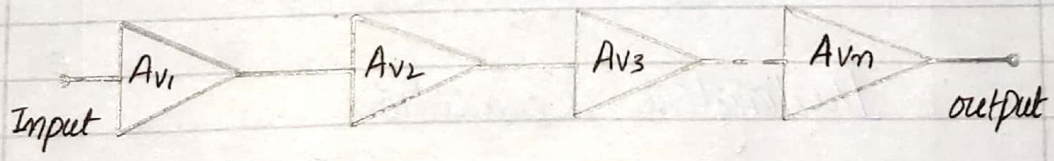
Ans:- (A)

Multisage Amplifiers-

Multisage amplifiers are amplifier circuit Cascaded to increased gain. we can express gain in decibels (dB).

Two or more amplifers can be connected to increase the gain of an ac signal. The overall gain can be calculated by simply multiplying each gain together

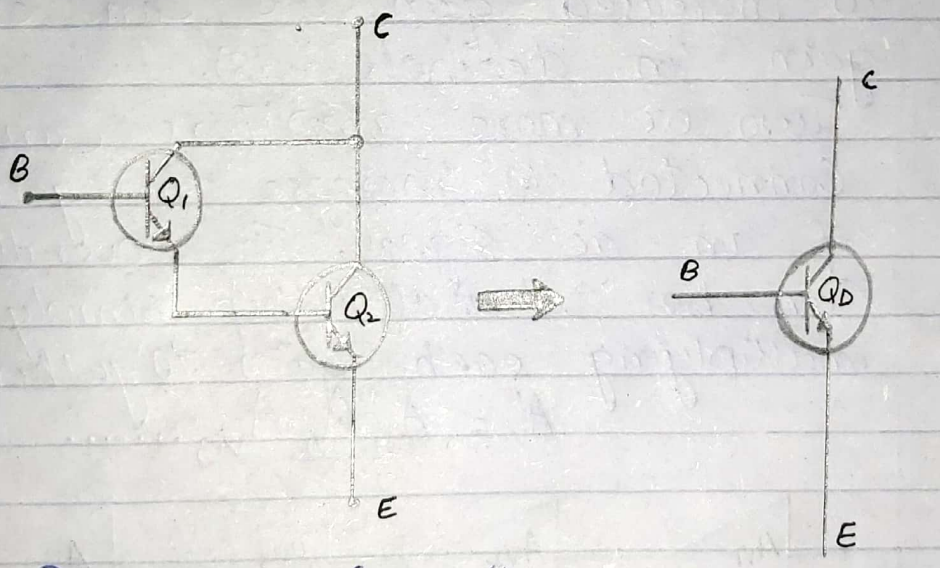
$$A_v' = A_{v1} A_{v2} A_{v3} \ldots\ldots$$



Darlington Connection- for multistage amplifiers.

A very popular Connection of two biopolar junction transistor for operation as one "superbeta" transistor is the Darlington Connection the main feature of the Darlington Comection is that the Composite

transistor acts as a single unit with a current gain that is the product of the current gains of the individual transistors. If the connection is made using two seperate transistors having current gain of β_1 and β_2 the Darlington connection provides a current gain of $\beta_D = \beta_1 \beta_2$



Darlington Connection.

Q No. One part (B)

(B) The input of a certain regulator increases by 4.5V. As a result, the output voltage increases by 0.062 V. The nominal output is 40 V. Evalute the line regular in both % and in %/V.

Given data:

Nominal output = 20 V

Input, Certain regulator = 4.5V

Output, voltage increase = 0.062V

To Find :-

line Regular in % = ?

line Regular in %/V = ?

Solution :-

For Line Regular in %

$$\text{Line Regular} = \frac{\text{Output voltage}}{\text{Input Certain regular (V)}} \times 100\%$$

$$\text{line Regular} = \frac{0.062}{4.5} \times 100$$

$$\text{line Regular} = 1.3\%$$

$$\text{line Regulation} = \frac{\frac{\text{Output voltage}}{\text{nominal output}}}{\text{Input voltage}} \times 100\%$$

$$\text{line Regulation} = \frac{\frac{0.062}{40}}{4.5} \times 100\%$$

$$\text{line Regulation} = 0.03\%/V$$

Q NO. 2:-

Explain colpitts and Hartley Oscillators-

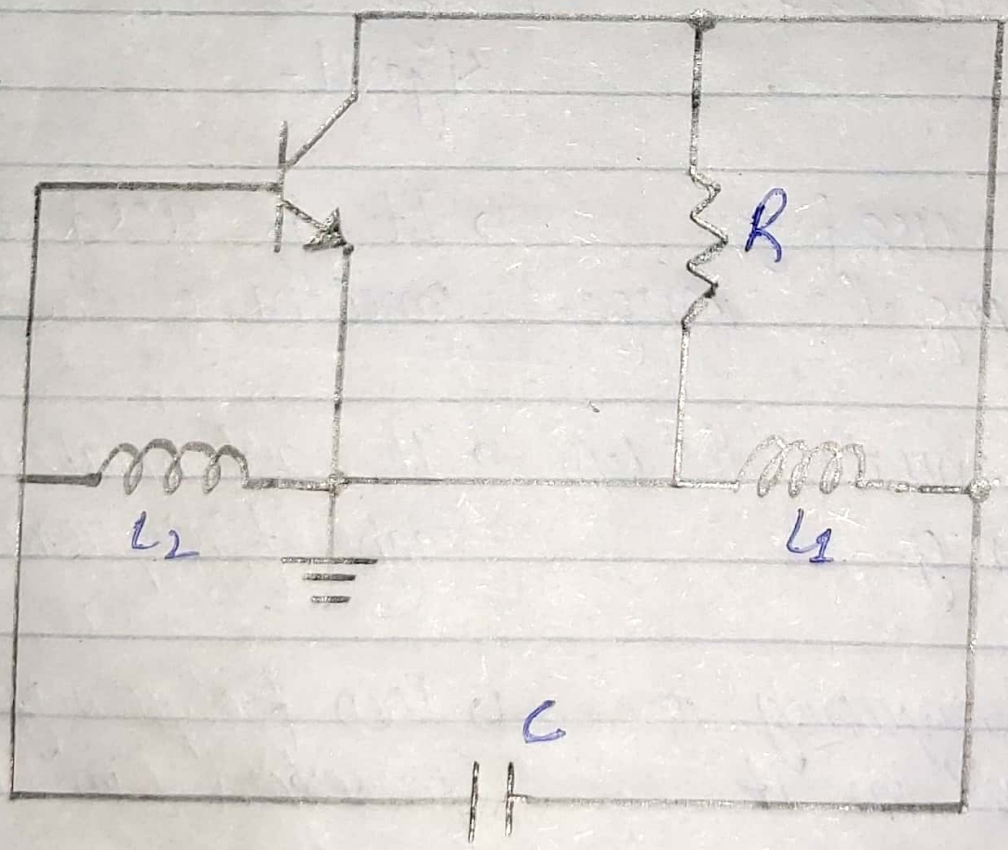
Ans:-

HARTLEY OSCILLATORS:-

Hartley Oscillator is a device that generates oscillatory output (sinusoidal)- It consists of a amplifier linked to an oscillatory circuit, also called LC circuit or tank circuit- The function of tank circuit is to tune a certain frequency-

LC oscillators are designed to operate in the radio-frequency range- Its inductance will be in micro Henries- However they can also be designed to produce oscillations in the low audio-frequency range- But for the low-frequency operation, the inductors used will be very large in value, (i.e) of milli Henrie range and hence very large in physical size-

4. The Hartley oscillator is almost identical to the colpitts oscillator



↳ The primary difference is that the feedback network of the Hartley oscillator uses tapped inductors (L_1 and L_2) and a single capacitor C.

↳ The analysis of Hartley oscillator is identical to that colpitts oscillator.

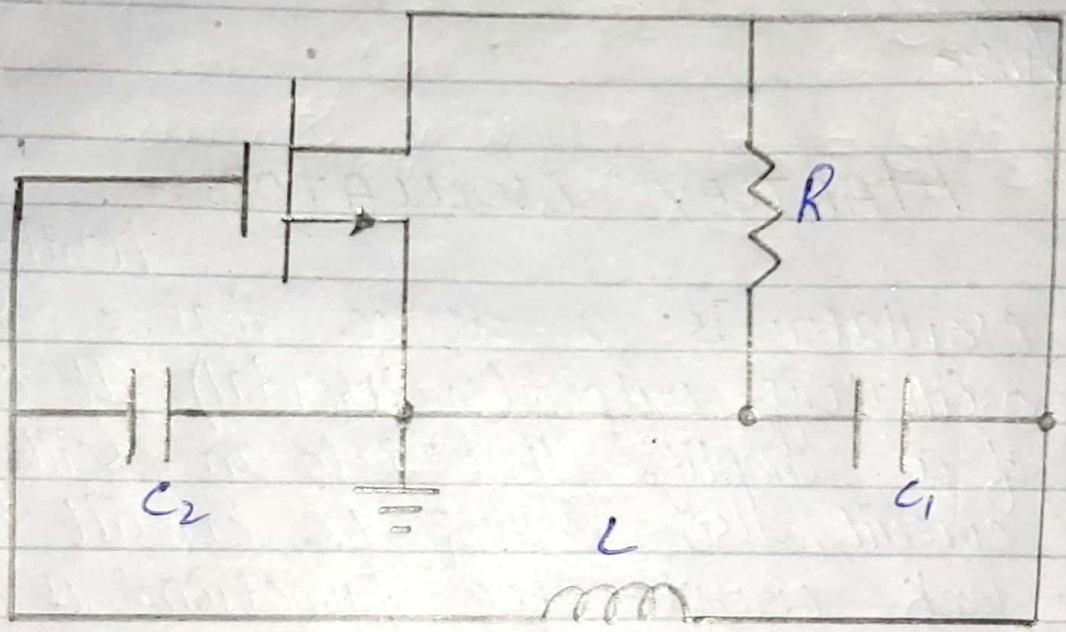
↳ The frequency of oscillation:

$$\omega_0 = \frac{1}{\sqrt{(L_1 + L_2)C}}$$

Colpitts Oscillator:-

The colpitts oscillator is a type of oscillator that uses an LC circuit in the feed back loop.

↳ The feedback network is made up of a pair of tapped capacitors (C_1 and C_2) and an inductor "L" to produce a feedback necessary for oscillations.



↳ The output voltage is developed across C_1.

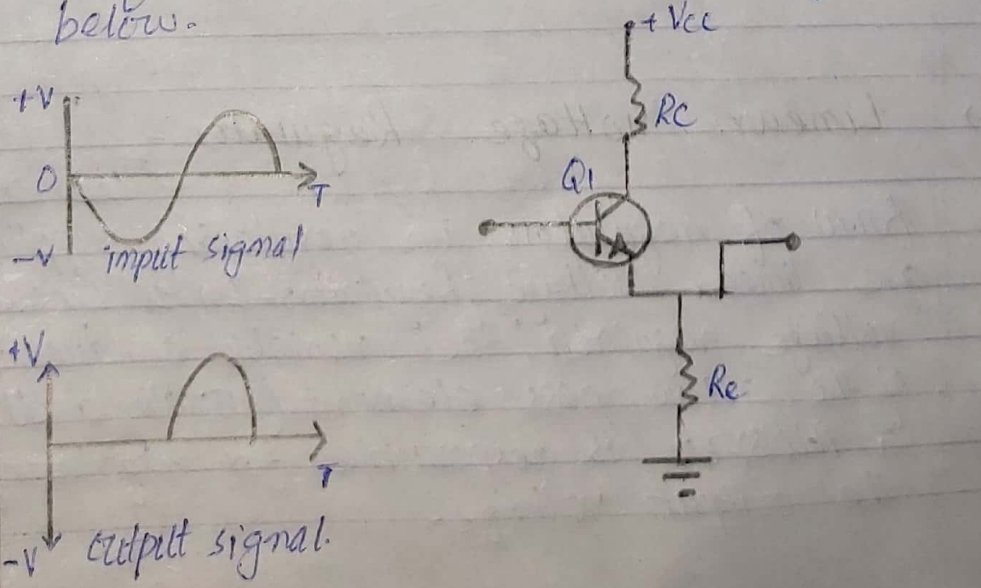
↳ The feedback voltage is developed across C_2.

Q NO. 3 part (A):-

(A) Describe the idea behind class B amplifiers-

Ans :- Class B Amplifier:-

Class B Amplifier is a type of power amplifier where the active device (transistor) conducts only for one half cycle of the input signal- That means the conduction angle is 180° for a class B amplifier- Since the active device is switched off for half the input cycle, the active device dissipates less power and hence the efficiency is improved- Theoretical maximum efficiency of class B power amplifier is 78.5%- The schematic of a single ended class B amplifier and input, output waveforms are shown in the figure below.



Q No. 3 part (B)

(B) Explain the types of voltage regulators and their purposes.

Ans:- VOLTAGE REGULATORS:-

A voltage Regulator is a device or a circuit that is responsible for providing a steady DC voltage to an electronic load.

Types of voltage regulator:-

Voltage Regulators can be implemented using discrete compent circuits or ICs. Irrespective of the implementation, voltage regulators can be classified into two types:

- Linear Voltage Regulator
- Switching voltage Regulator.

- Linear voltage Regulator:-

The original form of regulators in regulating supplies are linear voltage Regulators. In a linear voltage regulator, the variable conductivity of the active pass element (usually a BJT or a MOSFET is responsible for regulating the output voltage.

When a load is connected to the ~~Changes~~ in either input or load will result in a variation in current through the transistor so that the output is maintained constant. For the transistor to be able to vary its current (collector-emitter current in case of a BJT, it must be operated in active or Ohmic region (also know as linear Region).

During this process, the linear voltage regulator wastes a lot power as the net voltage i.e. the difference between the input and output is dropped in the transistor and is dissipated as heat.

Usually, linear voltage regulators are classified into five categories. They are

- Positive Adjustable Regulator.
- Negative Adjustable Regulator.
- Fixed output Regulator.
- Tracking Regulator.
- Floating Regulator.

Switching Voltage Regulators:-

In both the linear voltage Regulators i.e:- the series Regulator and the shunt Regulator, the active pass element i.e:- the transistor is operating in its linear region. By varying the conduction of the transistor, output voltage is maintained at a desirable level.

Advantage of switching voltage Regulators

- The main advantage of the switching power supply or switching voltage regulators is the efficiency - usually, with a better design efficiency up to 95% can be achieved.

- As the transistor is oscillating between ON and OFF states, and the times it says in active region is very less, the amount of power wasted is very less.

Q NO. 4

a) Explain the working of Flash ADC.

b) Ans:- Flash ADC:-

Also called the parallel A/D converter, this circuit is the simplest to understand. It is formed of a series of comparators, each one comparing the input signal to a unique reference voltage. The comparator outputs connect to the inputs of a priority encoder circuit, which then produces a binary output.

b) Working of Flash ADC:-

Analog voltage is applied to non inverting terminals of all comparators using a single line. Reference voltage is applied to inverting terminals of comparators using divider circuits.

Each comparators produces digital output in the form of 1 or 0. If unknown analog voltage is greater than reference voltage comparator produces high logic. If analog voltage is less than reference voltage then comparator produces low logic i.e "0".

Thus all parallel comparator produces digitals representation of analog voltage in the form of zero and one- these outputs of comparator are then applied to the fast encoder- Encoder converts these zeros and once into binary number and produces digital binary output -

Q5 No. part (A):-

Differentiate between the following-

(a):- Low pass and high pass filters.

High pass filters	Low pass filters
↳ A high pass filters attenuates the low-frequency signal and allows only high-frequency signal to pass through it. Although it offers attenuation to high-frequency signal too but the attenuation factor is so small that it can be neglected.	In a low pass filter, the position of capacitor and resistor is interchanged so that the desired output can be obtained. when the applied to low pass filter circuit, then the resistance will offer the constant obstruction, but the position of capacitor affector the output signal.
↳ It is used for sharpening the image.	↳ It is used for smoothing the image
↳ It attenuates the low frequency.	↳ It attenuates the high frequency.
↳ High frequency is presened in it	↳ low frequency is presened in it.

↳ It allows the frequency above cut off frequency to pass through it.	↳ It allows the frequency below cut off frequency to pass through it.
↳ It consists of capacitor that is followed by resistor.	↳ It consists of resistor that is followed by capacitor
↳ It helps in remaval of noise	↳ It helps in removal of aliasing effect.
↳ $H(u,v) = 1 - H'(u,v)$	↳ $G(u,v) = H(u,v)$.

Q NO.5 Part (B):-

The difference between Active and Passive Filters

1. Passive Filters Consume the energy of the signal, but no power gain is available while active filters have a power gain.

2; Active Filters require an external power supply. while passive Filters operate only on the signal input

3; Only passive Filters use inductors.

4; Only active Filters use elements like op-amps and transistors. which are active elements.

5; Theoretically, passive Filters have no frequency limitations while active Fiters limitations due to active elements

6; Passive Filters have a better stability and Can with stand large Currents.

7; Passive Filters are relatively Cheaper than active Filters.