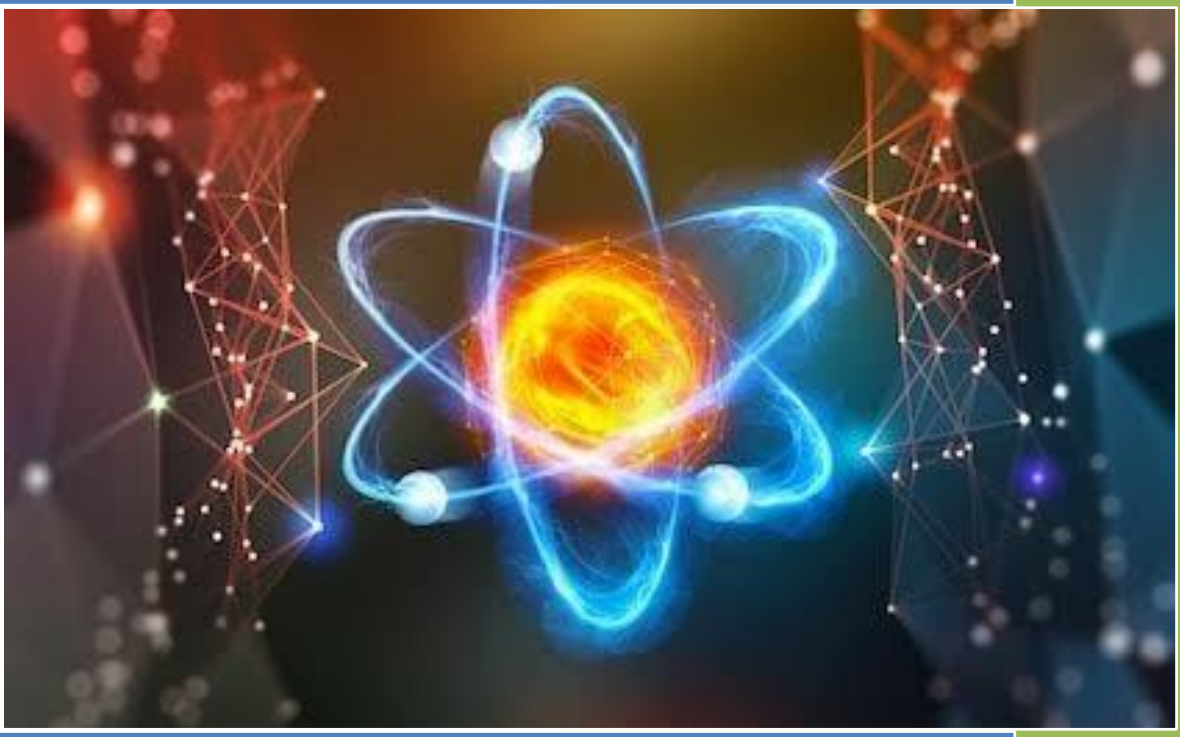
Guru Nanak Vidyak Society's

GURU NANAK COLLEGE OF ARTS, SCIENCE & COMMERCE

2019

DBT- Star College Scheme



F. Y. B. Sc. Practical Manual

Department of Physics

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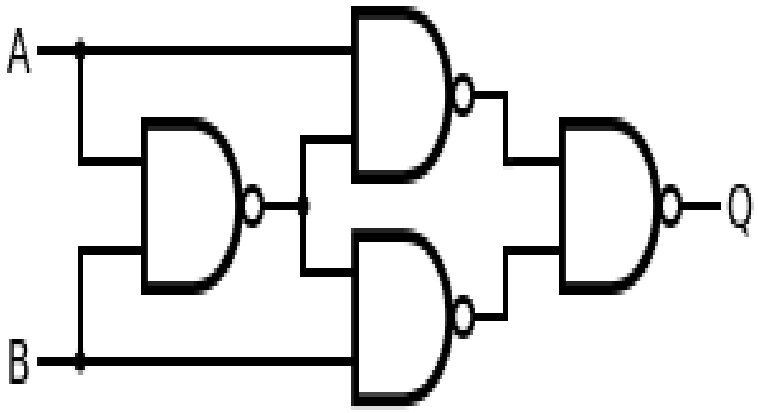
EXPERIMENT NO. 1

NAND as EX – OR gate

Aim: To Verify NAND as EX – OR gate.

Apparatus: IC 7400, Bread board, +5V Power Supply, L.E.D., Connecting wires.

Diagram: NAND as EX – OR gate:



Procedure:

1.Verify all the gates of IC 7400.
2.Connect Power supply & ground at proper pins.
3. Connect the circuit as shown in figure.
4.Give the input & verify the truth tables.

Truth Table:

Inputs		Outputs
A	**B**	**Y**

Result:

NAND Gate as EX – OR gate is Verified.

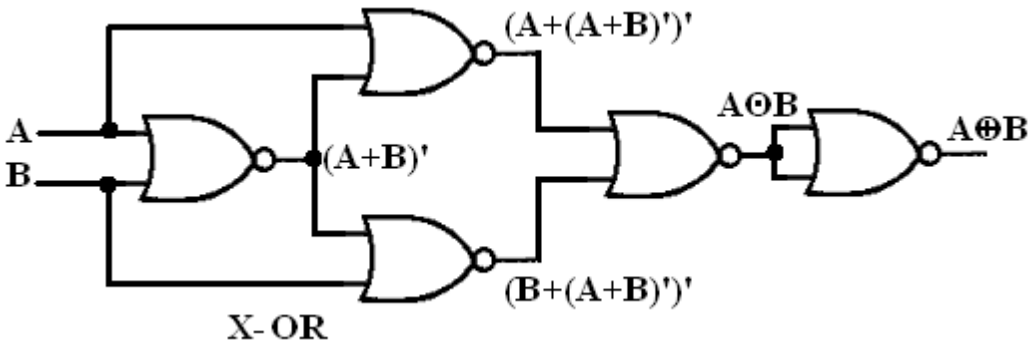
EXPERIMENT NO. 2

NOR as EX – OR gate

Aim: To Verify NOR as EX – OR gate.

Apparatus: IC 7402, Bread board, +5V Power Supply, L.E.D., Connecting wires.

Diagram: NOR as EX – OR gate:



Procedure:

1.Verify all the gates of IC 7402.
2.Connect Power supply & ground at proper pins.
3. Connect the circuit as shown in figure.
4.Give the input & verify the truth tables.

Truth Table:

Inputs		Outputs
A	**B**	**Y**

Result:

NOR Gate as EX – OR gate is Verified.

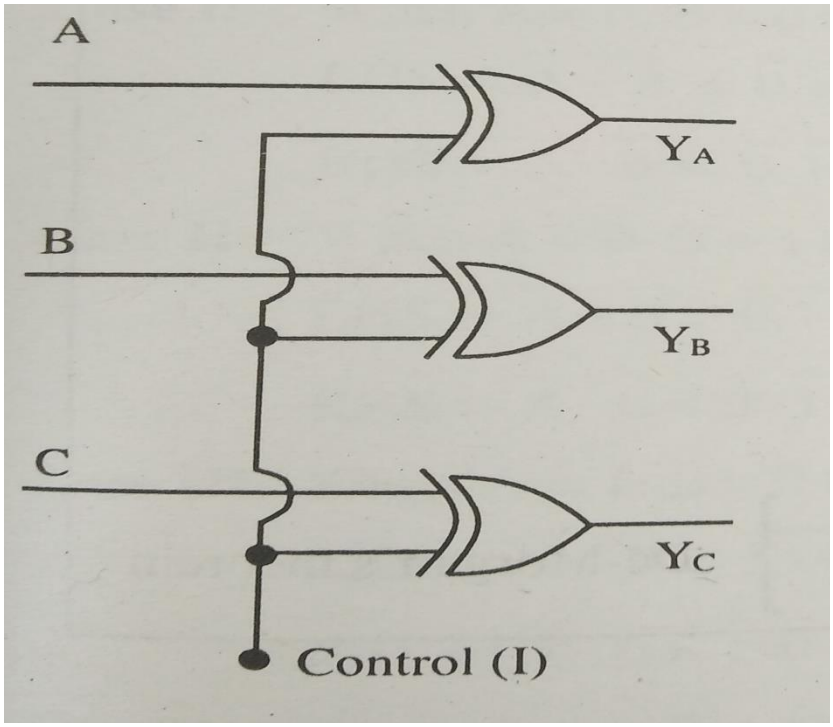
EXPERIMENT NO. 3

EX – OR gate as 1's Complement

Aim: To Verify EX – OR gate as 1's complement.

Apparatus: IC 7486, Bread board, +5V Power Supply, L.E.D., Connecting wires.

Diagram: EX – OR gate as 1's complement:



Procedure:

1. Verify all the gates of IC 7486.
2 Connect Power supply & ground at proper pins.
3 Connect the circuit as shown in figure.
1. Give the input & verify the truth tables.

Control (I)	Inputs			Outputs		
(I)	C	B	A	Y_C	Y_B	Y_A
0	0	0	0	0	0	0
0	1	1	1	1	1	1
1	0	0	0	1	1	1
1	0	0	1	1	1	0
1	0	1	0	1	0	1
1	0	1	1	1	0	0
1	1	0	0	0	1	1
1	1	0	1	0	1	0
1	1	1	0	0	0	1
1	1	1	1	0	0	0

Result:

EX – OR gate as 1's complement is Verified.

****

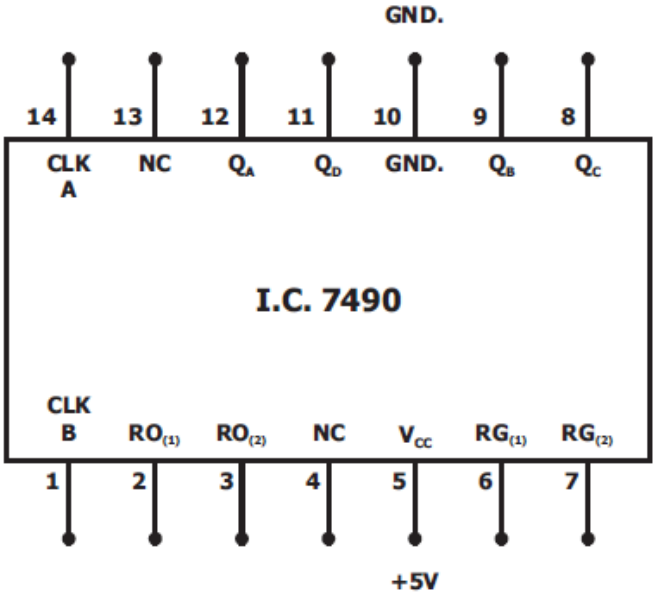
EXPERIMENT NO. 4

Study of Counter Circuit

Aim: to study the operation of divide by 2,5 and 10 counter circuit using IC 7490.

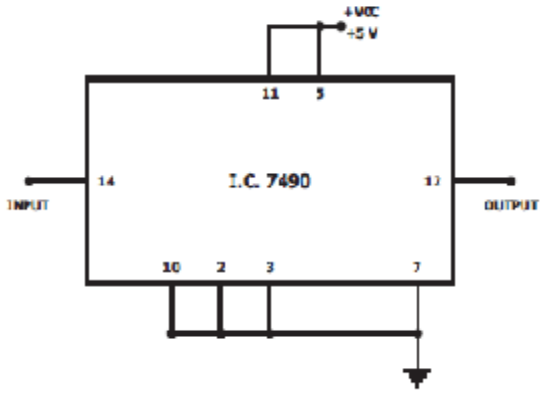
Apparatus: IC 7490, bread board, Patch cords, C.R.O., square wave generator.

DIVIDE BY 2, 5, 10 COUNTER

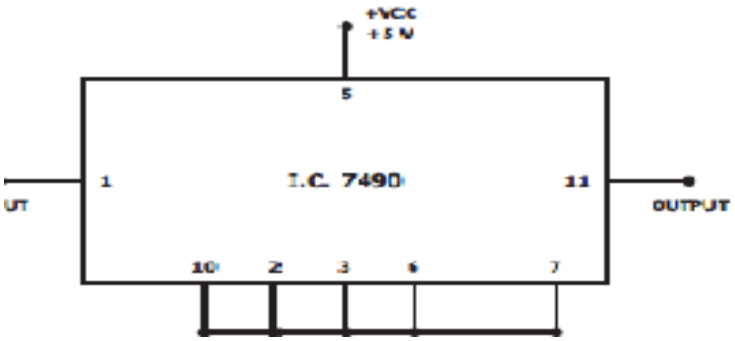


OPERATION OF 7490 AS A DIVIDE BY - N - COUNTER			
DIVISOR N	**I/P. PIN**	**O/P. PIN**	**EXTERNAL CONNECTION**
2	14	12	PIN 2 OR 3 LOW
5	1	11	PIN 2 OR 3 LOW
10	14	11	PIN 12 TO PIN 1 PIN 2 OR 3 LOW

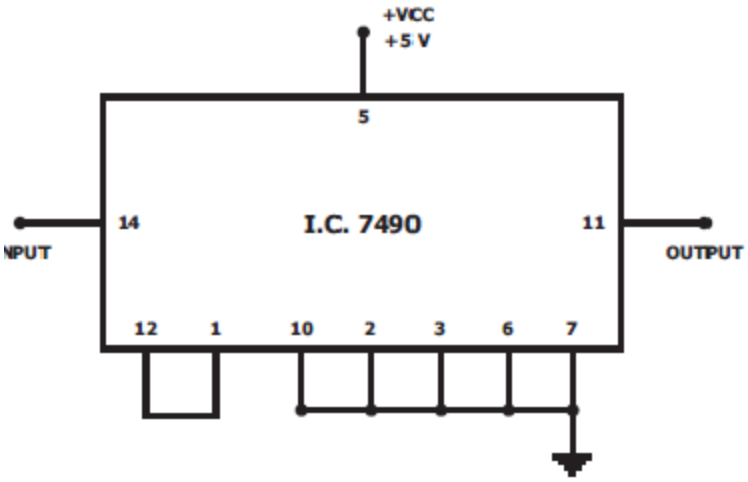
7490 FOR DIVIDE BY 2



7490 FOR DIVIDE BY 5



7490 FOR DIVIDE BY 10



Procedure:

1. Connect the circuit using 7490 IC divider to mains supply and witch it on.
2. Connect built in pulse to the clock pulse input pin.
3. Select divide by 2,5 and 10 operation and connect pin no. 2 and 3 to ground terminal.
4. Verify that you get divide by 2 or 5 or 10 output.
5. Draw the wave forms on graph paper for each mod.

Observation table:

MOD 2

Tin	
Tout	
Tin/ Tout	

MOD 5

Tin	
Tout	
Tin/ Tout	

MOD 10

Tin	
Tout	
Tin/ Tout	

Result: Counter 7490 IC studied as a counter**.**

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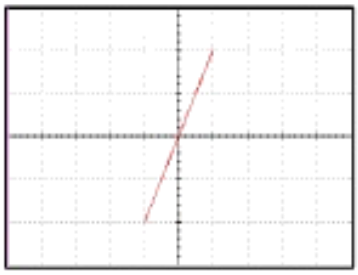
EXPERIMENT NO. 5

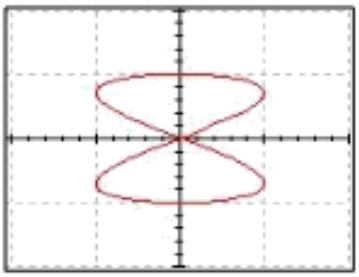
Aim: Study of superposition of wave using C.R.O.

Apparatus: C.R.O two sine wave generator, connecting wires

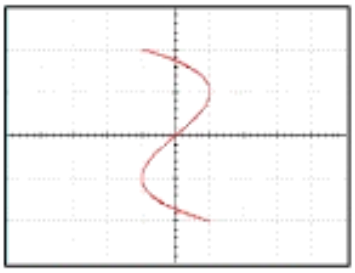
Diagram:



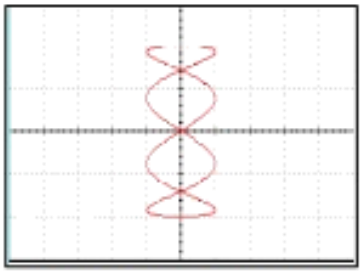
Frequency of vertical wave is same as the frequency of horizontal wave.



Frequency of vertical wave is twice the frequency of horizontal wave.



Frequency of vertical wave is thrice the frequency of horizontal wave.



Frequency of vertical wave is four times the frequency of horizontal wave.

Procedure:

1) Measure the input voltages of both the sine wave signal generators.
2) Set up both the sine wave signal generator at a frequency of 1 KHz.
3) Connect one sine wave single generator to channel X and the other to channel Y.
4) Swap both the channels.
5) Keep the frequency of one sine wave signal generator constant and change the other to obtain different Lissajous figures.
6) Obtain the relation between their frequencies.

Observation Table:

Obs. No.	Lissajous Figures	Frequency of sine wave generator at channel X	Frequency of sine wave generator at channel Y	Relation between frequencies
1				
2				
3				
4				

Result:

Lissajous figures are obtained for different frequencies which are due to superposition of wave.

EXPERIMENT NO. 6

Balmer Series of Hydrogen atom.

Aim: To study Balmer series of hydrogen atom.

Apparatus: spectrometer, mercury source, hydrogen discharge tube, spirit level etc.

Formula:

$$\frac{1}{\lambda} = R\left[\frac{1}{2^2} - \frac{1}{n^2}\right]$$

Theory: The atomic spectral lines of hydrogen are classified into several series. The series in the visible region is known as Balmer series.

The hydrogen emission lines belonging to a general series is given by,

$$\frac{1}{\lambda} = R\left[\frac{1}{n_1^2} - \frac{1}{n_2^2}\right]$$

Where, R is the Rydberg constant.

n_1 & n_2 are the quantum numbers of the electron orbital participating in the transition.

λ is the wavelength emitted.

For Balmer series, **n_1=2 & n_2=3, 4, 5**etc. i.e. the transition takes place from higher energy level to **n=2**.

Procedure:

1) Find the mean angle of minimum deviation **(δm)** of various known wavelength **(λ)** using mercury source.
2) Replace the mercury source by hydrogen source and determine the **δm** for different spectral lines.
3) Plot a graph of δm against **λ.**
4) Using the values of these **δm**, find the corresponding wavelengths using the calibration graph.

Observation Table:

Least count of spectrometer = _____

Direct reading: Window A =_____

Window B =_____

A] For mercury:

Obs. No.	Colors	Λ	Readings on		Minimum deviation δm		Mean δm
			Window A	Window B	Window A	Window B	
1.	Violet	4047					
2.	Blue	4358					
3.	Blue green	4916					
4.	Green	5461					
5.	Yellow	5769					
6.	Orange	6152					
7.	Red	6232					

B] For Hydrogen:

Obs. No.	Colors	Readings on		Minimum deviation δm		Mean δm
		Window A	Window B	Window A	Window B	
1.	Violet					
2.	Blue green					
3.	Red					

Result:

The spectrum of Hydrogen is studied.

EXPERIMENT NO. 7

Identification of Bravais lattices

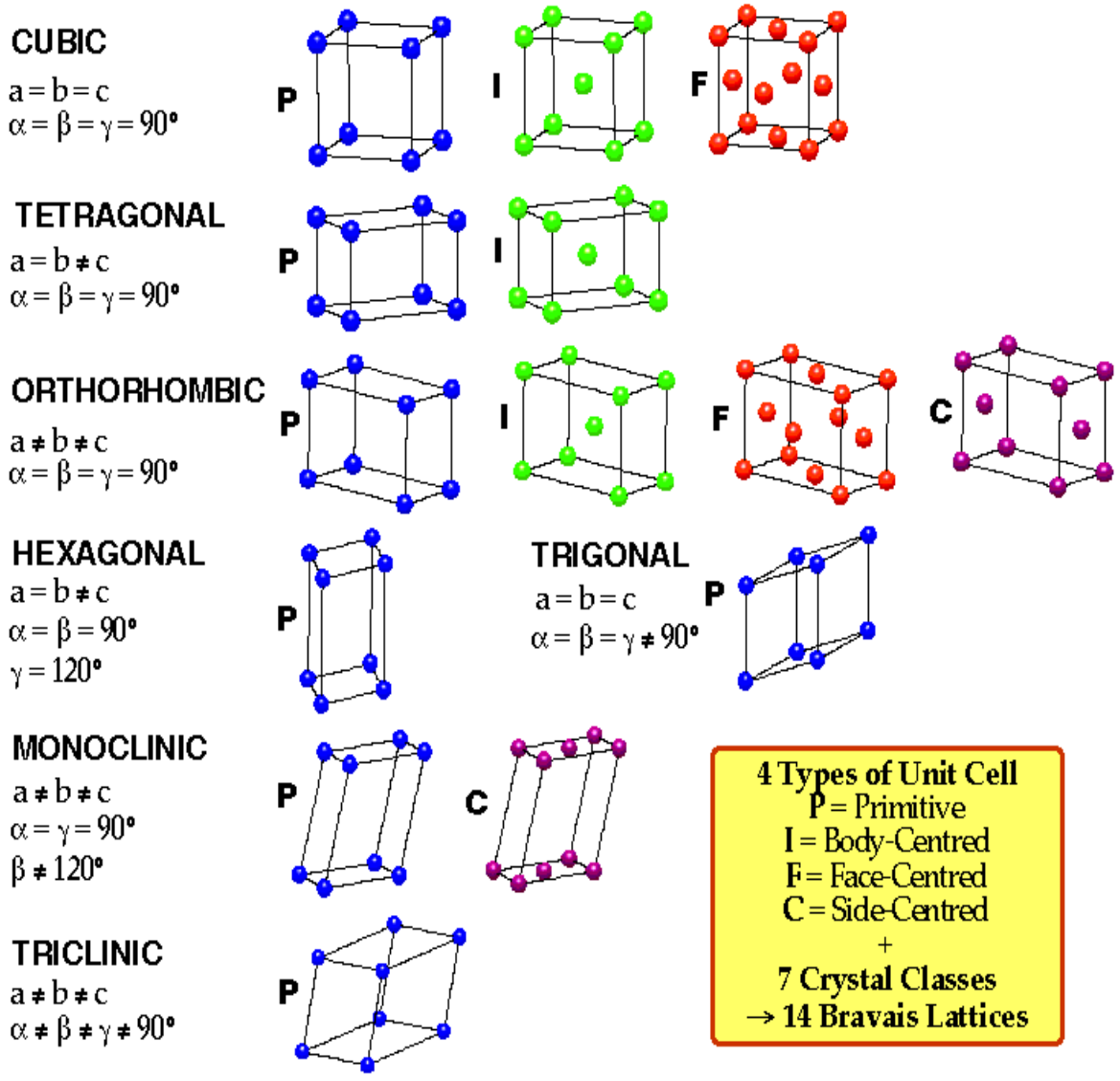
Aim: Identify the bravais lattices of the given crystal.

Theory: Bravais lattice A lattice is a framework, resembling a three-dimensional, periodic array of points, on which a crystal is built. Bravais showed that identical points can be arranged spatially to produce 14 types of regular pattern. These 14 space lattices are known as 'Bravais lattices'.

The 14 Bravais lattices are grouped into seven lattice systems: triclinic, monoclinic, orthorhombic, tetragonal, rhombohedral, hexagonal, and cubic.

Procedure:

1. Identify the given crystal according to its type.
2. Observe and identify the bravais lattice of the given crystal with the help of the given information.



Observation table: Draw the given Bravais lattices to and indent their types

Sr. No.	crystal system	Name of Bravais lattice
1		
2		
3		
4		
5		
6		
7		

8		
9		
10		
11		
12		
13		
14		

Result: The given crystals are identified on the basis of its bravais lattice structures.