PRACTICAL (16PHU312)

SYLLABUS:

1. To design bridge rectifier circuit and study effect of C-filter.
2. To design the active Low pass filters of given specification.
3. To design the active High pass filters of given specification.
4. To design the active filter (band reject) of given specification.
5. To study the output and transfer characteristics of a JFET.
6. To design a common source JFET Amplifier and study its frequency response.
7. To design an Amplitude Modulator using Transistor.
8. To design an Astable multivibrator of given specifications using IC 555.

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Experiment No:1

Date:

FULL WAVE BRIDGE RECTIFIER

AIM

To construct full wave bridge rectifier circuit using pn junction diode and find the ripple factor

APPARATUS:

pn junction diode, Resistance, Regulated power supply, Ammeter, Voltmeter, Bread board and connecting wires.

THEORY

A rectifier is an electrical device that converts alternating current (AC), to direct current (DC), which flows in only one direction. The process is called rectification.

In full wave bridge rectifier circuit four diodes are arranged in the form of a bridge. This configuration provides same polarity output with either polarity. During first half cycle of the AC input, diodes D1 and D_4 are forward biased. Current flows through path 1-2, enter into the load R_L. It returns back flowing through path 4-3. During this half input cycle, the diodes D_2 and D_3 are reverse biased. During the next cycle lower portion of the transformer is positive with respect to the upper portion. Hence during this cycle diodes D2 and D3 are forward biased. Current flows through the path 3-2 and flows back through the path 4-1.The diodes D1 and D4 are reverse biased. So there is no current flow through the path 1-2 and 3-4.Thus negative cycle is rectified and it appears across the load.

Ripple Factor (r): It is the ratio of root mean square (rms) value of AC component to the DC component in the output

PROCEDURE

WITHOUT FILTER:

1. Connect the circuit as shown in the diagram (1).
2. Connect the primary of the transformer to main supply i.e. 230V, 50Hz

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4. Switch on the power and measure the output across the load resistor RL and AC across secondary of the transformer.

5. Calculate ripple factor $\gamma = Vac / Vdc$

WITH CAPACITOR FILTER:

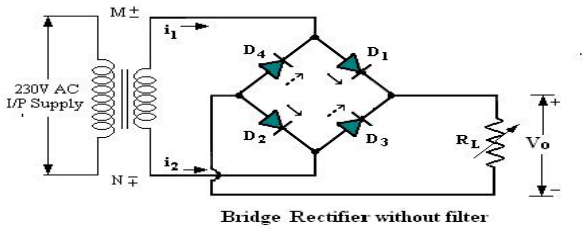
1. Connect the circuit as shown in the diagram (2).

2. Connect the primary of the transformer to main supply i.e. 230V, 50Hz

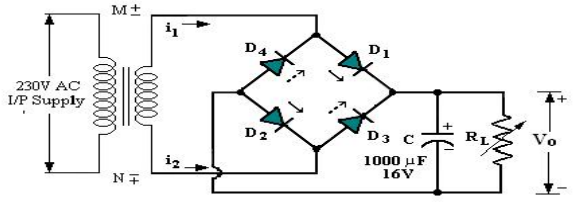
4. Switch on the power and measure the output across the load resistor RL and AC across secondary of the transformer.

5. Calculate ripple factor $\gamma = Vac / Vdc$

CIRCUIT DIAGRAM



Bridge Rectifier without filter



Bridge Rectifier with capacitor filter

TABULAR FORMS:

WITH OUT FILTER:

S No	Load Resistance R_L in Ω	Output Voltage Vo		Ripple factor Γ = Vac/Vdc
		V ac in	V dc in	

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		Volt	Volt	

WITH FILTER

S No	Load Resistance R_L in Ω	Output Voltage Vo		Ripple factor Γ = Vac/Vdc
		V ac in Volt	V dc in Volt	

RESULT

Ripple factor of bridge rectifier with filter =

Ripple factor of bridge rectifier without filter =

VIVA –QUESTIONS

1. What is full wave bridge rectifier?
2. Explain the working principle of full wave bridge rectifier.
3. What is the efficiency of full wave bridge rectifier?
4. What is the effect of capacitor in this circuit?
5. What are the advantages of full wave bridge rectifier?

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Experiment No:2

Date:

FIRST ORDER LOW PASS FILTER

AIM

To construct study the characteristics of active low pass filter using op-amp and draw the frequency response curve.

APPARATUS

Op-amp(IC 741), Resistors, Capacitors, Constant Dual power supply, Signal Generators, CRO, Bread board and connecting wires.

THEORY

A low-pass filter (LPF) is an active filter which passes low frequency signals and stops high frequency signal i.e., it transmit signals with a frequency lower than a certain cut off frequency and attenuates signals with frequencies higher than the cut off frequency.

PROCEDURE

1. Connections are made as shown in the diagram
2. Set the input signal as 1V (peak to peak) from function generator and apply to the circuit.
3. Observe the output from the CRO.
4. Vary the input frequency from signal generator and measure the corresponding output voltage.
5. Draw the frequency response curve in semilog graph.
6. Find out the cut off frequency from the graph and compare it to the theoretical value

$$f_H = 1/2\pi RC$$

CIRCUIT DIAGRAM

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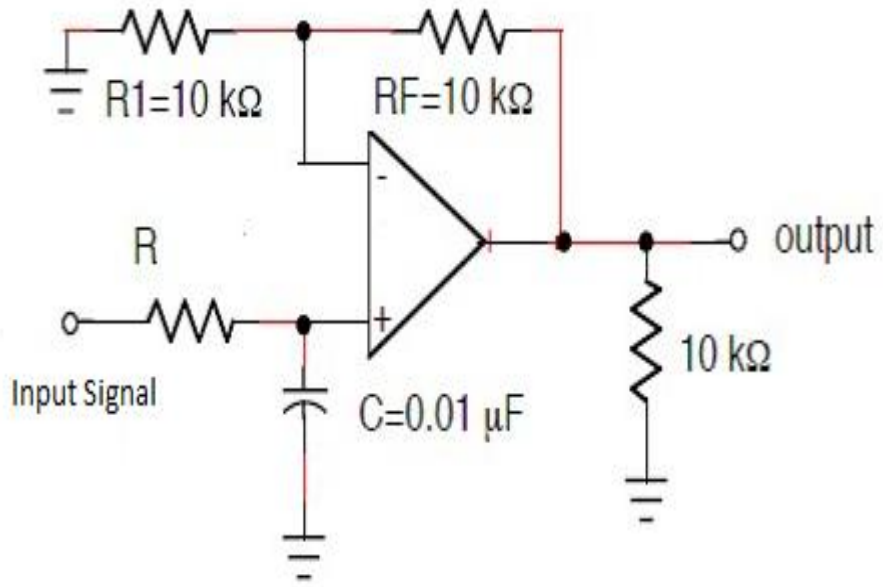

TABULAR FORM

Input Voltage Vi =……. Volts

Frequency in Hz	Output Voltage Vo in Volts	Gain =Vo/Vi	Gain in dB = 20log Gain

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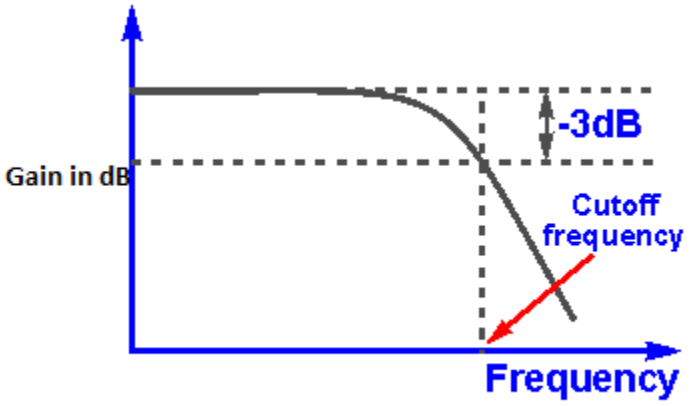
MODEL GRAPH



RESULT

Low pass filter using operational amplifier is constructed and calculated the cut off frequency.

Viva-Questions

1. What is filter?
2. What is low pass filter?
3. What is passive filter?
4. What is the role of Op-amp in filter circuits?
5. Explain the working principle of Low pass filter.

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Experiment No:3

Date:

FIRST ORDER HIGH PASS FILTER

AIM

To construct study the characteristics of active high pass filter using op-amp and draw the frequency response curve.

APPARATUS

Op-amp(IC 741), Resistors, Capacitors, Constant Dual power supply, Signal Generators, CRO, Bread board and connecting wires.

THEORY

A high pass filter is an active filter which passes high frequency signal and stops low frequency signal i.e., it passes signals with a frequency higher than a certain cutoff frequency and attenuates signals with frequencies lower than the cutoff frequency.

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PROCEDURE

1. Connections are made as shown in the diagram
2. Set the input signal as 1V (peak to peak) from function generator and apply to the circuit.
3. Observe the output from the CRO.
4. Vary the input frequency from signal generator and measure the corresponding output voltage.
5. Draw the frequency response curve in semilog graph.
6. Find out the cut off frequency from the graph and compare it to the theoretical value

$$f_H = 1/2\pi RC$$

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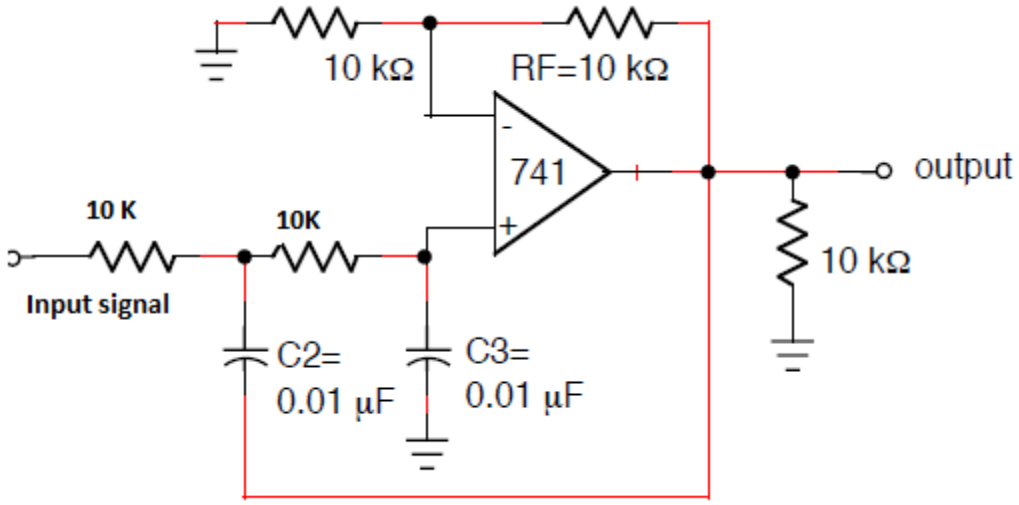
CIRCUIT DIAGRAM



TABULAR FORM

Input Voltage Vi =……. Volts

Frequency in Hz	Output Voltage Vo in Volts	Gain =Vo/Vi	Gain in dB = 20log Gain

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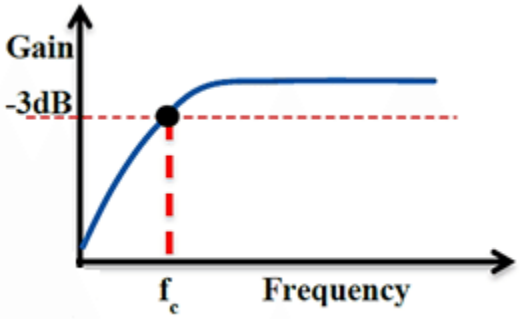
MODEL GRAPH



RESULT

High pass filter using operational amplifier is constructed and calculated the cut off frequency.

Viva-Questions

1. What is active filter?

2. What is high pass filter?

3. What are the filter components used in high pass filter?

4. What is the role of Op-amp in filter circuits?

5. Explain the working principle of High pass filter.

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Experiment No:4

Date:

NARROW BAND REJECT FILTER

AIM

To construct and to study the characteristics of active narrow reject filter using op-amp and draw the frequency response curve.

APPARATUS

Op-amp(IC 741), Resistors, Capacitors, Constant Dual power supply, Signal Generators, CRO, Bread board and connecting wires.

THEORY

Narrow band reject filter is a combination of low pass and high pass filter. It is a frequency selective circuit. It is called as Notch filter, it rejects a narrow band of frequency. That is it rejects a particular frequency having a notch where the signals are rejected.

PROCEDURE

1. Connections are made as shown in the diagram
2. Set the input signal as 1V (peak to peak) from function generator and apply to the circuit.
3. Observe the output from the CRO.
4. Vary the input frequency from signal generator and measure the corresponding output voltage.
5. Draw the frequency response curve in semilog graph.
6. Find out the cut off frequency from the graph and compare it to the theoretical value

$$f_H = 1/2\pi RC$$

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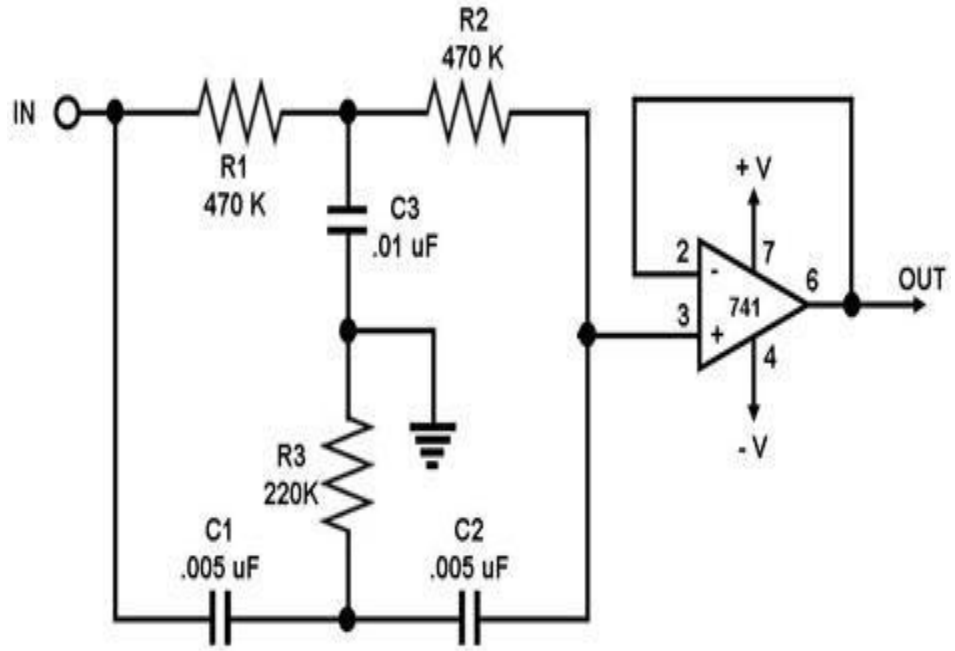
CIRCUIT DIAGRAM



TABULAR FORM

Input Voltage Vi =……. Volts

Frequency in Hz	Output Voltage Vo in Volts	Gain =Vo/Vi	Gain in dB = 20log Gain

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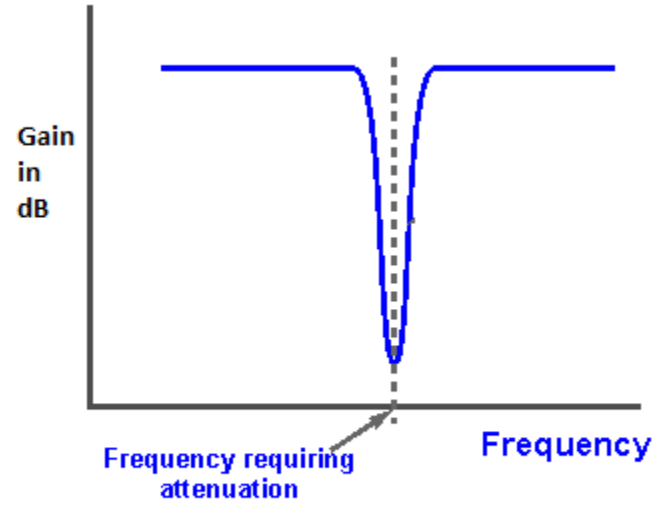
MODEL GRAPH



RESULT

Narrow band reject filter using operational amplifier is constructed and calculated the cut off frequency.

Viva-Questions

1. What is wide band reject filter?

2. What is notch filter?

3. Draw the frequency response curve of notch filter.

4. What are the applications of notch filter?

5. Explain the working principle of notch filter.

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Experiment No:5

Date:

JUNCTION FIELD EFFECT TRANSISTOR

AIM:

To study the characteristics of junction field effect transistor and plot the characteristics curve.

APPARATUS:

JFET transistor (BMW10), Resistance, Regulated power supply, Voltmeters, Ammeters, Bread board and connecting wires.

THEORY

It is a voltage controlled semiconductor device. JFET is a unipolar device since the current is carried by only one type of carriers. It has a very high input electrical resistance. Field effect transistor or FET is a voltage controlled device because it consists of a section of silicon whose conductance is controlled by an electric field. The section of silicon through which the current flows is called the channel, and it consists of one type of silicon, either N-type or P-type. It has three terminals Source, Drain and gate. Circuit operation is controlled by gate voltage.

Parameters to be calculated:

rd = ΔVDS/ ΔID (VGS = constant)

Transconductance, gm = ΔID/Δ VGS (VDS = constant).

PROCEDURE

To find the input characteristics:

1. Connect the circuit as shown in the circuit diagram.
2. Keep the output voltage V_{DD} constant and by varying gate voltage note down the corresponding change in I_D and $V_{GS.}$
3. Repeat the above steps for different values of $V_{GG.}$
4. Plot the input characteristics.

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To find the output characteristics:

1. Connect the circuit as shown in the circuit diagram.
2. Keep the input voltage V_{GG} constant and by varying V_{DD} note down the corresponding change in I_D and $V_{DS.}$
3. Repeat the above steps for different values of $V_{DD.}$
4. Plot the output characteristics.

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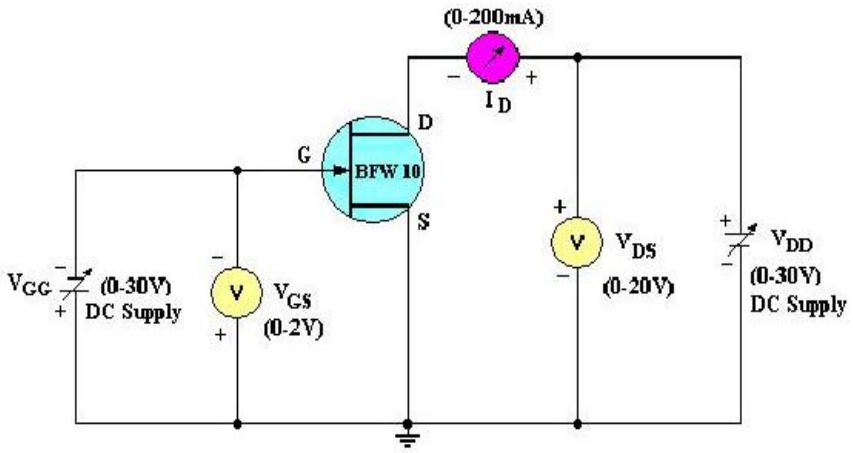
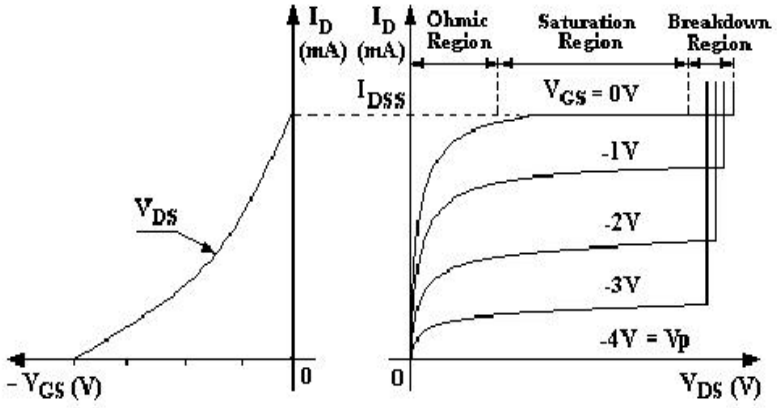
CIRCUIT DIAGRAM



MODEL GRAPH



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TABULAR FORM:

DRAIN CHARACTERISTICS:

S.No	VDS (V)	VGS = 0 volts ID (mA)	VGS = -1V ID (mA)	VGS = -2V ID (mA)

TRANSFER CHARACTERISTICS:

S.No	VGS (V)	VDS = 1.0V ID (mA)	VDS = 3.0V ID (mA)	VDS = 5.0Ā ID (mA)

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RESULT

The characteristics of transistor using were studied and plot the characteristics curve.

Viva-questions

1. Define transconductance.
2. What is JFET?
3. What are the difference between JFET and BJT?
4. Why JFET is known as voltage controlled device?
5. What is saturation region and break down region?

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Experiment No:6

Date:

JUNCTION FIELD EFFECT AMPLIFIER

AIM:

To construct JFET amplifier and plot the frequency response curve.

APPARATUS:

JFET transistor (BMW10), Resistance, Regulated power supply, function generator, CRO, Bread board and connecting wires.

THEORY

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One of the important operations of JFET is amplification. It amplified the weak signal connected to the gate terminals. Gate - source junction (input) is always reverse biased, so that a small change in the reverse bias on the gate produces a large change in drain current. This process will make JFET act as amplifier. Advantages of JFET amplifier over bipolar transistors are extremely high input impedance and low noise output.

PROCEDURE:

1. Connect the circuit as shown in the Diagram.
2. Set input voltage (1 V) from the Signal Generator
3. Observe the output wave form from CRO
4. Vary the frequency from Signal Generator in appropriate steps and note down the corresponding O/P Voltage Vo.
4. Calculate the Voltage Gain Av = Vo/Vi and note down in the tabular form.
5. Plot the frequency response curve on a Semi-log Graph sheet
6 Find out the Bandwidth B.W = f2 – f1.

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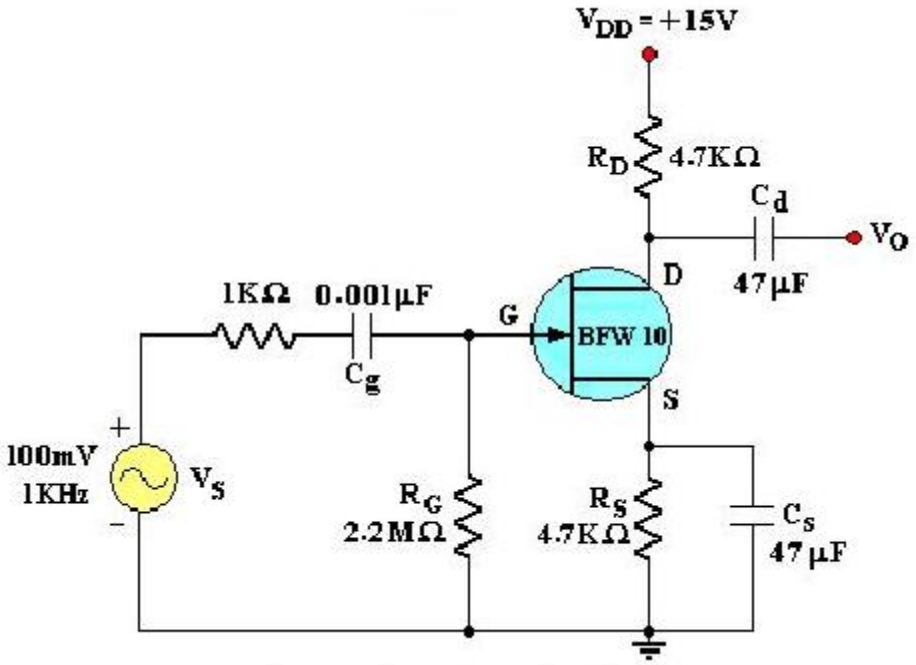
CIRCUIT DIAGRAM



TABULAR FORMS:

Input Voltage= …….. V

S.No	Frequency (Hz)	O/P Voltage, Vo (V)	Voltage Gain Av =Vo/Vi	Av in dB = 20 log (Av)

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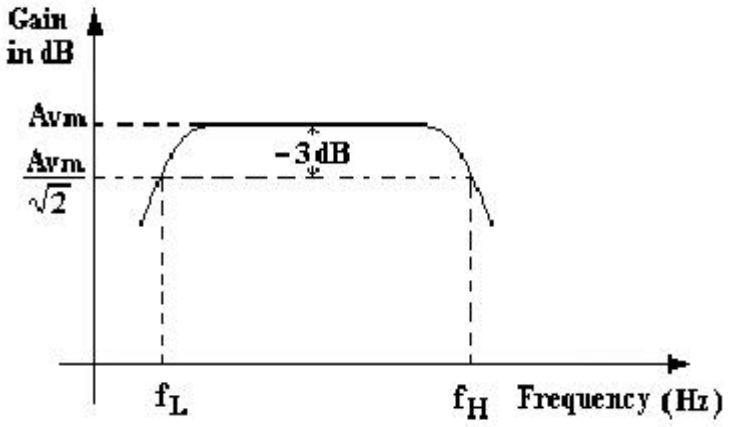
MODEL GRAPH



RESULT

Junction field effect transistor amplifier is constructed and plot the frequency response curve.

Bandwidth =

Viva-Questions

1. Explain the working of JFET as an amplifier.
2. What are the advantages of JFET amplifier?
3. Define stabilization?
4. Explain the biasing of JFET amplifier.
5. What is the use of Rs and Cs in the amplifier circuit?

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Experiment No:7

Date:

ASTABLE MULTIVIBRATOR

AIM

To study the operation of IC555 Timer as monostable multivibrator.

APPARATUS

IC 555, Resistors, Capacitors, Power supply, CRO, Bread board and connecting wires.

THEORY

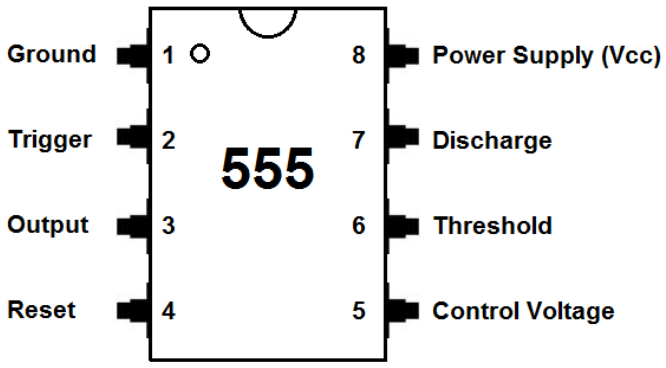
An Astable Multivibrator is a free running oscillator circuit that continuously produces rectangular wave without the help of external triggering. It has no stable state.

T charges= 0.69 (RA+RB) C

T discharge= 0.69 RBC

The total time period is T= T charges+ T discharge

PIN DIAGRAM



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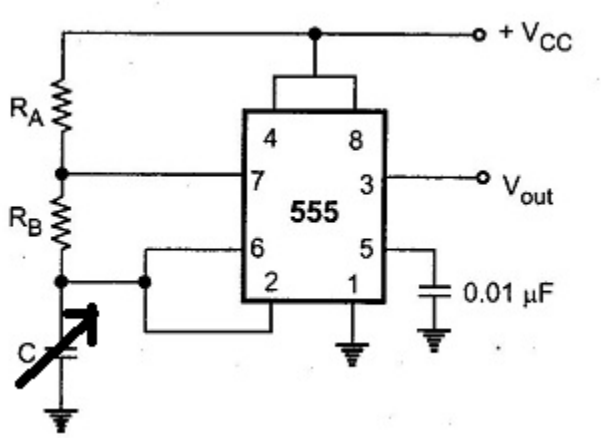
PROCEDURE

1. Make the connections as shown in the figure.
2. Switch on the power supply and observe the output wave form from CRO
3. Change the value of capacitor using a variable capacitance box and measure the time period of the signal and calculate the frequency.

CIRCUIT DIAGRAM



RA=10KΩ, RB=100KΩ, C1=0.01µf

TABULAR FORMS

Value of the capacitor	Time per division	Length of the wave	Time period (T mS)	Practical Frequency F=1/T in Hz	Theoretical Frequency

MODEL GRAPH

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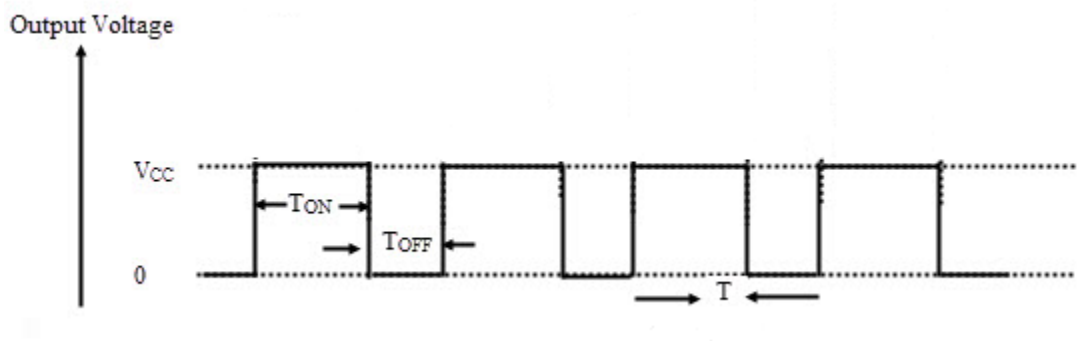

RESULT

Performance of astable multivibrator using 555 timer is studied.

Viva-Questions

1. Define multivibrator
2. What is astable multivibrator?
3. Explain the working principle of astable multivibrator.
4. Explain the origin of name IC555.
5. Explain the working principle of IC 555

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Experiment No:8

Date:

AMPLITUDE MODULATION

AIM

Design and construct Amplitude modulation circuit using transistor and calculate Modulation index.

APPARATUS

Transistor BC108, Resistors, Capacitors, AFO, CRO, Diode 0A79, Multimeter, Regulated power supply, Breadboard and connecting wires.

THEORY

Modulation is defined as the process by which some characteristics of a carrier signal is varied in accordance with a modulating signal. The base band signal is referred to as the modulating signal and the output of the modulation process is called as the modulation signal. Amplitude modulation is defined as the process in which is the amplitude of the carrier wave is varied about a means values linearly with the base band signal. The envelope of the modulating wave has the same shape as the base band signal provided the following two requirements are satisfied

1.The carrier frequency fc must be much greater then the highest frequency components fm of the message signal m (t) i.e. fc >> fm

2. The modulation index must be less than unity. if the modulation index is greater than unity, the carrier wave becomes over modulated.

PROCEDURE

1.The circuit connection is made as shown in the circuit.

2. The power supply is connected to the collector of the Transistor.

3. Modulated Output is taken from the collector of the Transistor.

4. Calculate Emax and Emin from the output waveform..

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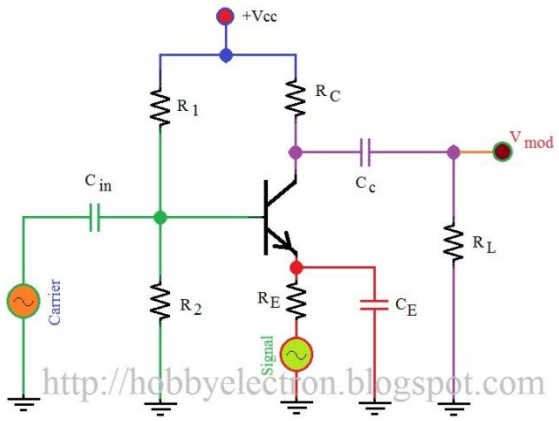
CIRCUIT DIAGRAM



R_L = R2=R1=10KΩ, Rc=100KΩ, C1=C $_E$ 10µf ,Cc= 100 µf

Design procedure

Given VC = 50mV, fc = 500 KHz, fm = 1KHz. Set modulating voltage Vm = 10 V. Emax = 1.6 V, Emin = 0.7 V

Modulation index (m) =Emax+Emin/Emax-Emin = 39.13%

TABULAR FORMS

Modulating Voltages(Volt)	**Emax**	**Emin**	**Modulation Index=** Emax+Emin/Emax-Emin

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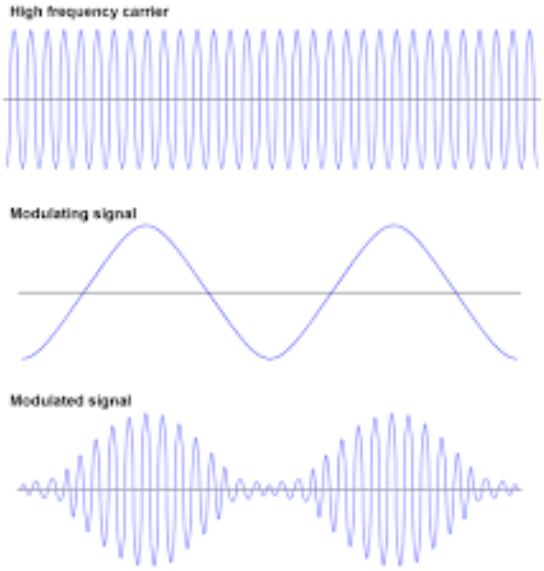
MODEL GRAPH



RESULT

Modulation Index =……

Viva-Questions

1. Define Amplitude Modulation.
2. Define Modulation.
3. Define demodulation.
4. What are the applications of Amplitude Modulation.
5. List out the difference between Modulating signal and carrier signal

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SEMESTER III

16PHU312	**PHYSICS OF DEVICES AND COMMUNICATION (PRACTICAL)**	**L T P C** **- - 4 2**

Any 8 Experiments

1. To design a power supply using bridge rectifier and study effect of C-filter.
2. To design the active Low pass and High pass filters of given specification.
3. To design the active filter (wide band pass and band reject) of given specification.
4. To study the output and transfer characteristics of a JFET.
5. To design a common source JFET Amplifier and study its frequency response.
6. To study the output characteristics of a MOSFET.
7. To study the characteristics of a UJT and design a simple Relaxation Oscillator.
8. To design an Amplitude Modulator using Transistor.
9. To design PWM, PPM, PAM and Pulse code modulation using ICs.
10. To design an Astable multivibrator of given specifications using transistor.
11. To study a PLL IC (Lock and capture range).
12. To study envelope detector for demodulation of AM signal.
13. Study of ASK and FSK modulator.
14. Glow an LED via USB port of PC.
15. Sense the input voltage at a pin of USB port and subsequently glow the LED connected with another pin of USB port.

REFERENCES

1. Ouseph C.C., U.J. Rao and V. Vijayendran 2007, Practical Physics and Electronics, S.Viswanathan (Printers & Publishers) Pvt. Ltd., Chennai
2. Singh S.P., 2003, Advanced Practical Physics – 1, 13th Edition, Pragathi Prakashan, Meerut
3. Singh S.P., 2000, Advanced Practical Physics – 2, 12th Edition, Pragathi Prakashan, Meerut