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Module	4th
Subject	Electronic Circuit Desing
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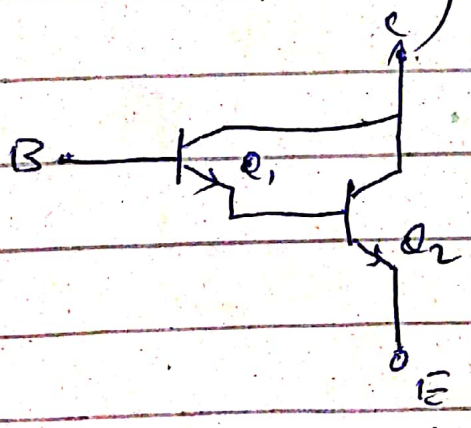
Q no 1 :—

(part a)

Discuss The daorlington connection for ——

Ans:

A very populer connection of two bipolar junction transistor for operation as one "superbeta" transistes is the Daorlington connection shown in Fig:



The main feature of the Daorlington connection is that the composite transistor acts as a single unit with a current gain that is the

The product of the current gains of the individual transistor. If the connection is made using two separate transistors having current of β_1 and β_2 the Darlington connection provides a current gain of $\beta_D = \beta_1 \beta_2$

If $\beta_1 = \beta_2 \rightarrow \beta$

so

$$\beta_D = \beta^2$$

Q no 1

(Part b)

The input of a certain regulator increases by 4.5 As a result, the output voltage increases by 0.062 v ——————

Solution:-

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

$$= 1.377\ \%$$

{

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

$$= 0.034\ \%/v$$ }

Q no 2 :-

Explain colpitts and Hartley oscillator.

Ans:-

Colpitts oscillator :-

- The colpitts oscillator is a type of oscillator that use an LC circuit in the feed-back loop.
- The feedback network is made up of a pair of tapped capacitor (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 feed back voltage is developed across C_2.

Pg=5

Hartley oscillator :-

- 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 frequency of oscillation

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

Q No 3 :—

(Part a)

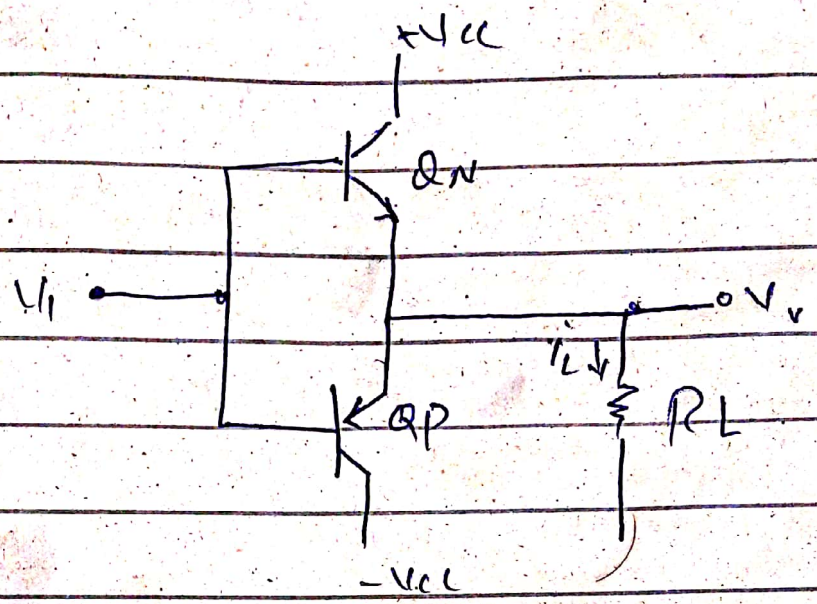
Describ the idea behind class B amplifiers.

Ans :

Class B desing show high efficiency but poor linearity around the crossover region (due to the time it take to turn one device off and the other device on, which translate into extreme crossover distortion.

→ class B design restricted to low power application e.g battery operated equipment such as communication audio.

Circuit operation



Efficiency / power dissipation:

- peak efficiency of the class B output stage 78.5% much higher then class A
- unlike class A, power dissipation varies with output amplitude
- Remember, There are two output devices so the power dissipation is shared between them.
- A class B otput stage can be far more efficient That a class A stage (78.5%) maximum efficiency with 25%.

part (b)

Explain the type of voltage regulators ---

Ans :-

• Fundmental classes of voltage regulator are linear regulators and switching regulators.

(1) liner regulator :-

liner regulator are basic two type sereies regulator and the shunt regulator.

sereies regulator :-

The sereies regulator is connected in series with load on the shunt regulator is connected in parallel with the load.

- control element in series with load between input and output.
- output sample circuit senses a change in output voltage.
- Error detector compares sample voltage with reference voltage → causes control element to compensate in order to maintain a constant output voltage.

shunt regulator :—

- The unregulator input voltage provides current to the load.
- some of the current is pulled away by the control element.
- If the load voltage tries to change in the load resistance, the feedback signal to a comparator.
- the resulting difference voltage then provides a control signal to vary

The amount of the current shunted away from the load to mintain the regulated output voltage across the load

switching regulator :-

- The switching regulator is a type of regulator circuit in which efficient transfer of power to the load is greater than series and shunt regulator because the transistor is not always conducting.
- the switching regulator passes voltage to the load in pulses which is then filtered to provide a smoth dc voltage.
- The switching regulator is more efficient then the linear series or shunt type.
- with switching regulator, 90% efficiency can be achieved.
- The type of regulator is ideal for high current application since less power is dissipated.

Q No 4 :-

Explain the working of Flash ADC.

Ans:-

- series of comparators, each one compares input to a unique reference voltage.
- comparator output connect to a priority encoder circuit → produces binary output.

Flash Analog to Digital converter :-

- $2^n - 1$ comparators for n-bits.
- Each reference voltage equivalent to a quantization level.
- Encoding logic produces word.

How Flah work

- As the analog input voltage exceeds the reference voltage at each comparator the comparator output will sequentially saturate to a high state.

- The pesisity encodes generates a binary number based on the highest-order active input, ignoring all other active inputs.

QNO 5 :-

Differentiate between the following.

Ans:

(a) Low pass and high pass filters.

(i) Low pass is electectronic filter, on the other hand, is the opposite of the high pass filter which allows frequency that is below the cutoff frequency to pass through. This, in turn, will let the filter reduce the high frequency that are above the cutoff frequency other name of this low pass filter is table filters or high-cut filters.

(2) The high-pass filters is the type of electronic filter that allows high frequency wave that are above the certain boundry or a cut off frequency to pass throw. This in turn would reduce the low frequency and also prevent them from passing. The other name is low-cut filter or bass filter.

(b) Different between Active and passive

(i) passive filters consume the energy of the sing1, but no power gain is availabl while active filter have a power gain.

2. Active filters require an external power supply while passive filter operates only on the single input.

(3) Only passive filters use inductors.

(4) only active filters use element like op-amps and transistor, which are active elements.

(5) Theoretically, passive filter have no frequency limitations. while, active filters have limition due to active element.

(6) passive filter have a better stability and can whistand large current.

(7) passive filters are relatively cheaper than active filters.