

# Nonlinearity -- Overview

## System Non-Linearity



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## OBJECTIVES:

At the end of performing this experiment, learners would be able to:

- Understand the Non-linearity of the given system

## EQUIPMENT:

- Signal generator
- Resistors – 1 k $\Omega$
- Diode
- Digital Storage Oscilloscope & probes
- Connecting wires & Bread Board

## THEORY:

A system which does not satisfy the superposition principle – meaning that the output of a nonlinear system is not directly proportional to the input.

### Acknowledgement

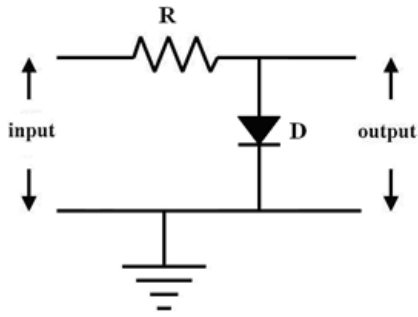
Mr. Shreenivas B for converting laboratory experiment to Tektronix courseware format

## Nonlinearity -- Procedures

### Step 1

#### Circuit setup:

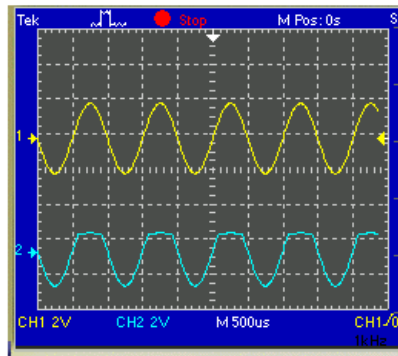
Build the following circuit with given component values



## Step 2

Choose  $R = 1\text{ K}\Omega$  (some typical value)

Connect the above circuit, and give input-I and observe the



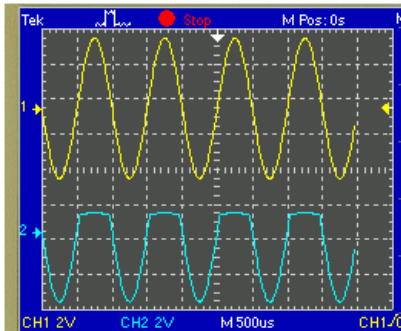
Input - I

Output - I

corresponding output

## Step 3

Give amplified input-I and observe the corresponding output

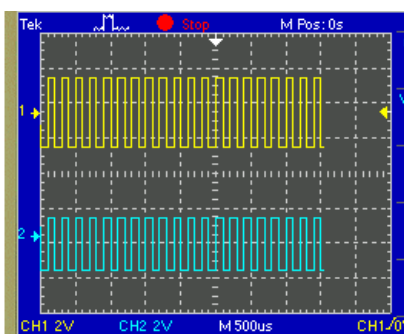


Amplified Input - I

Amplified Output - I

## Step 4

Give input-II and observe the corresponding output

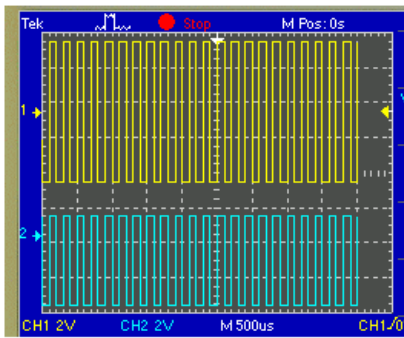


Input - II

Output - II

## Step 5

Give amplified input-II and observe the corresponding output

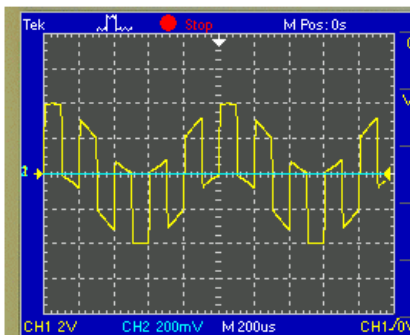


Amplified Input - II

Amplified Output - II

## Step 6

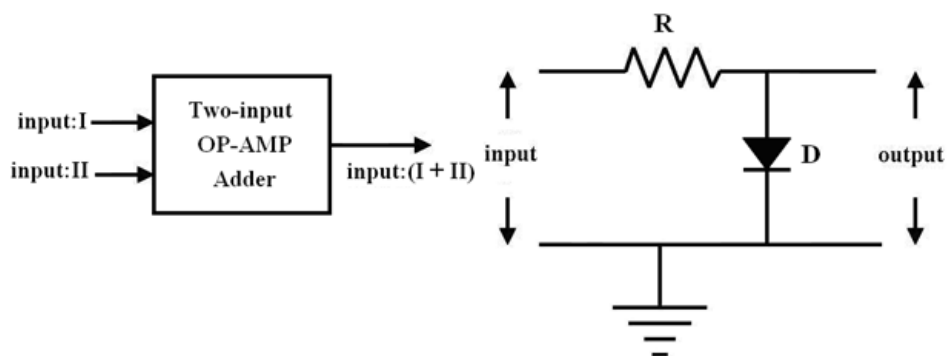
Obtain the SUM of the two inputs



(Input - I) + (Input - II)

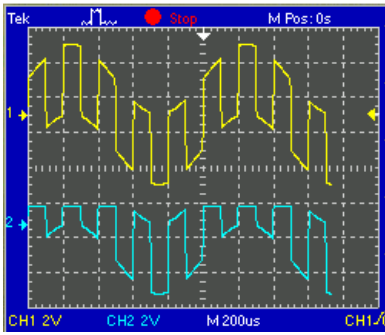
## Step 7

Give the SUM of the two inputs



## Step 8

Observe the corresponding output

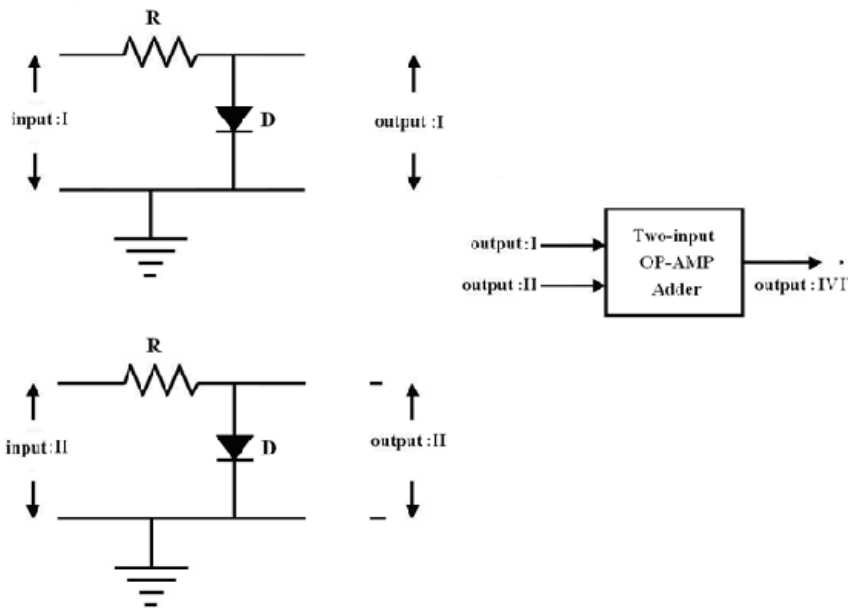


(Input - I) + (Input - II)

Corresponding Output

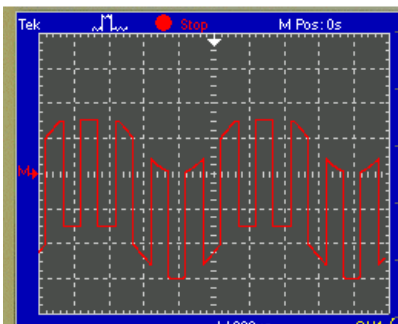
## Step 9

Connect another similar circuit



## Step 10

Obtain the SUM of the two outputs



(Output - I) + (Output - II)

## Step 11

### Observation

1) Since the superposition theorem is not satisfied, the given system is \_\_\_\_\_

Open-ended Question / Can you answer this?

1) Since sinusoidal input to the above system does not result in the sinusoidal signal of same frequency at the output, the system is

\_\_\_\_\_

2) With sinusoidal input to the above non-linear system, the output is not \_\_\_\_\_, however, it a \_\_\_\_\_ signal of the same period.