LIST OF EXPERIMENTS

A) DESIGN AND SIMULATION IN SIMULATION LAB USING MULTISIM:

1. COMMON EMITTER AMPLIFIER.
2. COMMON SOURCE AMPLIFIER.
3. TWO STAGE RC COUPLED AMPLIFIER.
4. RC PHASE SHIFT OSCILLATOR USING TRANSISTORS.
5. CLASS A POWER AMPLIFIER.
6. CLASS B COMPLEMENTARY SYMMETRY AMPLIFIER.
7. CURRENT SHUNT FEEDBACK AMPLIFIER.

B) TESTING IN THE HARDWARE LABORATORY:

8. SINGLE TUNED VOLTAGE AMPLIFIER.
9. HARTLEY & COLPITT'S OSCILLATORS.
10. CLASS A POWER AMPLIFIER.
11. COMMON EMITTER AMPLIFIER.
12. COMMON SOURCE AMPLIFIER.
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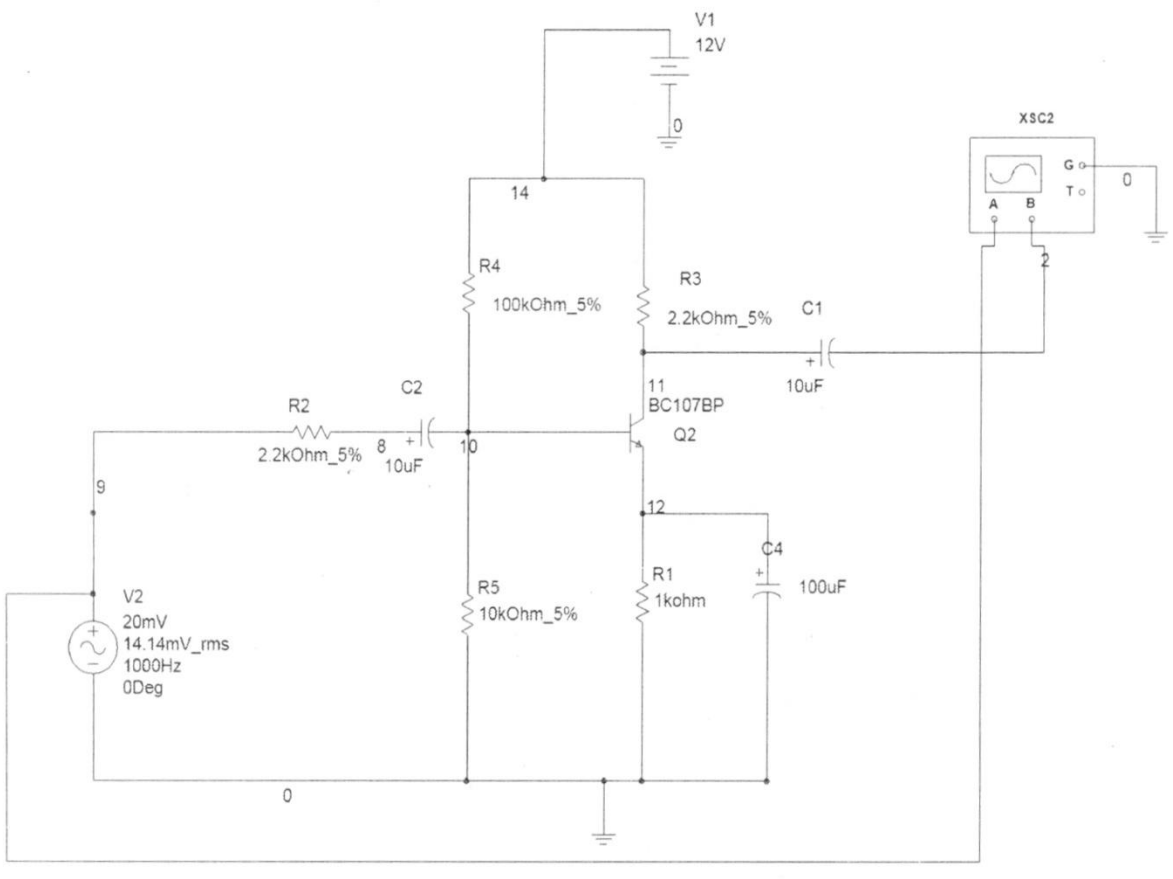
EXPERMENT: 1

COMMON EMITTER AMPLIFIER

AIM: To obtain the Voltage gain for CE Amplifier and also to observe the frequency Response.

EQUIPMENT REQUIRED: PC & MULTISIM 2001 Software.

CIRCUIT DIAGRAM:



THEORY:

The CE amplifier provides high gain &wide frequency response. The emitter lead is common to both input & output circuits and is grounded. The emitter-base circuit is forward biased. The collector current is controlled by the base current rather than emitter current. The input signal is applied to base terminal of the transistor and amplifier output is taken across collector terminal. A very small change in base current produces a much larger change in collector current. When +VE half-cycle is fed to the input circuit, it opposes the forward bias of the circuit which causes the collector current to decrease, it decreases the voltage more –VE. Thus when input cycle varies through a -VE half-cycle, increases the forward bias of the circuit, which causes the collector current to increases thus the output signal is common emitter amplifier is in out of phase with the input signal.

PROCEDURE:

1. Enter in to the Multisim 2001 software.
2. Customize the screen and then draw the circuit on the screen with the help of mouse.
3. Connect the CRO and ground it.
4. The input terminal is connected to one terminal of CRO and output to the terminal.
5. Switch on CRO and observe the input and output waveforms.
6. Determine the input and output voltage and calculate the voltage gain.
7. The frequency response of (amplitude) amplifier is found out by dc and ac analysis.

OBSERVATION:

V_1 = input voltage = ----------

V_O = output voltage = ----------

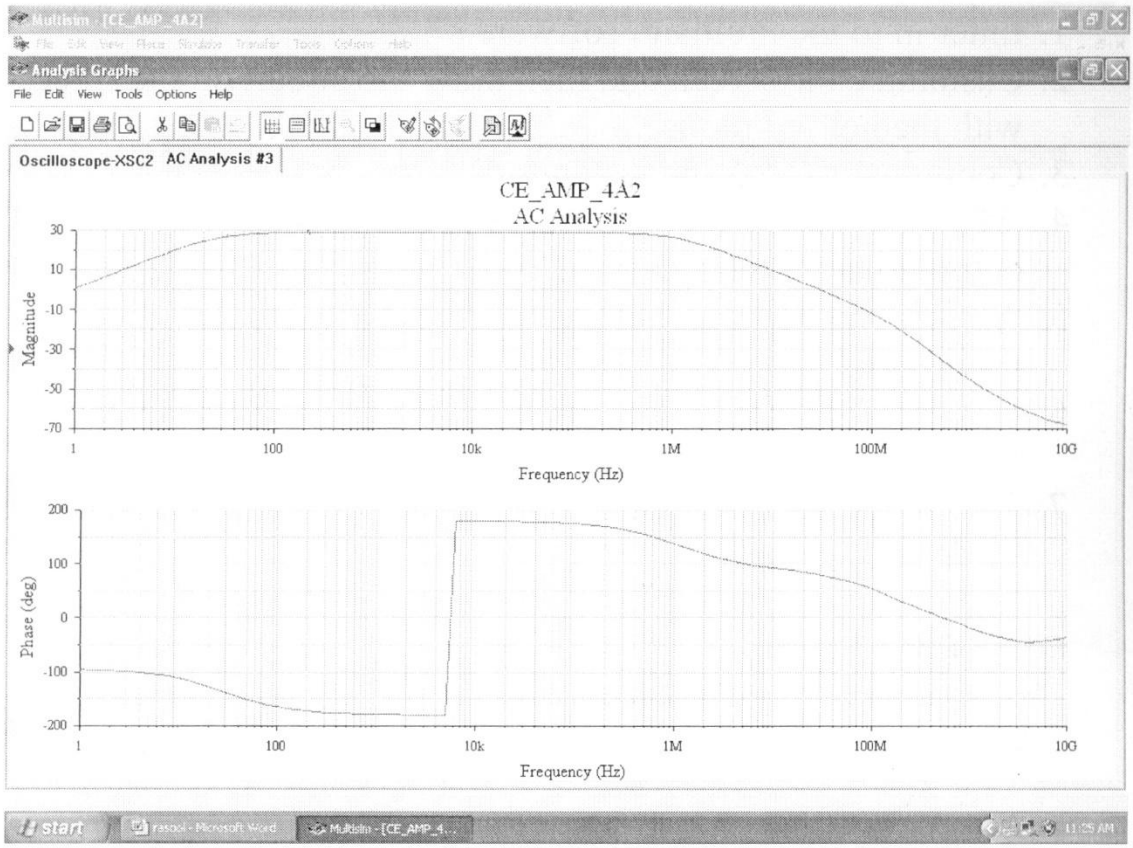
CALCULATIONS:

Voltage gain = (output voltage / input voltage) = ----------

Bandwidth = F_2 - F_1 = ----------

Gain in decibels =----------

GRAPH:



RESULT:

The voltage gain of CE amplifier = ----------

The Bandwidth of CE amplifier = ----------

VIVA QUESTIONS:

1. What are the advantages of CE amplifier?

2. Why CE amplifier is widely used for amplification purpose?

3. Explain how the CE amplifier is producing 180° Phase Shift?

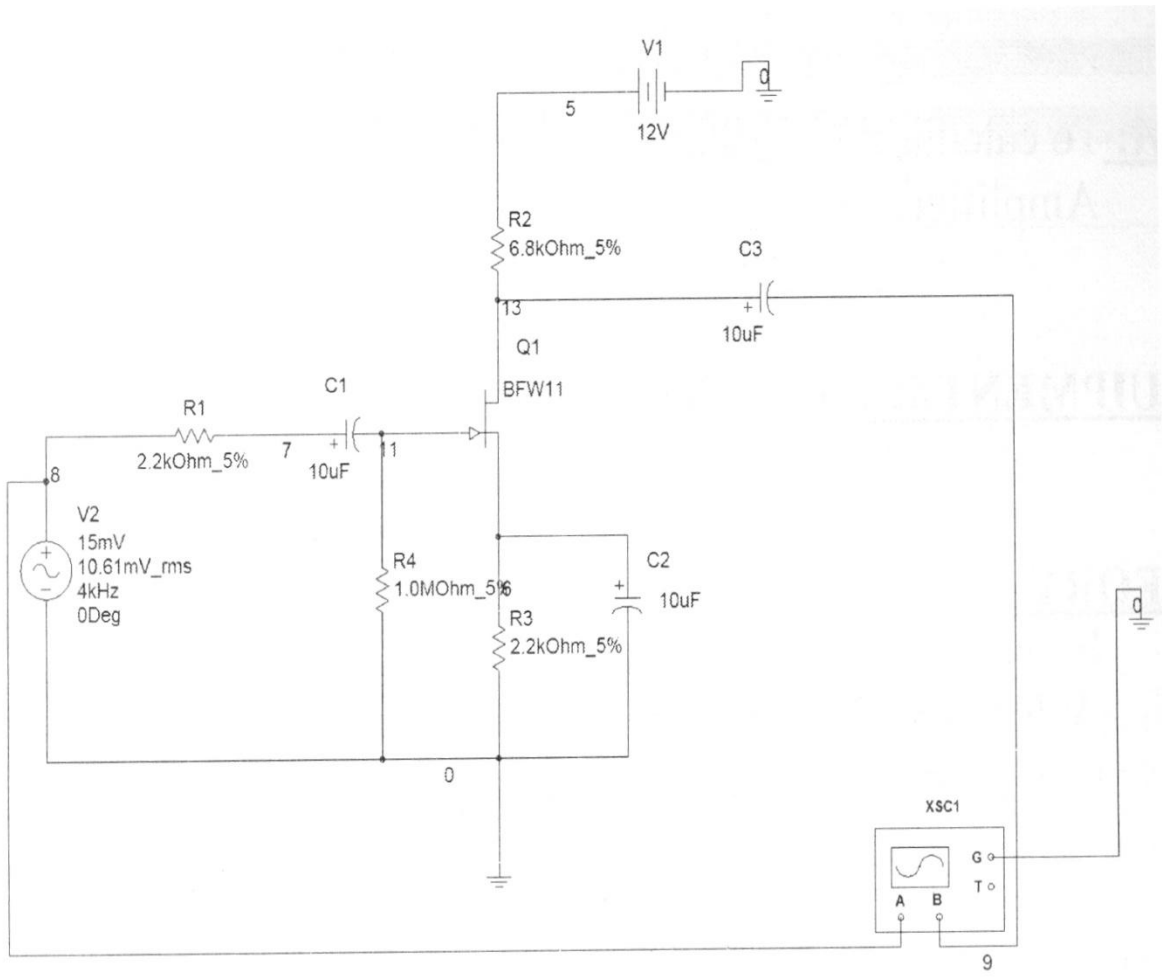
EXPERMENT: 2

FET AMPLIFIER (COMMON SOURCE)

AIM: To Calculate the voltage gain and the bandwidth of FET Common Source Amplifier.

EQUIPMENT REQUIRED: PC & MULTISIM 2001 Software.

CIRCUIT DIAGRAM:



THEORY:

An amplifier is used to increase the signal level i.e., the amplifier is used get larger signal output from a small signal input. We will assume a sinusoidal signal at the input of the amplifier. At the output, signal must remain sinusoidal in waveform with frequency same as that of the input .To make transistor work as an amplifier, it is to be bias to operate in active region i.e., base emitter junction is forward bias while base –collector to be reverse biased.

Field effect transistor (FET) is a popular active device of electronics it is widely used for amplification as well as switching similar to that of bipolar junction transistor (BJT) .The operation of this device depends on the control of flow current by virtue of electric field this is a uni polar device that is the operation of the device based on the flow of only one type of charge only majority carriers contribute to the flow of current and minority carriers have no role to play in the process of operation , unlike BJT they greatest advantage with FET is that it has very high input impedance , which the prime requirement for a voltage amplifier

PROCEDURE:

1. Enter in to the Multisim 2001 software.
2. Customize the screen and then draw the circuit on the screen with the help of mouse.
3. Connect the CRO and ground it.
4. The input terminal is connected to one terminal of CRO and output to the terminal.
5. Switch on CRO and observe the input and output waveforms.
6. Determine the input and output voltage and calculate the voltage gain.
7. The frequency response of (amplitude) amplifier is found out by dc and ac analysis.

OBSERVATIONS:

V_1 = Input voltage = ----------

V_O = Output voltage = ----------

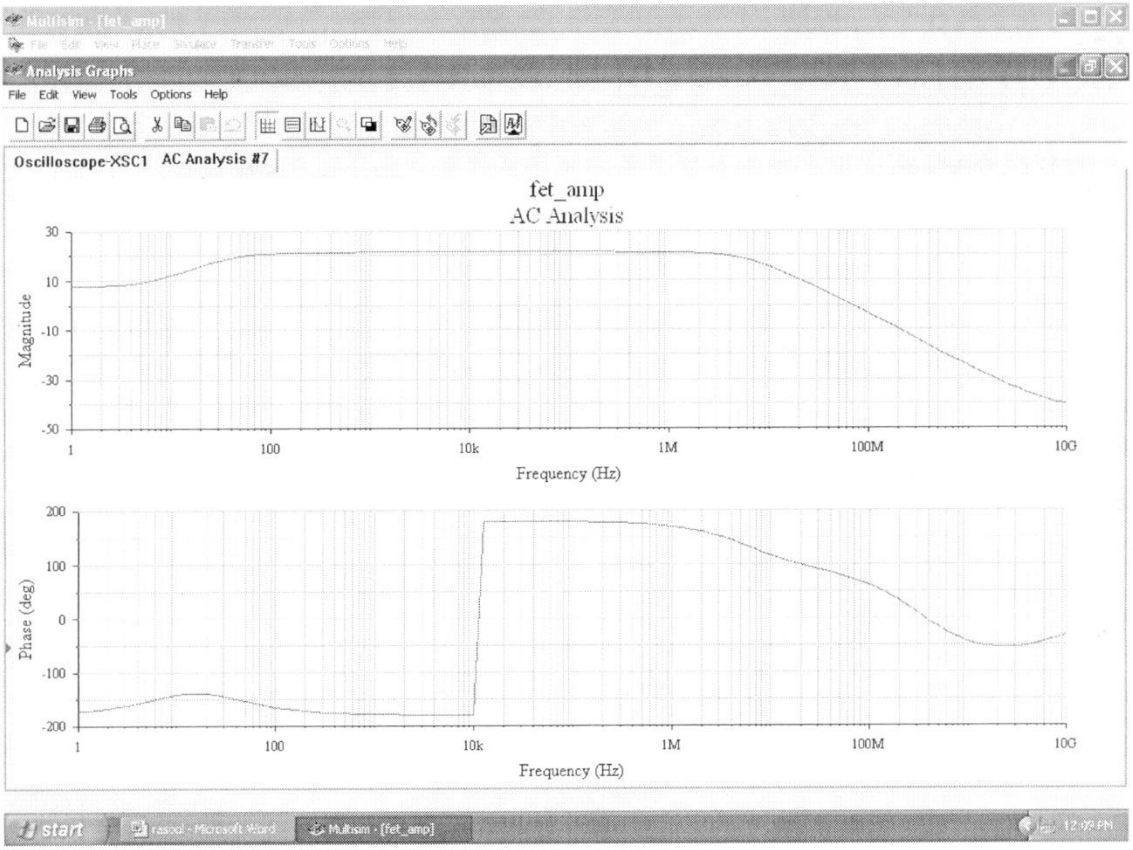
CALCULATIONS:

Voltage gain = (output voltage / input voltage) = ----------

Bandwidth = F_2 - F_1 = ----------

Gain in decibels = ----------

GRAPH:



RESULT:

The voltage gain of CE Amplifier = ----------

The bandwidth of CE Amplifier = ----------

VIVA QUESTIONS:

1. Explain the operation of Common source amplifier?

2. What are the advantages of Common source amplifier?

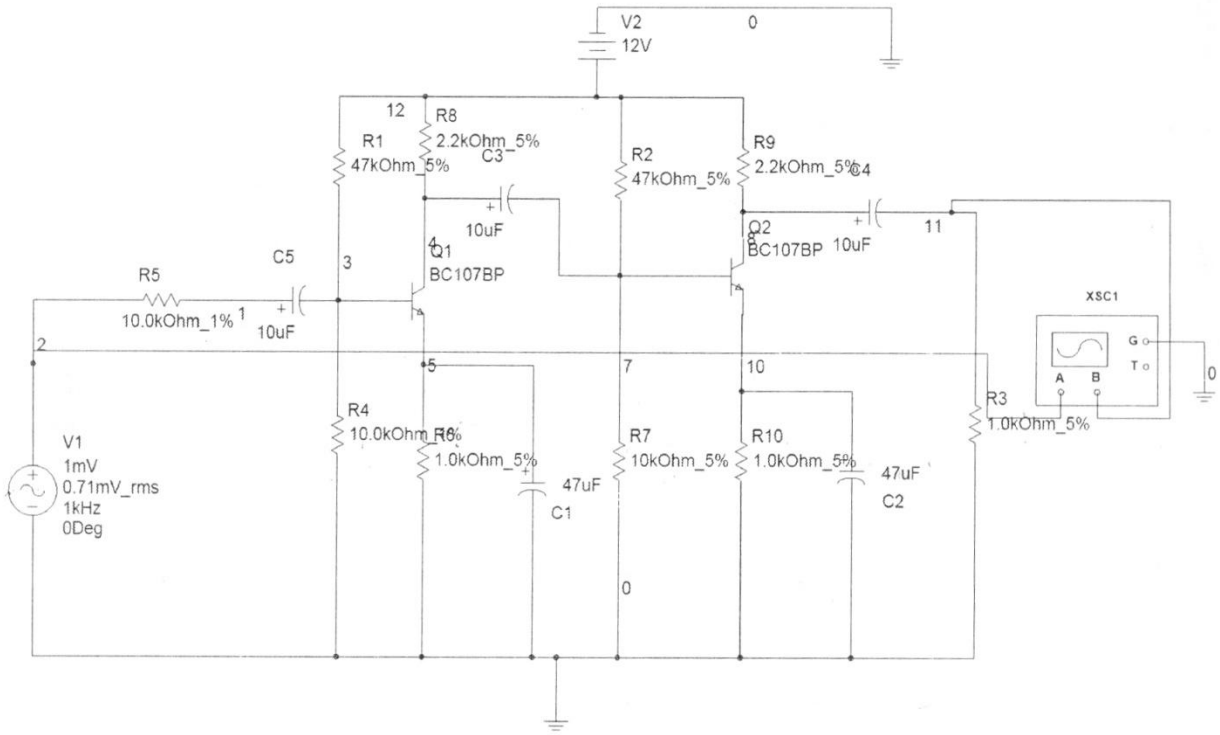
EXPERMENT: 3

TWO STAGE RC COUPLED AMPLIFIER

AIM: To Calculate the Voltage gain, Bandwidth of a Two stage RC Coupled amplifier.

EQUIPMENT REQUIRED: PC & MULTISIM 2001 Software.

CIRCUIT DIAGRAM:



THEORY:

Whenever large amplification with very good impedance matching is required using an active device such as a transistor or a field effect transistor a single active device and its associated circuitry will not be able to cater to the needs.

In such a case single stage amplifier is not sufficient and one requires more stages of amplification i.e., output of one stage is connected to the input of second stage of amplification circuit and the chain continues until the required characteristics of amplifier is achieved such an amplifier is called as multistage amplifier. In multistage amplifier, the output signal preceding stage is to be coupled to the input circuit of succeeding stage. For this interstage coupling different types of coupling can be employed. They are

1. RC coupling
2. Transformer coupling
3. Direct coupling

RC coupling is most popularly used type of coupling because it is cheap and provides excellent fidelity over a wide range of frequency .it is usually employed for voltage amplification .A coupl.ing capacitor is connected to the output of first stage to the base of the input of the second stage and so on.

PROCEDURE:

1. Enter in to the multisim 2001 software.
2. Customize the screen and then draw the circuit on the screen with the help of mouse.
3. Connect the CRO and ground it.
4. The input terminal is connected to one terminal of CRO and output to other terminal.
5. Switch on CRO and observe the input and output waveforms.
6. Determine the input and output voltage and calculate the voltage gain.

OBSERVATIONS:

Input Voltage = ----------.

Output Voltage = ----------.

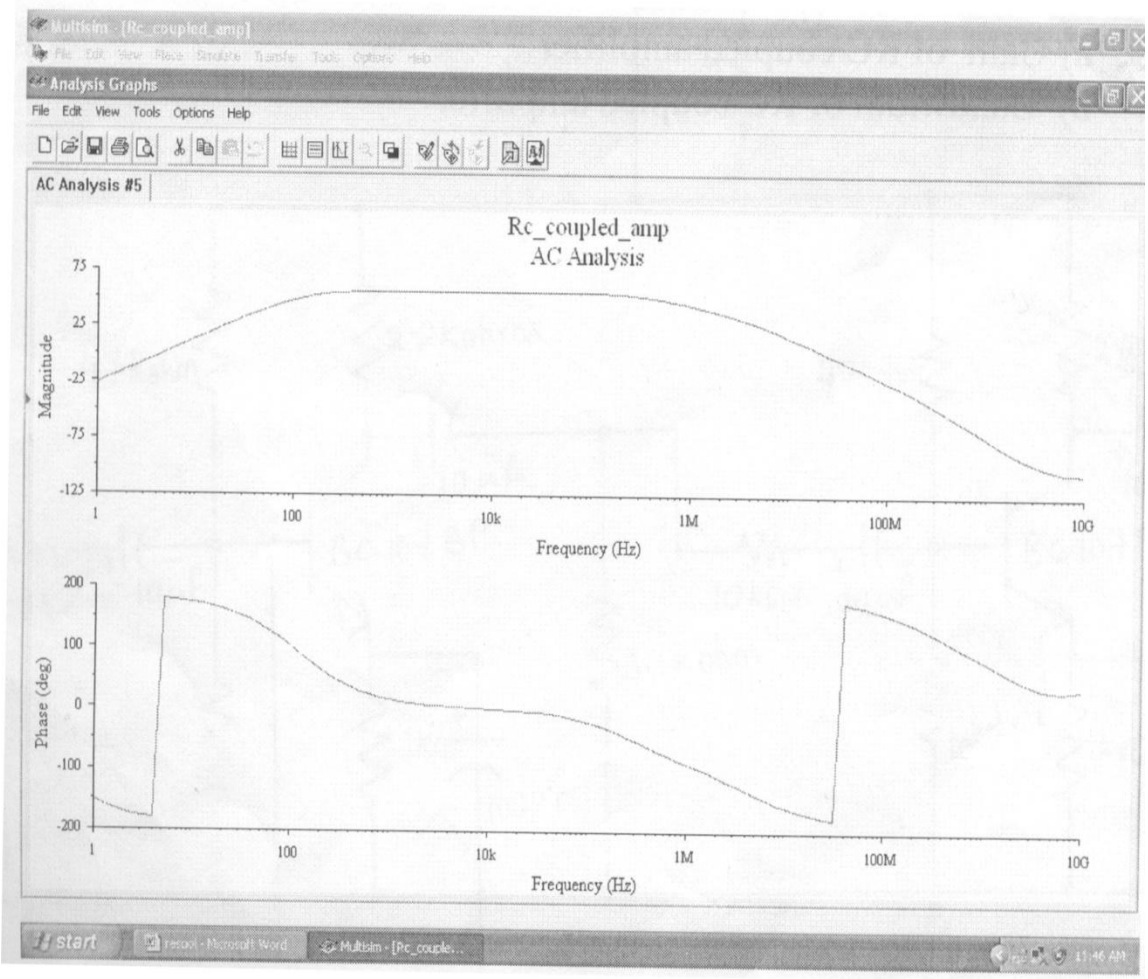
CALCULATIONS:

Gain = ----------

A_{V1} = ----------, $A_{V1} * A_{V2}$ = ----------

A_{V2} = ----------, Bandwidth = ----------

GRAPH:



RESULT: a) Gain of RC Coupled Amplifier = ----------.

b) Bandwidth of RC Coupled amplifier = ----------.

VIVA QUESTIONS:

1. What is the necessity of coupling?
2. What are the different types of coupling techniques?
3. What are the advantages of RC coupling?

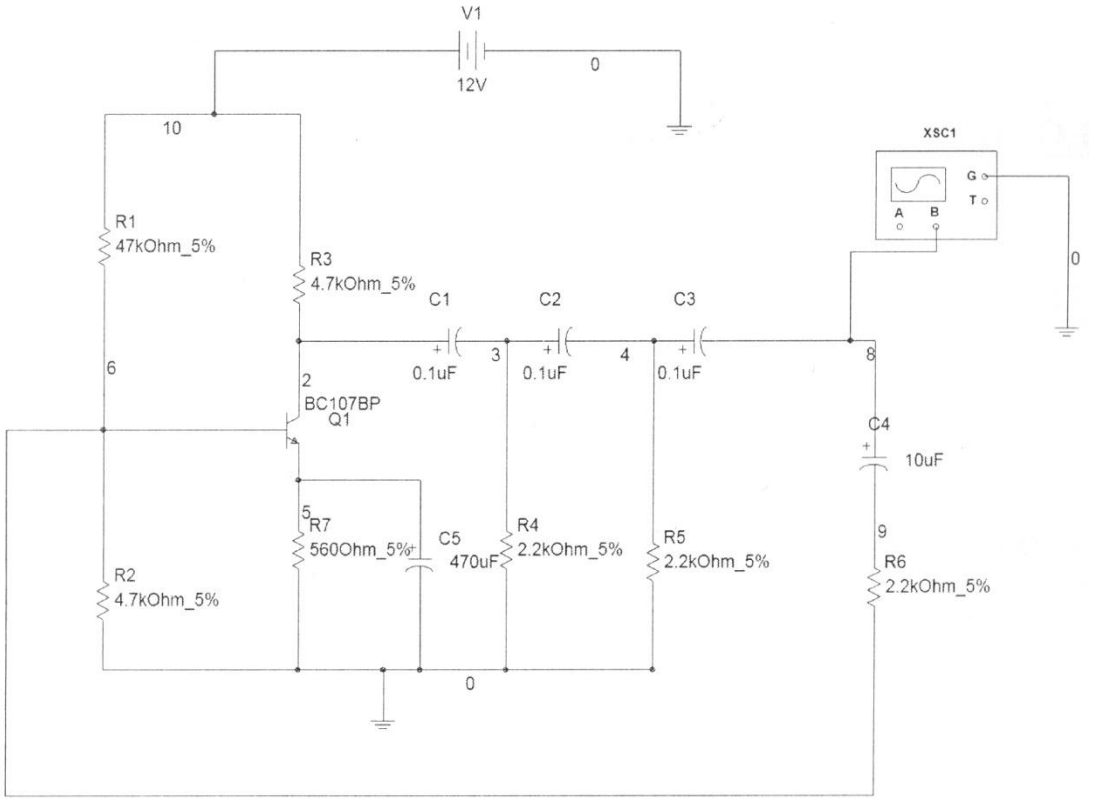
EXPERMENT: 4

RC PHASE SHIFT OSCILLATOR

AIM: To design and predetermine the frequency of oscillation of RC Phase Shift Oscillator.

EQUIPMENT REQUIRED: PC & MULTISIM Software.

CIRCUIT DIAGRAM:



THEORY:

RC phase shift oscillator consists of a conventional single transistor amplifier and a RC phase shift network .The phase shift network consists of three sections R_1,C_1,R_2,C_2 and R_3,C_3.At some particular frequency f_o .the phase shift in each RC section in 60^o so that the total phase shift produced by the RC network is 180^o. The frequency is given by

$$F_0 = 1/2\pi RC\sqrt{6}$$

When the circuit is switched on it produces oscillations of frequency f_o .The output f_o of the amplifier is feedback to RC feedback network .This network produces a phase shift of 180o and a voltage Ear appears at its output which is applied to transistor amplifier .The feedback fraction $m=E_i/E_o$ A phase shift of 180o is produced by the transistor amplifier. A further 180o is produced by the RC network the phase shift around the entire loop is 360o hence barkhausen condition is satisfied.

PROCEDURE:

1. Enter in to the multisim 2001 software.
2. Customize the screen and then draw the circuit on the screen with the help of mouse.
3. Connect the CRO and ground it.
4. Start the simulation and observe the output waveform.
5. Note down the output voltage and time period of the output waveform.

OBSERVATIONS:

Amplitude = ----------

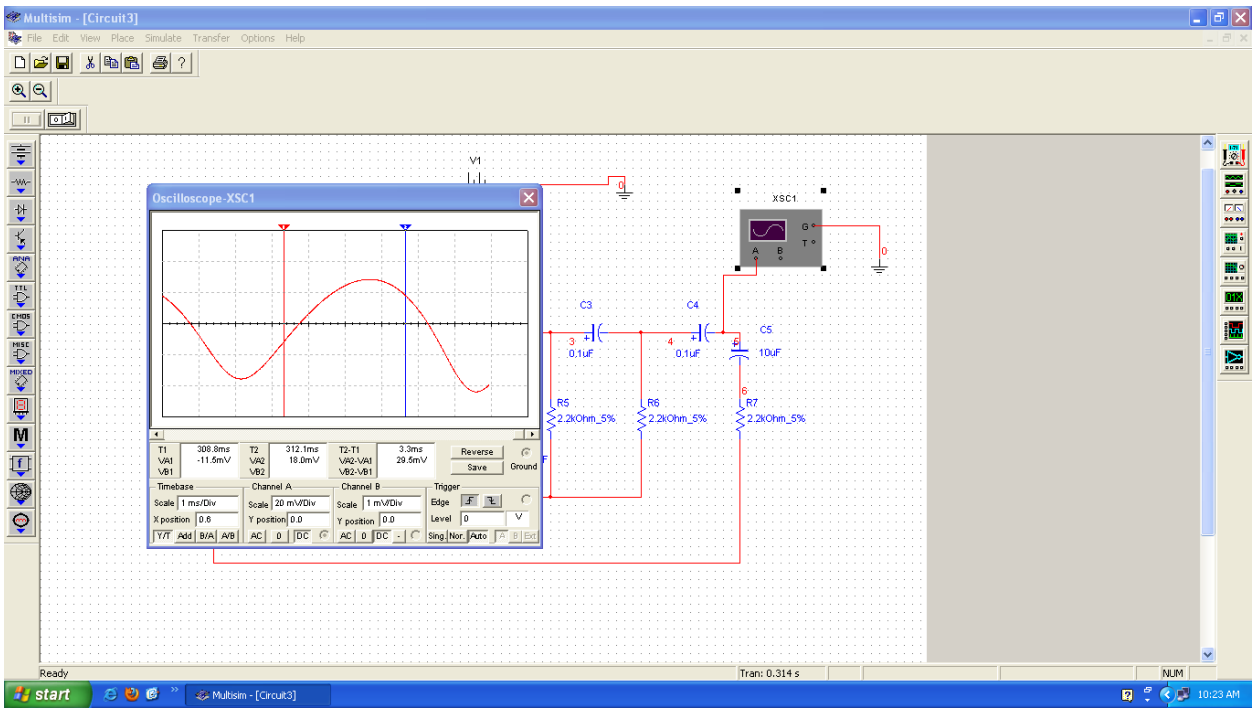
Timeperiod = ----------

Frequency = ----------

CALCULATIONS:

$$f_0 = 1 / 2\pi \sqrt{6}\, RC$$

GRAPH:



RESULT: The frequency of oscillations of RC Phase Shift Oscillator is obtained.

VIVA QUESTIONS:

1. What is an oscillator?

2. How the feedback network is going to produce starting voltage?

3. Explain the principle involved in RC Phase Shift Oscillator?

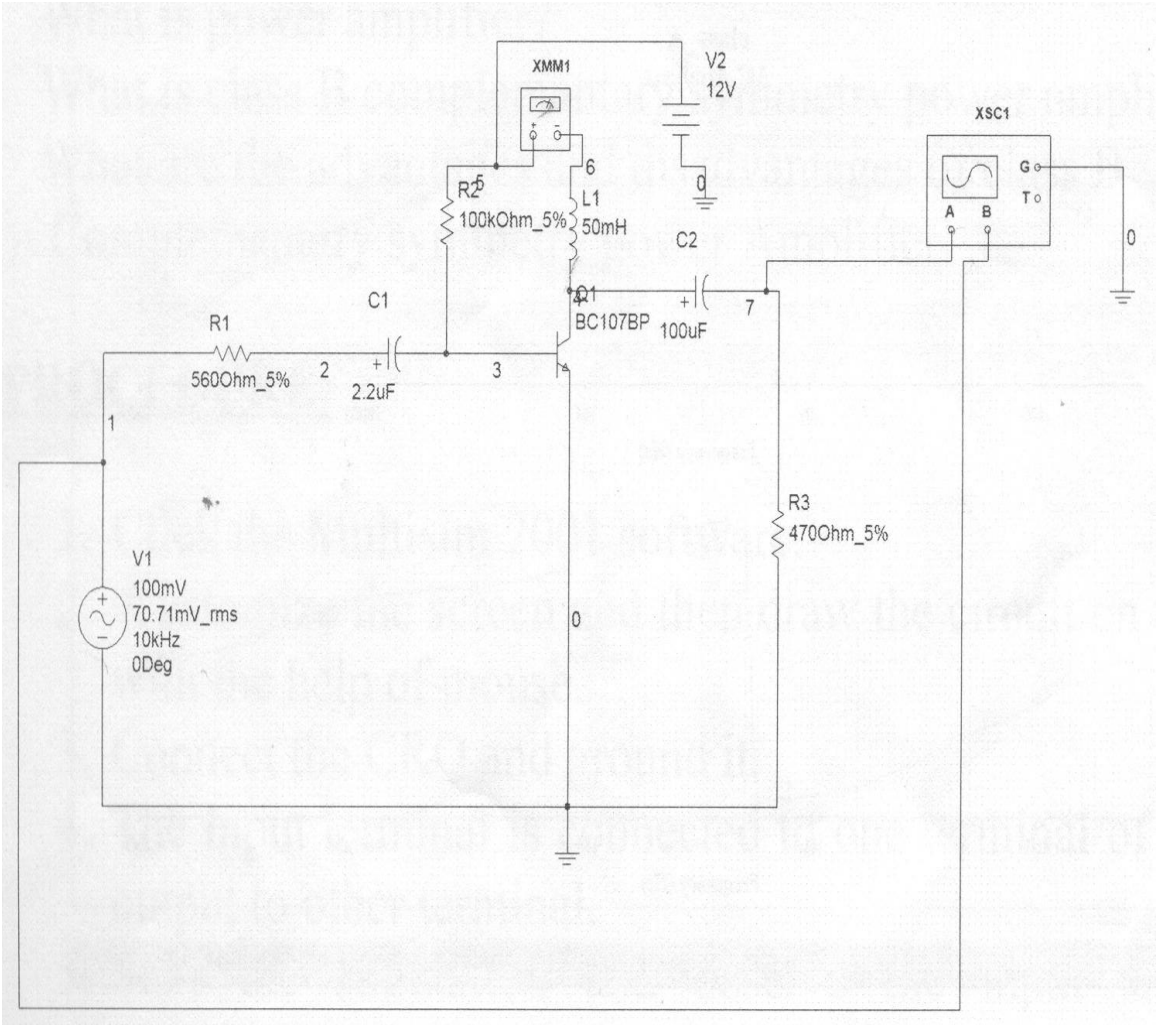
EXPERMENT: 5

CLASS A POWER AMPLIFIER

AIM: To observe the input and output waveforms and to calculate the efficiency of CLASS A Power Amplifier.

EQUIPMENT REQUIRED: PC & MULTISIM 2001

CIRCUIT DIAGRAM:



THEORY:

The amplifier is said to be class A power amplifier if the q point and the input signal are selected such that the output signal is obtained for a full input cycle . For this class the position of q point is approximately y at the mid point of the load line. For all the values of input signal the transistor remains in the active region and never entire into the cutoff or saturation region. The collector current flows for 3600 (life cycle) of the input signal in other words the angle of the collector current flow is 3600 the claa a amplifiers or furthers classified as directly coupled and transformer coupled and transformer coupled amplifiers in directly coupled type .The load is directly connected in the collector circuit while in the transformer coupled type, the load is coupled to the collector using the transformer.

Advantages:

1. Distortion analysis is very important
2. It amplifies audio frequency signals faithfully hence they are called as audio amplifiers

Disadvantages:

1. H parameter analysis is not applicable
2. Due to large power handling the transistor is used power transistor which is large in size and having large power rating

PROCEDURE:

1. Enter in to the multisim 2001 software.
2. Customize the screen and then draw the circuit on the screen with the help of mouse.
3. Connect the CRO and ground it.
4. The input terminal is connected to one terminal of CRO and output to other terminal.
5. Start the simulation and observe the input and output waveforms.
6. Note down the values of

OBSERVATIONS:

VO = _____, VI = _____

VCC = _____

RL = _____

CALCULATIONS:

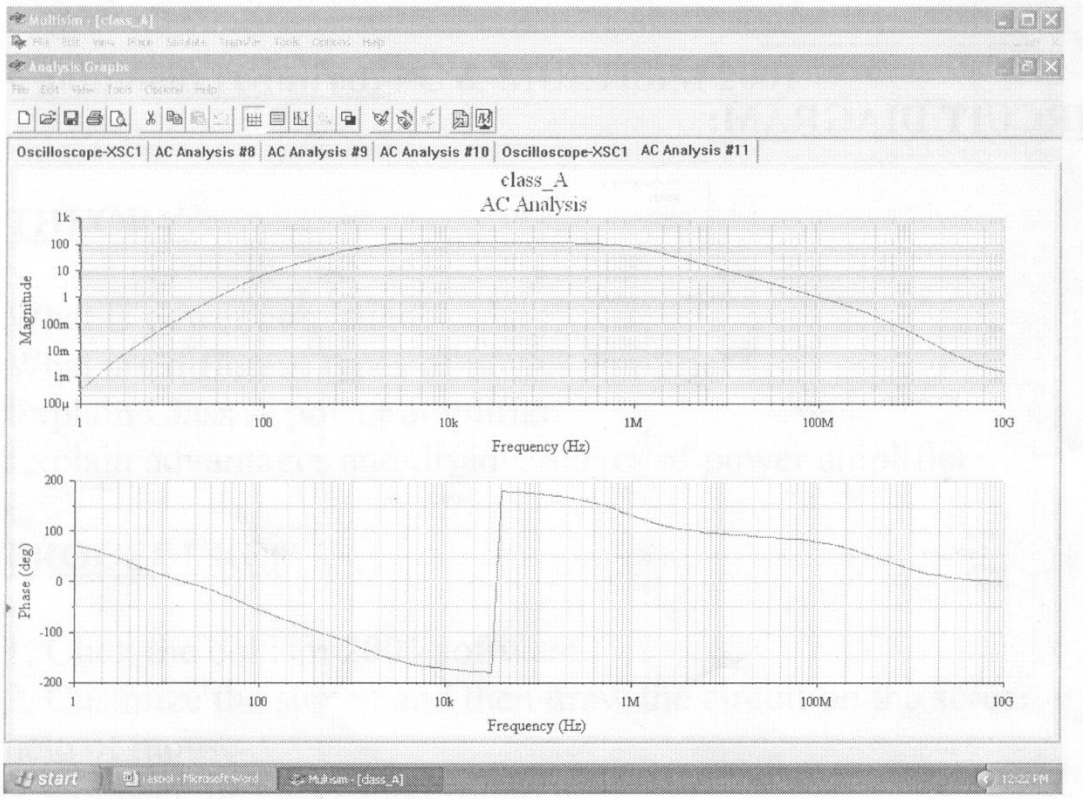
Efficiency (Pac/ PDC) = _____

$P_{ac} = V_{cc}\ Ic$

$P_{DC} = V_m/2R_L = V^2_{pp}/8R_L$

$\%n = P_{ac}/ P_{DC}\ X\ 100$

GRAPH:



RESULT

Input and output wave forms as observed and efficiency of class A power amplifier is _____

VIVA QUESTIONS:

1. Explain the operation of Class A power amplifier?

2. What are the advantages of Class A Power amplifier?

3. What is the efficiency of Class A power amplifier?

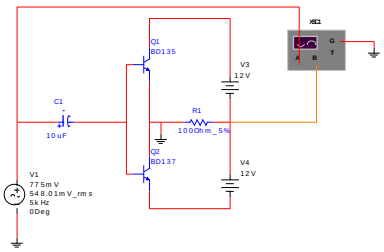
EXPERMENT: 6

CLASS B COMPLEMENTARY SYMMETRY AMPLIFIER

AIM: To observe the input and output waveforms and to calculate the efficiency of Class B Complimentary symmetry power amplifier.

EQUIPMENT REQUIRED: PC & MULTISIM 2001

CIRCUIT DIAGRAM:



THEORY:

An amplifying system consists of several stages in cascade. The input and the intermediate stages amplify small signal excitations to a value large enough to drive the final device .The out put stage feeds the final device .The output stage feeds a transducer such as a CRO,loudspeaker or servomotor. Thus the final stage must be capable of delivering a large voltage or current or appreciable amount of power. This requires an amplifier which is referred as a power amplifier

In class B complimentary symmetry class _B amplifier one n-p-n and p-n-p is used. Hence the circuit is called class-B complimentary symmetry amplifier. This circuit ifis transformer less circuit .But with common emitter configuration it becomes power transfer without output impedance for maximum power transfer without an output transformers. Hence the matched pair of complementary transistors are used in common collector configuration This is because in common collector configuration has lowest output impedance and hence the impedance matching is possible.

PROCEDURE:

1. Enter in to the Multisim 2001 software.
2. Customize the screen and then draw the circuit on the screen with the help of mouse.
3. Connect the CRO and ground it.
4. The input terminal is connected to one terminal of CRO and output to other terminal.
5. Start the simulation and observe the input and output waveforms.
6. Note down the values of VO & VI and find AC and DC power.
7. Hence find efficiency

OBSERVATION:

VO =

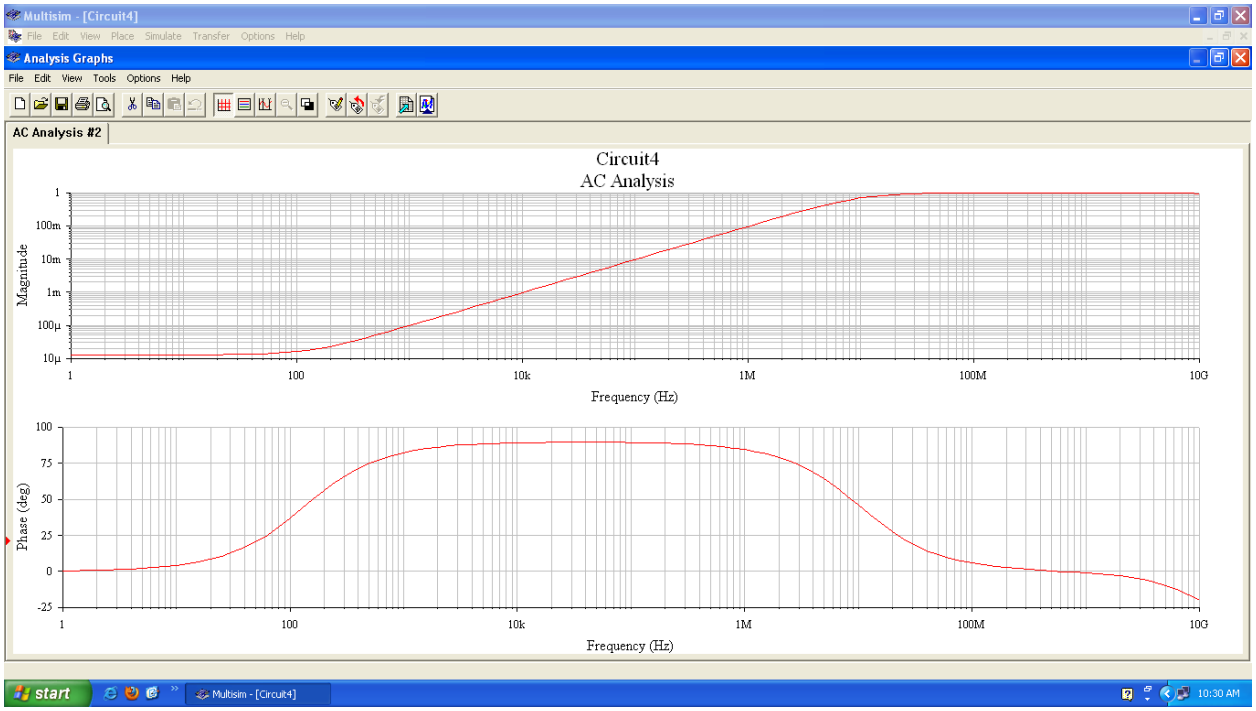
VCC =

RL =

EFFICIENCY: $P_{ac}/P_{DC} = V_{mx}$ II /4 X V_{CC}

Vm = V pp/2

GRAPH:



RESULT: The efficiency of class B complimentary symmetry power amplifier is obtained.

VIVA QUESTIONS:

1. What is the efficiency of Class B complimentary symmetry power amplifier?

2. What are the advantages of Class B complimentary symmetry power amplifier?

3. What are the disadvantages in Class B push pull power amplifier?

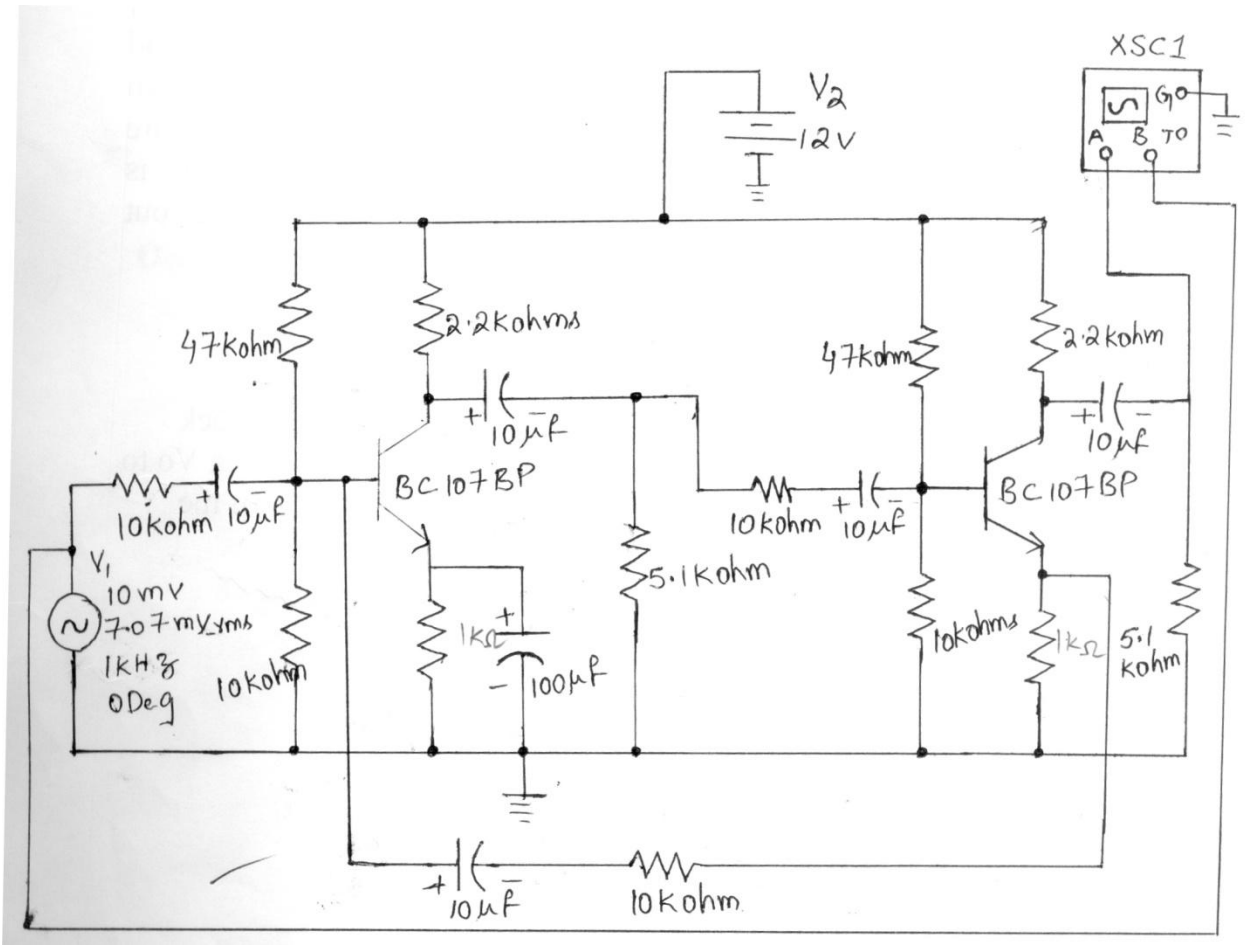
EXPERMENT: 7

CURRENT SHUNT FEEDBACK AMPLIFIER

AIM: To find out the voltage gain and plot the frequency response of a Current Shunt Feedback Amplifier with and without feedback using Multisim and compare the gains and bandwidths of two.

EQUIPMENT REQUIRED: PC & MULTISIM 2001

CIRCUIT DIAGRAM:



PROCEDURE:

1. Start MULTISIM. A blank circuit window will appear on the screen along with a component tool bar.
2. Using component tool bar place all the components on the circuit window and wire the circuit.
3. Save the circuit file.

TO FIND THE VOLTAGE GAIN:

a) WITHOUT FEEDBACK:

4. To find the voltage gain .Av of the amplifier without feedback disconnect at point B and feed a low input signal (of the order in mv) of 1 KHZ to the input of amplifier. Connect the oscilloscope probe A to the input and probe B to output i.e., at Vo .ensure that the colors of two (input and output) wires connected to oscilloscope are different. Reduce the input signal if the output is distorted. Determine the gain Av of the amplifier with out feedback.

b) WITH FEEDBACK:

5. To find the voltage gain of the amplifier with feedback Av f connect points B and C.Connect probe Bat Vo to Find the out[put voltage .Determine the gain Avf of the Amplifier with feedback.

TO FIND THE FREQUENCY RESPONSE:

a) Frequency response of amplifier with out feedback:

6. For plotting the frequency response of the amplifier with Out feedback. Remove the connection between B and C.
7. Using AC analysis obtains the frequency response of the amplifier with frequency 1Hz to 100MHZ.
8. Using the signal generator feed a low input signal (Vs) of mv, 1KHZ to the amplifier at point A. Connect a CRO at Vo.
9. Note down the 3-db gain points i.e., lower cut off (f_L) and higher cut off frequencies (f_H) Determine the bandwidth of the amplifier with out feedback. BW=f_L-$f_{H.}$

b) Frequency response of amplifier with feedback:

10. For plotting the frequency response of the current shunt Feedback amplifier with feedback connect the points B and C. Connect a CRO at VO.

11. Repeat the above the steps of amplifier with out feedback.

OBSERVATIONS AND CALCULATIONS:

1. INPUT VOLTAGE: V_i =_____

2. OUTPUT VOLTAGE: Vo =_____-

3. TOTAL VOLTAGE GAIN WITH OUT FEEDBACK: ----------

4. f_L = F_h =

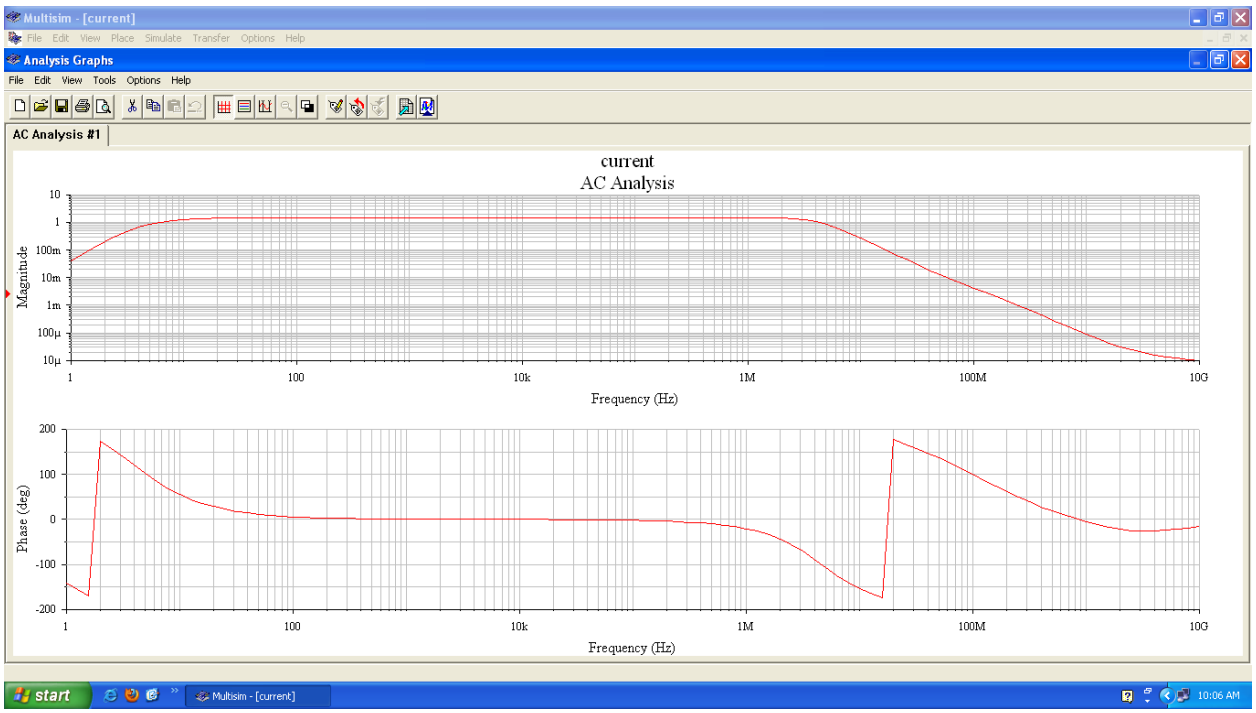
5. TOTAL BANDWIDTH WITHOUT FEEDBACK: ----------

6. TOTAL VOLTAGE GAIN WITH FEEDBACK: ----------

7. f_{Lf} = f_{Hf} =

8. TOTAL BANDIDTH WITH FEEDBACK: ----------

GRAPH:



RESULT: The frequency response of a Current shunt feedback amplifier with and without feedback is observed by using MULTISIM.

VIVA QUESTIONS:

1. What is a feedback amplifier?

2. What is the necessity of feedback?

3. What are the advantages and disadvantages of current shunt feedback amplifier**?**

B) TESTING IN THE HARDWARE LABORATORY:

8. SINGLE TUNED VOLTAGE AMPLIFIER.

9. HARTLEY & COLPITT'S OSCILLATORS.

10. CLASS A POWER AMPLIFIER.

11. COMMON EMITTER AMPLIFIER.

12. COMMON SOURCE AMPLIFIER.

13. TWO STAGE RC COUPLED AMPLIFIER.

EXPERMENT: 8

SINGLE TUNED VOLTAGE AMPLIFIER

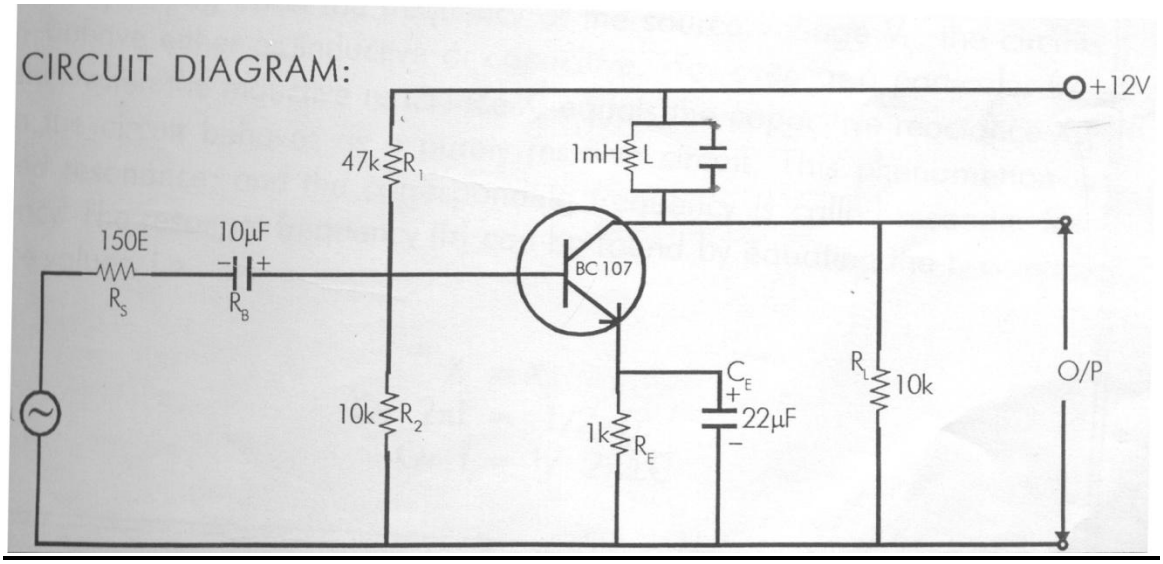
AIM: To study single tuned voltage Amplifier and to calculate

1. Resonant Frequency.
2. Q factor.
3. Bandwidth and
4. Impedance

APPARATUS:

1. Tuned RF Amplifier trainer Kit.
2. Function Generator.
3. CRO.
4. BNC probes and connecting wires

CIRCUIT DIAGRAM:



THEORY:

It is usually required to use a number of tuned amplifier stages in cascade in order to obtain large overall gain. These cascade tuned amplifiers may be put into the following three categories:

1. Single tuned amplifiers.
2. Double tuned amplifiers.
3. Stagger-tuned amplifiers.

Single tuned amplifiers use one parallel tuned circuit as the load impedance in each stage and all these tuned circuits in different stages are tuned to the same frequency.

Double tuned amplifier uses two inductively coupled tuned circuits per stage, both the tuned circuits being tuned to the same frequency.

Staggered tuned amplifier uses a number of single tuned stages in cascade, the successive tuned circuits being tuned to slightly different frequencies.

Single tuned amplifiers may again be put into following two categories:

a) Capacitance coupled single tuned amplifiers and
b) Transformer coupled or inductively coupled single tuned amplifiers.

RESONANT FREQUENCY:

Depending upon the frequency of the source voltage Vs, the circuits may behave either as inductive or capacitive. However, at a particular frequency when the inductive reactance Xl equals the capacitive reactance Xc, then the circuit behaves as a purely resistive circuit. This phenomenon is called resonance: and the corresponding frequency is called resonant frequency. The resonant frequency (fr) can be found by equating the two reactance values, i.e.,

PROCEDURE:

1. Connect ions should be made as per the circuit diagram.
2. Connect the AC signal source from function generator (above AF range) to input of the trainer kit.
3. Keep the input voltage constant , vary the frequency in regular steps and down the corresponding output voltage
4. Calculate the resonant frequency.
5. Plot the graph: gain (db) Vs frequency
6. Find the input and output impedance
7. Calculate the bandwidth and Q factor

PRECAUTIONS:

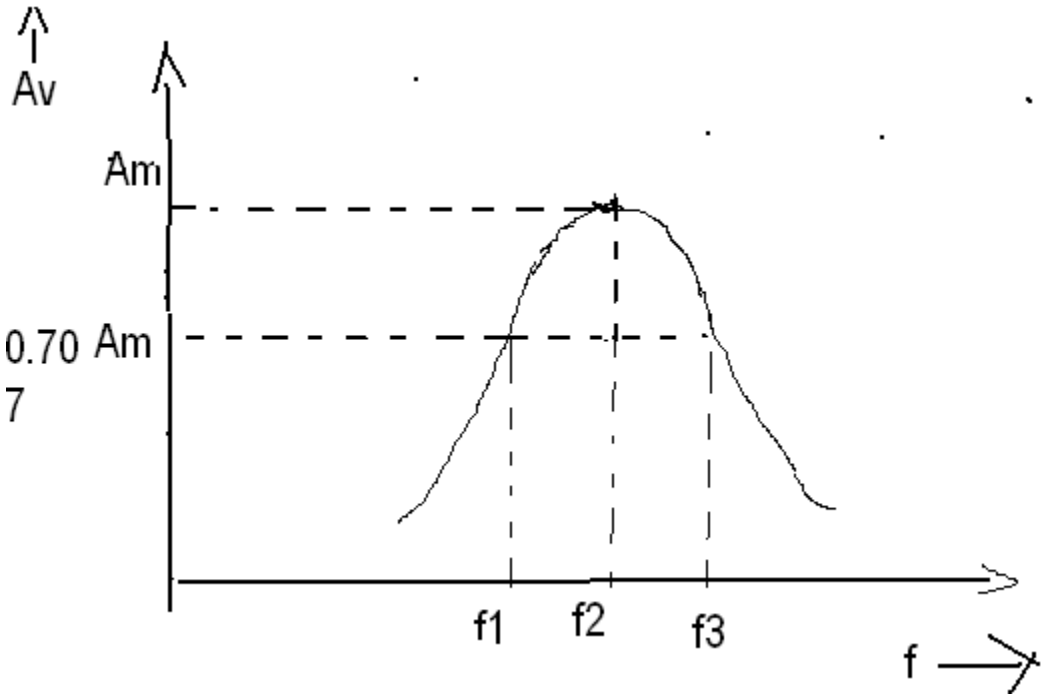
1. Check connections before switching ON power supply
2. Don't apply over voltage
3. When you are not using the equipment switch them OFF.
4. Handle all equipment carefully

OBSERVATION:

Input voltage = (constant)

s.no	Input Frequency (hertz)	Output voltage(v)	Gain = V_{out}/V_{in}	Gain in dB

EXPECTED GRAPH:



RESULT: Gain and frequency as observed of single tuned voltage amplifier.

VIVA QUESTIONS:

1. What are tuned amplifiers?

2. What is tuning?

3. Explain how the tuned amplifiers work?

EXPERMENT: 9

HARTLEY AND COLPITTS OSCILLATORS

AIM: To study the operation of Hartley and Colpitts oscillator and to find its frequency of oscillations.

APPARATUS:

1. Cathode Ray Oscilloscope
2. Hartley & Colpitts trainer kit
3. Patch cords

CIRCUIT DIAGRAM:

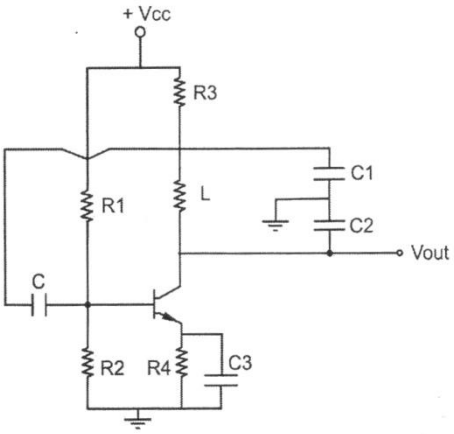


fig: Colpitts oscillator

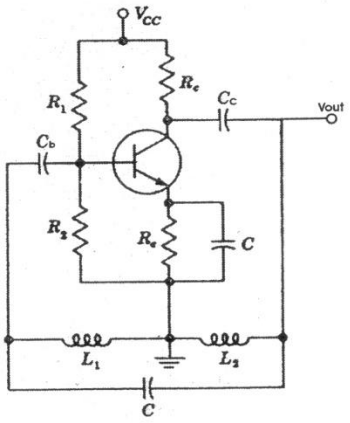


fig: Hartley oscillator

THEORY:

Hartley oscillator:

The Hartley oscillator is one of the simplest and best known oscillators and is used extensively in circuits, which work at radio frequencies. Figure shows the basic Hartley oscillator circuit configuration .The transistor is in voltage divider bias, which sets up Q- point of the circuit. The output voltage is fed back to the base and sustains oscillations developed across the tank circuit, provided there is enough voltage gain at the oscillation frequency.

The Hartley oscillator is an LC electronic oscillator that derives its feedback from a tapped coil in parallel with a capacitor. Although their is no requirement for there to be mutual coupling between the two coil segments, the circuit is usually implemented as such. A Hartley oscillator is essentially any configuration that uses a pair of series connected coils and a single capacitor. Hartley oscillator is similar to Colpitt's oscillator with minor modification. Instead of using tapped capacitance, two inductance L_1 and L_2 are placed across a common capacitance C and the center of the inductors is tapped as shown in figure 1. The tank circuit up of L,.L2 and C.The resonant frequency of the Hartley oscillator can be calculated from the tank circuit used . We can calculated the approximately resonant frequency as

$$F_r = 1/2\pi\sqrt{L_T C}$$

Here, the inductor used is the equivalent inductance. In Hartley oscillator the circulating current pass through the series combination of 1 and L2 .Therefore equivalent inductance is,

$$L_T=L_1+L_2+2M$$

Where, M is the mutual inductance between two inductors.

$$M= K\sqrt{L_1 L_2}$$

Where K is the coefficient of coupling .lies between 0 to 1. The coefficient of coupling gives the extent to which two inductors are couple.

Colpitt Oscillator:

The colpitt oscillator is one of the simplest and best known oscillators and is used extensively in circuits, which work at radio frequencies. Figure shows the basic colpitt oscillator circuit configuration. The transistor is in voltage divider bias, which sets up Q-point of the circuit. In the circuit note the V_{out} is actually the AC voltage across C2. This voltage is feedback to the base sustains oscillations developed across the tank circuit, provided there is enough voltage at the oscillation frequency.

The resonant frequency of the colpitt oscillator can be calculated from the tank circuit used. We can calculate the approximately resonant frequency as

$$\text{Resonant frequency (Fr)} = 1/2\pi\sqrt{(LC)}$$

Here, the equivalent capacitance is the circulating current passes through. In colpitt oscillator the circulating current passes through the series combination of C1 and C2. Therefore equivalent capacitance is :

$$C_{equ} = C1 * C2/C1+ C2$$

PROCEDURE FOR HARTLEY OSCILLATOR:

1. Connect 12V DC supply to the trainer board NV6505.
2. Now connect +12 V terminal on TP1 and Gnd to Gnd using patch cord as shown in figure 1
3. Connect terminals a and b together.
4. Similarly connect d and Gnd together
5. Switch on the mains supply.
6. Connect oscilloscope between Vout (TP4) and Gnd.
7. If you want to check the unfiltered output waveform, you may observe the signal on TP3 also.
8. Measure the value of output frequency on oscilloscope.
9. Record it into the observation table.
10. Calculate the resonance frequency using equation.
11. Compare the resonance frequency with the theoretical calculated value.
12. Switch off the supply.
13. Remove the patch cord connected between terminals a and b and connect it between a and c.
14. Similarly remove the patch cord connected between terminals d and Gnd and connect it between e and Gnd.
15. Follow the procedure from step 5 to 12

OBSERVATION

S.No.	Capacitor	Inductor	C_{eq} (Equivalent Capacitance)	L (Equivalent Inductance)	Output frequency (Measured)	Output frequency (Theoretical)

PROCEDURE FOR COLPITTS OSCILLATOR:

1. 1. Connect 12V DC supply to the trainer board NV6505.
2. Now connect +12 V terminal on TP1 and Gnd to Gnd using patch cord as shown in figure 1
3. Connect terminals a and b together.
4. Similarly connect d and Gnd together
5. Switch on the mains supply.
6. Connect oscilloscope between Vout (TP4) and Gnd.
7. Measure the value of output frequency on oscilloscope
8. Calculate the resonance frequency using equation.
9. Compare the resonance frequency with the theoretical calculated value.
10. Switch off the supply.
11. Remove the patch cord connected between terminals a and b and connect it between a and c.
12. Similarly remove the patch cord connected between terminals d and Gnd and connect it between e and Gnd.
13. Follow the procedure from step 4 to 9.

OBSERVATIONS:

RESULT:

The frequencies of oscillations for Hartley and Colpitts oscillators are calculated theoretically and practically**.**

EXPERMENT: 10

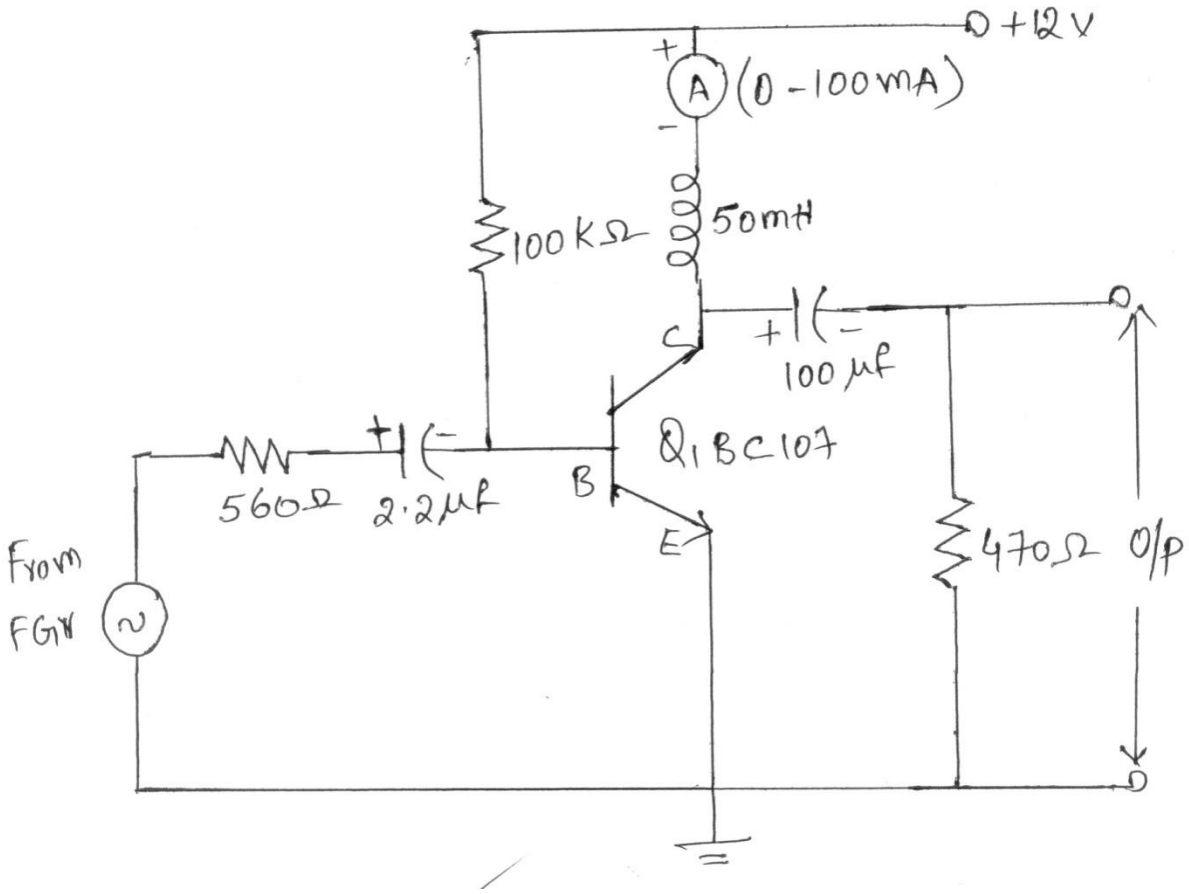
CLASS A POWER AMPLIFIER

AIM: To design and test the class A power amplifier

APPARATUS:

1. Class A power Amplifier trainer Kit.
2. Function Generator.
3. CRO.
4. BNC probes and connecting wires

CIRCUIT DIAGRAM:



THEORY:

The amplifier is said to be class A power amplifier if the q point and the input signal are selected such that the output signal is obtained for a full input cycle . For this class the position of q point is approximately y at the mid point of the load line. For all the values of input signal the transistor remains in the active region and never entire into the cutoff or saturation region. The collector current flows for 3600 (life cycle) of the input signal in other words the angle of the collector current flow is 3600 the claa a amplifiers or furthers classified as directly coupled and transformer coupled and transformer coupled amplifiers in directly coupled type .The load is directly connected in the collector circuit while in the transformer coupled type, the load is coupled to the collector using the transformer.

Advantages:

1. Distortion analysis is very important

2. It amplifies audio frequency signals faithfully hence they are called as audio amplifiers

Disadvantages:

1. H parameter analysis is not applicable

2.Due to large power handling the transistor is used power transistor which is large in size and having large power rating.

PROCEDURE:

1. switch ON Class –A power amplifier trainer

2. Set Vs (say 250 to 300 mV), at 10 KHz using signal generator.

3. Connect milli ammeter to the ammeter terminals

4. By keeping the input voltage constant, vary the frequency from 0 to 1MHz

in regular steps .

5. Note down the corresponding output voltage from CRO

6. Calculate the DC input power using the formula Pdc= $V_{cc}I_c$

7. Calculate the AC output power using the formula Pac = $V_O^2/8R_L$

8. Calculate the efficiency n = Pac /Pdc

9. Plot the graph between Gain (db) and frequency.

10. Calculate bandwidth from the graph.

PRECAUTIONS:

1. Check connections before switching ON power supply

2. Don't apply over voltage

3. When you are not using the equipment switch them OFF.

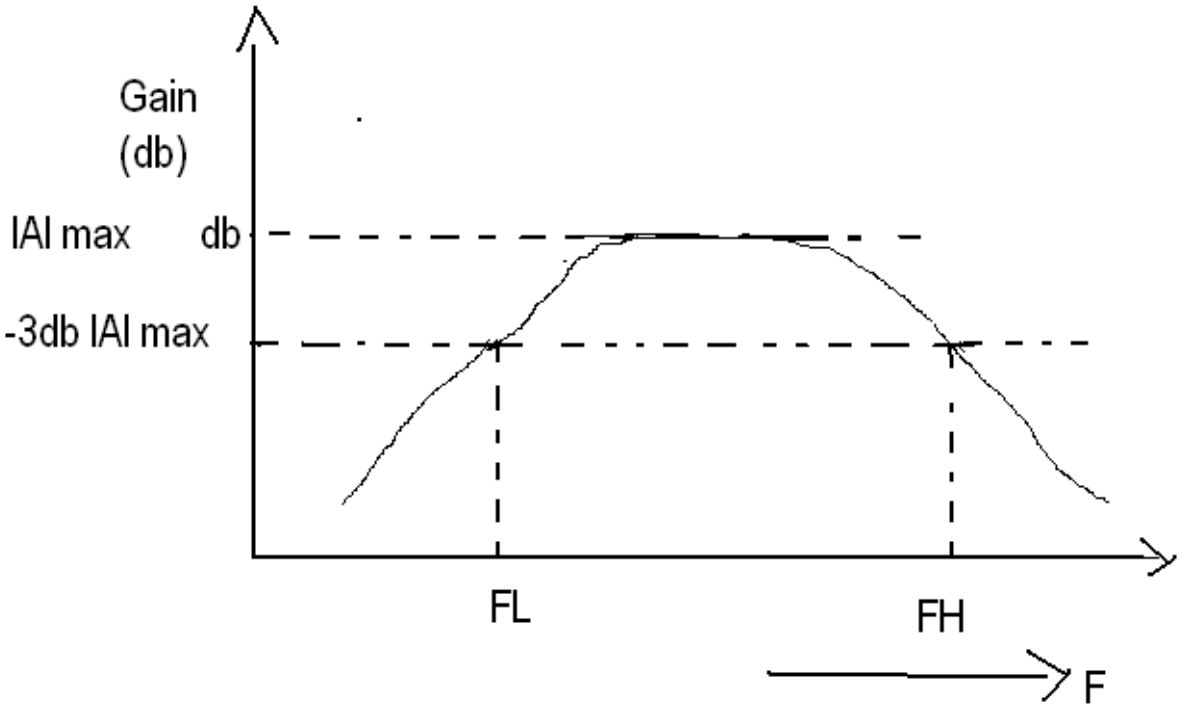
4. Handle all equipment carefully.

OBSERVATION:

Input voltage = (constant)

s.no	Input Frequency (hertz)	Output voltage(v)	Gain = V_{out}/V_{in}	Gain in dB

EXPECTED GRAPH:



RESULT: Gain and frequency as observed of Class A power amplifier.

EXPERMENT: 11

COMMON EMITTER AMPLIFIER

AIM: To study Out frequency Response of common emitter Amplifier and to find out its Bandwidth.

APPARATUS:

1. Transistor BC 107-1no
2. Resistor-2.2K ohms-2no

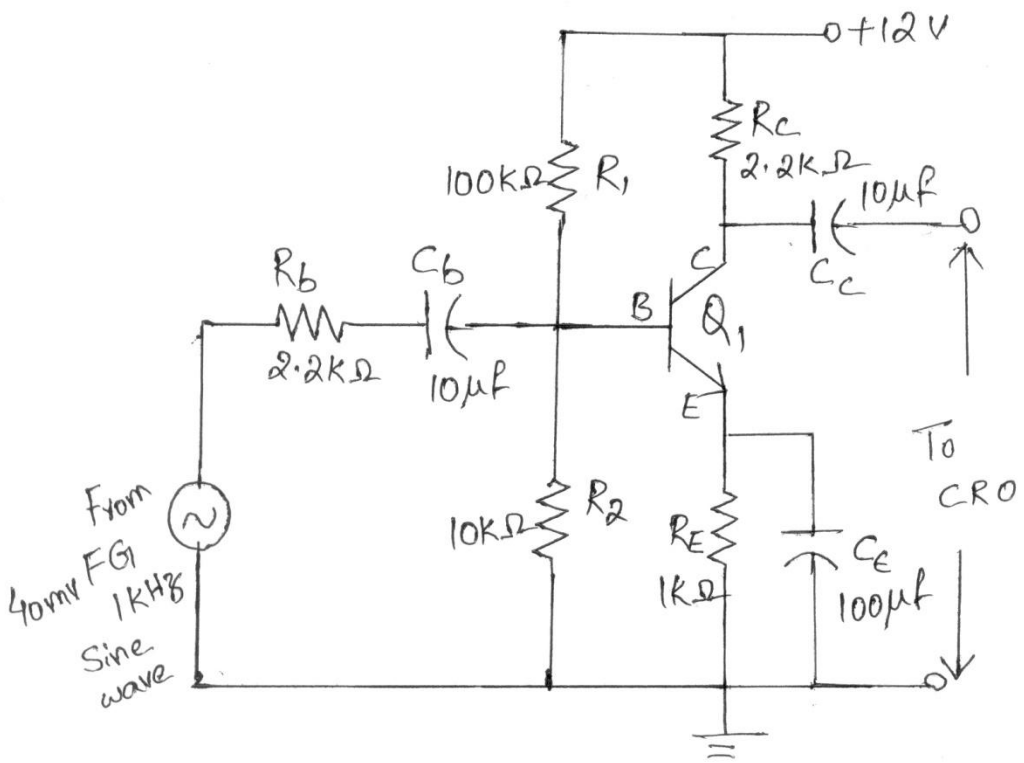
   10K ohms-1no

   100K ohms-1no

   1K ohms-1no
3. Capacitor-10µf- 2no

   100- 1n0
4. Function generator
5. CRO
6. Regulated power supply
7. Connecting wires
8. Bread board

CIRCUIT DIAGRAM:



THEORY:

The CE amplifier provides high gain &wide frequency response. The emitter lead is common to both input & output circuits and is grounded. The emitter-base circuit is forward biased. The collector current is controlled by the base current rather than emitter current. The input signal is applied to base terminal of the transistor and amplifier output is taken across collector terminal. A very small change in base current produces a much larger change in collector current. When +VE half-cycle is fed to the input circuit, it opposes the forward bias of the circuit which causes the collector current to decrease, it decreases the voltage more –VE. Thus when input cycle varies through a -VE half-cycle, increases the forward bias of the circuit, which causes the collector current to increases thus the output signal is common emitter amplifier is in out of phase with the input signal.

PROCEDURE:

1. Construct the circuit as shown in figures.

2. Connect the signal generator to the input terminal.

3. Connect the output terminal to the CRO.

4. Change the frequency of input signal from 10HZ to 1MHZ in steps and note down amplitudes of input and output waveforms (input signal should be maintained constant).

5. Select 1KHZ sine wave signal on the generator and set the amplitude.

6. Set the output of the signal on the generator just below the point of distortion so that maximum un distorted sine wave appeared on the screen of the scope .

OBSERVATIONS:

Input voltage = (constant)

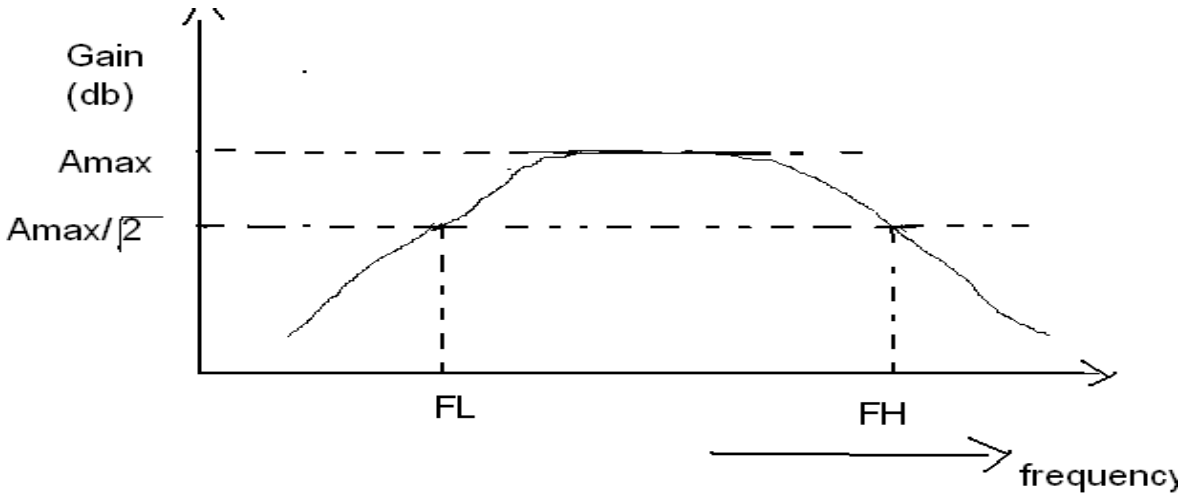
s.no	Input Frequency (hertz)	Output voltage(v)	Gain = V_{out}/V_{in}	Gain in dB

PRECAUTIONS:

1. Check connections before switching ON power supply.

2. Don't apply over voltage
3. When you are not using the equipment switch them Off.
4. Handle all equipment carefully.

EXPECTED GRAPH:



RESULT: The frequency response for CE amplifier is plotted and 3 db band widths calculated.

EXPERMENT: 12

COMMON SOURCE AMPLIFIER

AIM: To Calculate the voltage gain and the bandwidth of FET Common Source Amplifier.

APPARATUS:

1. Transistor BFW11-1no
2. Resistor-2.2K ohms-2no

   10K ohms-1no

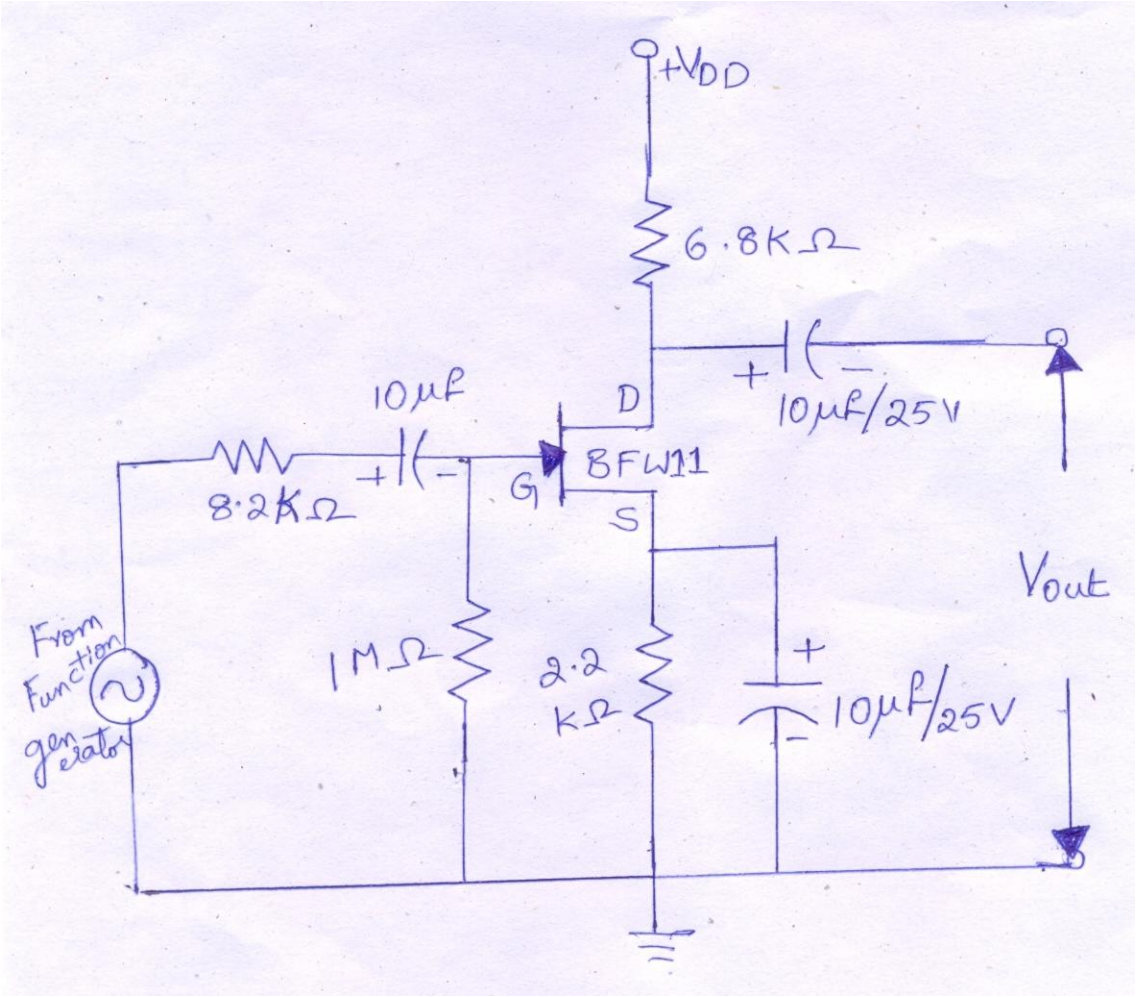
   100K ohms-1no

   1K ohms-1no
3. Capacitor-10µf- 2no

   100- 1n0
9. Function generator
10. CRO
11. Regulated power supply
12. Connecting wires
13. Bread board

.

CIRCUIT DIAGRAM:



THEORY:

An amplifier is used to increase the signal level i.e., the amplifier is used get larger signal output from a small signal input. We will assume a sinusoidal signal at the input of the

amplifier. At the output, signal must remain sinusoidal in waveform with frequency same as that of the input .To make transistor work as an amplifier, it is to be bias to operate in active region i.e., base emitter junction is forward bias while base –collector to be reverse biased.

Field effect transistor (FET) is a popular active device of electronics it is widely used for amplification as well as switching similar to that of bipolar junction transistor (BJT) .The operation of this device depends on the control of flow current by virtue of electric field this is a uni polar device that is the operation of the device based on the flow of only one type of charge only majority carriers contribute to the flow of current and minority carriers have no role to play in the process of operation , unlike BJT they greatest advantage with FET is that it has very high input impedance , which the prime requirement for a voltage amplifier

PROCEDURE:

1. Enter in to the Multisim 2001 software.
2. Customize the screen and then draw the circuit on the screen with the help of mouse.
3. Connect the CRO and ground it.
4. The input terminal is connected to one terminal of CRO and output to the terminal.
5. Switch on CRO and observe the input and output waveforms.
6. Determine the input and output voltage and calculate the voltage gain.
7. The frequency response of (amplitude) amplifier is found out by dc and ac analysis.

OBSERVATIONS:

V_1 = Input voltage = ----------

V_O = Output voltage = ----------

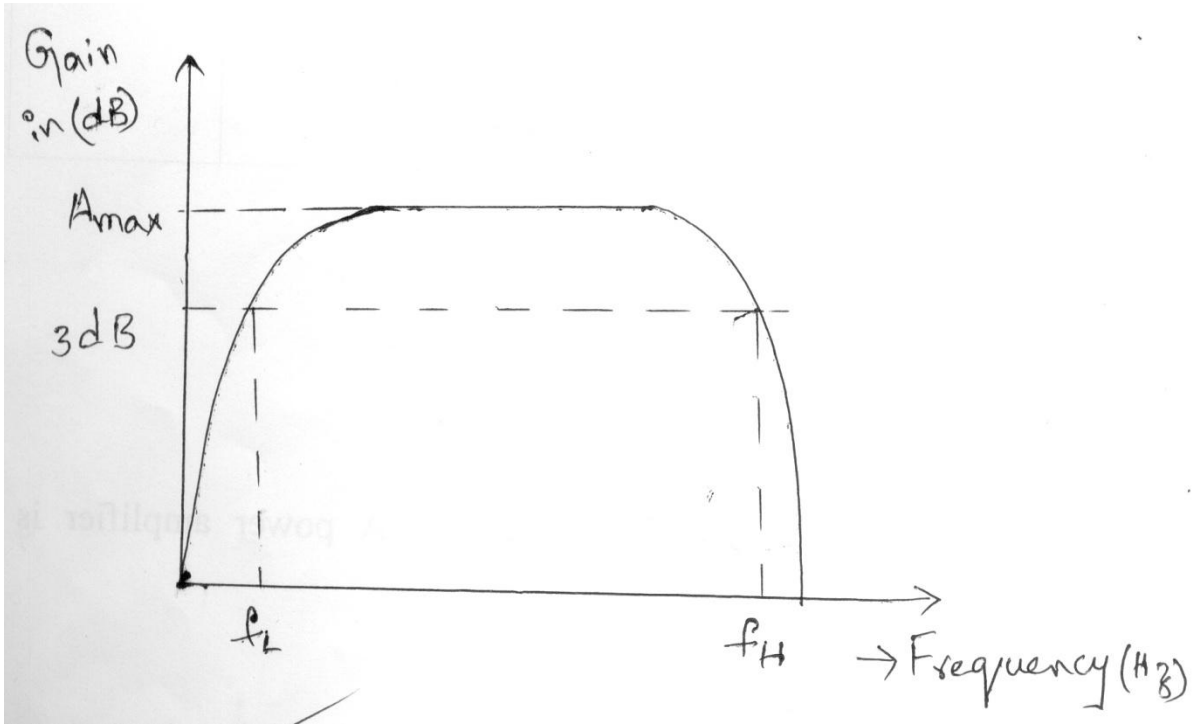
CALCULATIONS:

Voltage gain = (output voltage / input voltage) = ----------

Bandwidth = F_2 - F_1 = ----------

Gain in decibels = ----------

EXPECTED GRAPH:



RESULT:

The voltage gain of CE Amplifier = ----------

The bandwidth of CE Amplifier = ----------

EXPERMENT: 13

TWO STAGE RC COUPLED AMPLIFIER

AIM: To plot the frequency response of a two stage RC –coupled amplifier using BJT and calculate 3-db band width

EQUIPMENT REQUIRED:

1. Bread board
2. Cathode ray oscilloscope (CRO)
3. DC Regulated power supply
4. Function generator
5. Transistor-BC 107-2nos
6. Resistors: 10KΩ, 47KΩ, 2.2KΩ, 1KΩ.-2nos
7. Capacitors: 10µf-2nos 47µf-2no

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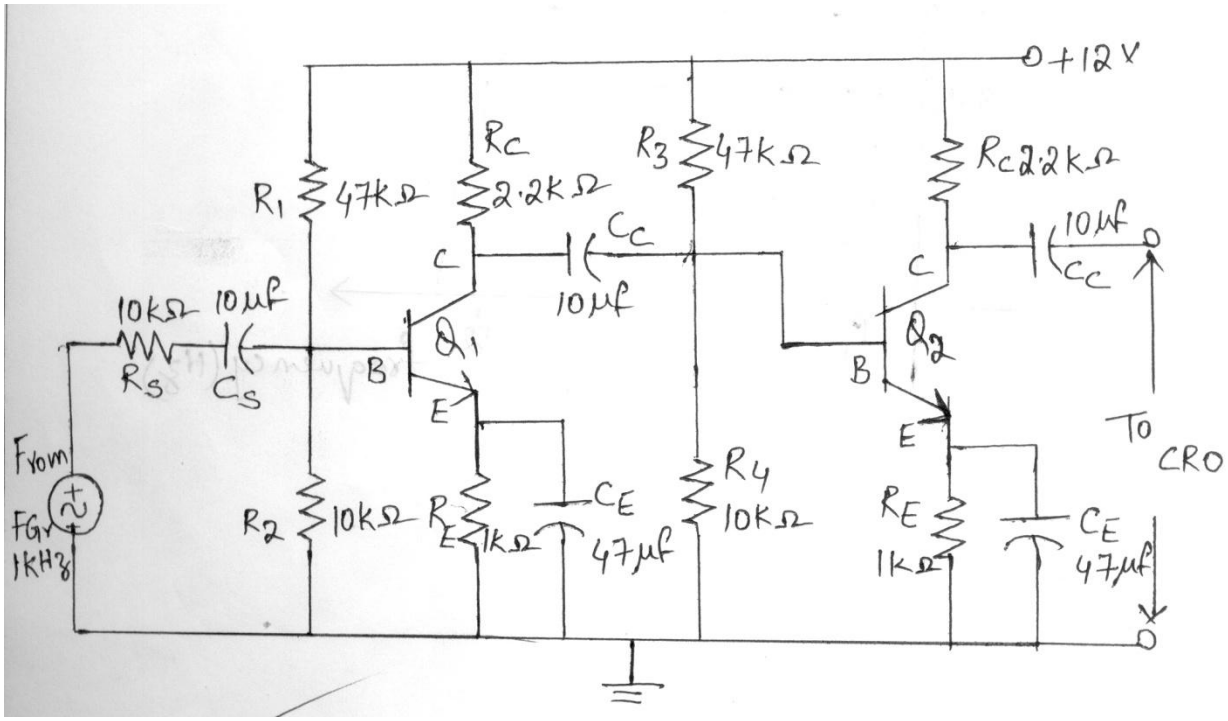
CIRCUIT DIAGRAM:



THEORY: Whenever large amplification with very good impedance matching is required using an active device such as a transistor or a field effect transistor a single active device and its associated circuitry will not be able to cater to the needs. In such a case single stage amplifier is not sufficient and one requires more stages of amplification i.e., output of one stage is connected to the input of second stage of amplification circuit and the chain continues until the required characteristics of amplifier is achieved such an amplifier is called as multistage amplifier

In multistage amplifier, the output signal preceding stage is to be coupled to the input circuit of succeeding stage. For this interstage coupling different types of coupling can be employed. They are

1. RC coupling
2. Transformer coupling
3. Direct coupling

RC coupling is most popularly used type of coupling because it is cheap and provides excellent fidelity over a wide range of frequency .it is usually employed for voltage

amplification .A coupl.ing capacitor is connected to the output of first stage to the base of the input of the second stage and so on.

PROCEDURE:

1) Connect the circuit as shown in the figure.
2) Apply 1KHZ Sine wave from function generator and calculate maximum signal handling capacity.
3) Adjust amplitude of sine wave such that it is less than maximum signal handling capacity.
4) Observe input and output Waveforms simultaneously on C.R.O
5) Change the frequency of input signal from 10HZ to 1MHZ in steps and note amplitudes of input and output Waveforms (input signal should be maintained constant)
6) Calculate Voltage gain (A) for each (in db) verses frequency on semi log sheet and calculate 3db Band width.

OBSERVATIONS:

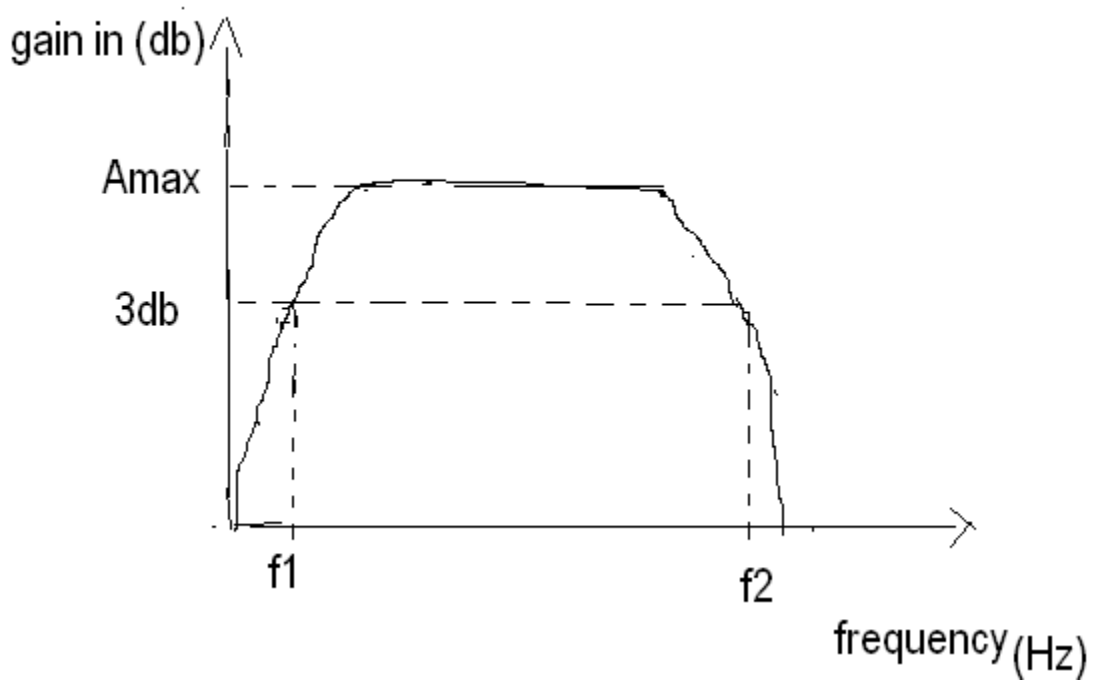
S.NO	Frequency(HZ)	Input Voltage'vi'(m volt)	Output Voltage'vi'(m volt)	Gain A=vo/vi	Gain in db=20 log A

PRECAUTIONS:

1. Check connections before switching ON power supply.
2. Don't apply over voltage
3. When you are not using the equipment switch them OHH

4. Handle all equipment carefully

EXPECTED GRAPH:



RESULT:

Plotted the frequency response of a two stage RC coupled amplifier using BJT and 3db bandwidth calculated=_____