FAWAD AHMAD

14231

ECD

Q.1(a) Discuss the darlington connection for multistage amplifiers

ANS:- A very popular connection of two bipolar junction transistors for operations as one 'superbeta' transistor is the Darlington connection. The main feature of the Darlington connection is that the composite transistor acts as a single unit with a current gain that is the product of the current gains of the individuall transistors. If the connection is made using two separate transistors having current gain of β_1 and β_2 the Darlington connection provides a current gain of $\beta_D = \beta_1 \beta_2$

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Q1 (b) The input of a - - - - - - - - - - - - - - - in %/V.

Soln:-

i) Line Reg $= 0.062/_{42} \times 100\%$

$= 1.37\%$

ii) Line Regulation in %/V ⇒

$$= \frac{0.062/_{40} \times 100\%}{4.5}$$

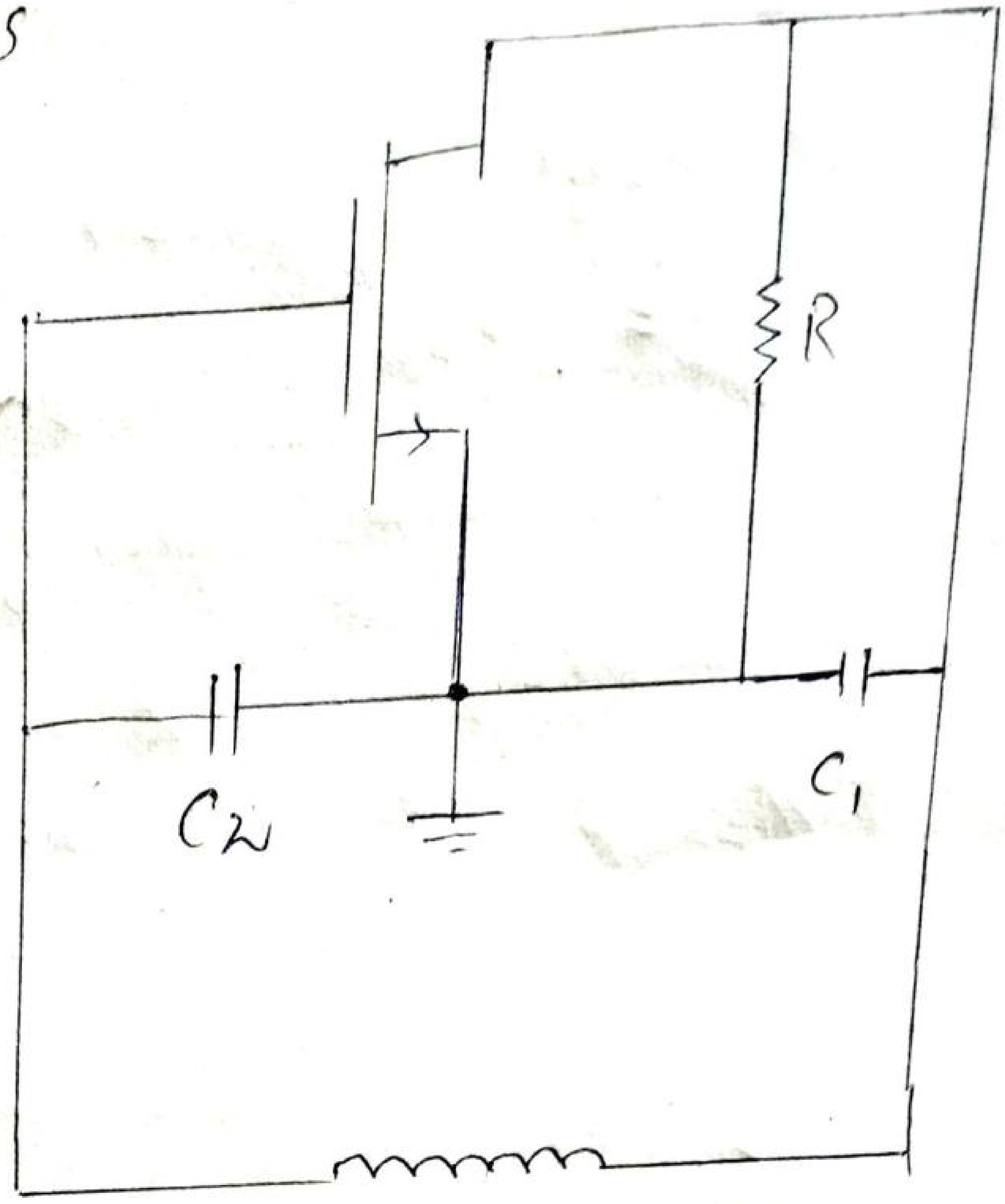
$= 0.034\%/V$

Q2 Explain Colpitts and Hartley oscillators.

ANS:- 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 ~~feedback~~ output voltage is developed across C_1. The feedback voltage is developed across C_2.

COLPITTS

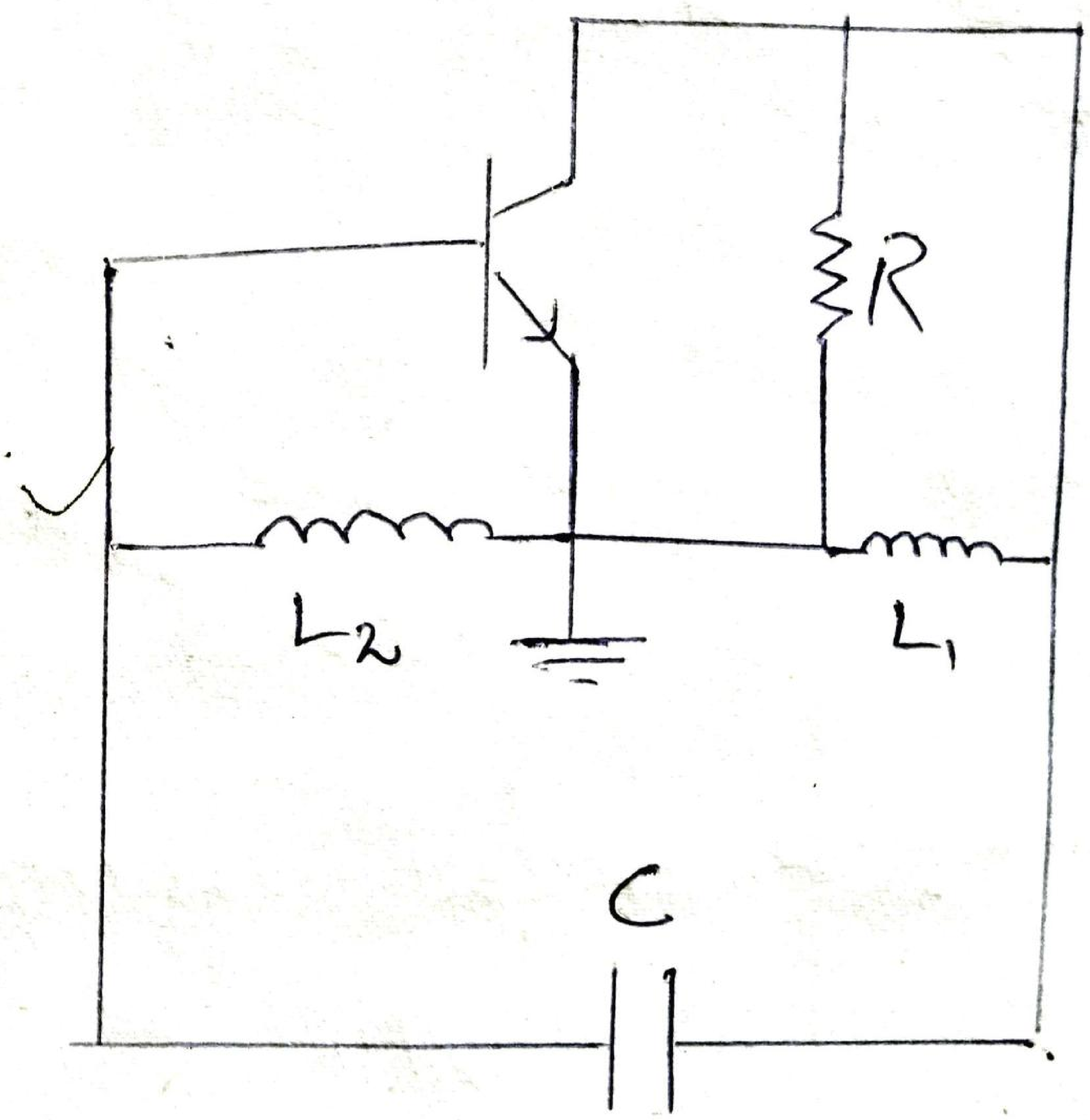


HARTLEY OSCILLATOR:-

The Hartley Oscillator is almost identical to the Colpitts Oscillator. The primary difference is that the feedback network of the ~~the~~ Hartley oscillator uses tapped inductors (L_1 and L_2) a single capacitor C. The analysis of Hartley oscillator is identical to that Colpitts oscillator. The frequency of oscillations

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

HARTLEY



Ans: Class B amplifier is a type of power amplifier where the active device 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 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.

Q3(b) Explain the types of voltage regulators and their purpose.

Ans: There are two types of voltage regulators.

1) SERIES VOLTAGE REGULATORS:-
A series voltage regulator uses a variable element placed in series with the load. By changing the resistance of that series element the voltage dropped across it can be changed.

2) SHUNT VOLTAGE REGULATOR:-
A shunt voltage regulator works by providing a path from the supply voltage to ground through a variable resistance. The current through the shunt regulator has diverted away from the load and flows uselessly to the ground making this from usually less efficient than the series regulator.

PURPOSE OF VOLTAGE REGULATOR:-

The Regulator is separate set of components and function inside the unit. The regulator function is very simple in most motorcycle regulators. A regulator control circuit monitors battery voltage and compares this measurement to an internal reference voltage. Motorcycle regulators are generally designed to allow a maximum battery voltage of 14.6VD at the battery while charging.

Q4 Explain the working of Flash ADC.

ANS:- A flash ADC is a type of analog-to-digital converter that uses a linear voltage ladder with a comparator to each 'rung' of the leader to compare the input voltage to successive reference voltage. Often these reference ladders are constructeel of many resistors; however modern implementatio show that capacitive voltage division is also possible. The output of these comparators is generally feed into a digital encoder, which converts the input into a binary value.

Q5 (a) Differentiate between the following

Ans LOW PASS AND HIGH PASS

FILTER:-

The circuit of low pass filter can be built with a resistor as well as a capacitor in series so that the output can be acheived. One the input is given to the circuit of the low pass filter. then the resistance will give a stable obstacle, however the capacitor position will have an effect on the output signal

An high pass filter blocks the low-frequency signals and allows just high frequency signals for flowing through it. Even through it provides reduction to high-frequencies signal also however the attendation issue is so little that it can be ignored

Q5(3) Active and passive filters.

ANS:- ACTIVE FILTER:-

Active filters have the ~~capacit~~ capability of amplyfing filter output, while passive filters consume the power of the input signal and cannot amplify the output signal.

PASSIVE FILTERS:-

Passive filters are designed using capacitors, resistors, and inductors while active filters do not use inductors in their design.

This results in a compact design of active filter as compared to passive filters.

Active filters need outside sources for their operation, while passive filters do not need any outside source for their operations.

Q6:-

Sol:- GIVEN THAT

$A_{ol} = 400,000$

$A_{cm} = 0.6$

Required: CMRR = ?

$CMRR = A_{ol}/A_{cm}$

$= 400,000/0.6$

$= 666,666.0$

Expressed in decibels

$CMRR = 20 \log (666,666.1)$

$= 116.47 dB$

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Q7(a)

ANS:- Using an op-amp with negative feedback is that the actual voltage gain of the op-amp does'nt matter so long as its very large. If the op-amp's differential gain were 250,000 instead of 200,000 all it would mean is that the output voltage would hold just a little closer to Vin. In the circuit just illustrated, the output voltage would still be equal to the non-inverting input voltage. Op-amps gains therefore do not have to be precisely set by the factory in order for the circuit designer to build an amplifier circuit with precise gain. Negative feedback makes the system self correcting.