# PHYSICS PRACTICAL

Name of Student: Subject Code: PHY 113
Roll No:

| Exp No. | Name of Experiment | Initial | Final | Signature |
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# PHYSICS PRACTICAL SHEETS

Date 2079-
Class BSc CSIT 1st Sem
Roll No 21-00037-5
Shift Morning
Subject of the Experiment (Block Letter)

..........Campus

Experiment No.
Group
Subject Physics
Set

TO DETERMINE THE MOMENT OF INERTIA OF GIVEN FLYWHEEL

APPARATUS: A flywheel, few different masses & a mass provided with a hook, a strong & thin ring, stop watch, meter scale Vernier Callipers, chalk.

THEORY: A flywheel is simply a heavy wheel with a long axle supported in bearings such that it can rest in any position. C.G lies on the axis of rotation. The moment of inertia of flywheel about axis of rotation is given by:

$$I = \frac{2mgh - mr^2\omega^2}{\omega^2\left(1 + \frac{n}{n_1}\right)}$$

where, 'm' is the mass attached to axle of wheel
'h' is the height through which the mass has fallen.
'r' is the radius of axle.
$\omega = \frac{4\pi n_1}{t}$ is angular velocity of wheel.
'$n_1$' is no. of revolution made by wheel before coming to rest.
't' is time taken by wheel before coming to rest.
'n' is no. of turn of cord on the wheel which is also no. of revolution the wheel makes during the decent of mass 'm'.

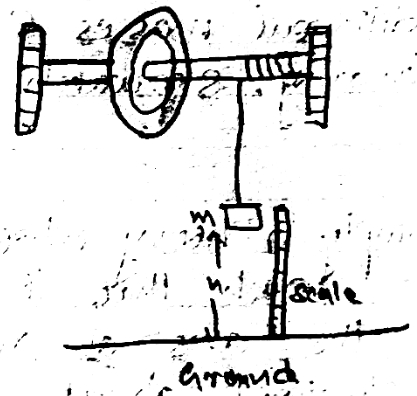


Fig. Flywheel.

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## ~~OBServations~~ OBSERVATIONS

~~Veanior~~ Constant of vernier calliper (V.C) = 1 MSD − 1 VSD

= 0.1 − 0.098

= 0.002 cm

Observation Table for determination of radius of axle.

| No. of obs. | M.S.R $x$ | V.S.R $y$ | Value of V $y \times V.C = y'$ | Total $D' = x + y'$ | Mean 'D' |
|---|---|---|---|---|---|
| 1 | 2 | 40 | 0.08 | 2.08 | 2.03 |
| 2 | 2 | 5 | 0.01 | 2.01 | |
| 3 | 2 | 0 | 0 | 2.00 | |

∴ Radius of axle $(r) = D/2 = 2.03/2 = 1.015\,cm = 0.01015\,m$

Circumference of wheel C = 61.5cm

Table for determination of Moment of Inertia

| S.N | height 'h' (m) | mass (kg) 'm' | No. of turns 'n' | No. of complete revolution 'x' | Distance of mark from pointer 'd' (cm) | Fraction revolution $y = \frac{d}{c}$ | Total rev. $n_1 = (x + y)$ | time 't' (s) | $\omega = \frac{4\pi n_1}{t}$ |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 82.5 = 0.825m | 0.1 | 10 | 43 | 49 | 0.79 | 43.79 | 70s | 7.86 |
| 2 | 0.625 | 0.2 | 8 | 57 | 51.5 | 0.84 | 57.84 | 75s | 9.686 |
| 3 | 0.53 | 0.3 | 6 | 63 | 57.5 | 0.93 | ~~78~~ 63.93 | 78s | 10.29 |
| 4 | 0.39 | 0.4 | 4 | 61 | 0 | 0 | 61 | 77s | 9.95 |

Now,

$$I_1 = \frac{2mgh - mr^2\omega^2}{\omega^2\left(1 + \frac{n}{n_1}\right)} = \frac{2\times 0.1\times 9.8\times 0.825 - \cancel{0.1\times(0.002)^2}\ 0.1\times(0.01015)^2 \times (7.86)^2}{(7.86)^2 \times \left(1 + \frac{10}{43.79}\right)}$$

$$= 0.027 \text{ kgm}^2$$

Similarly,

$$I_2 = 0.022 \text{ kgm}^2$$
$$I_3 = 0.026 \text{ kgm}^2$$
$$I_4 = 0.028 \text{ kgm}^2$$

Error

$$\bar{I} = \frac{0.022 + 0.026 + 0.028 + 0.027\ \cancel{0.025}}{4} \quad \cancel{n = 34}$$

$$= 0.024$$

$$\sigma_I = \sqrt{\frac{\Sigma(I_i - \bar{I})^2}{n(n-1)}}$$

$$= \sqrt{\frac{(0.027-0.024)^2 + (0.022-0.024)^2 + (0.026-0.024)^2 + (0.028-0.024)^2}{4(4-1)}}$$

$$= \sqrt{\frac{0.000009 + 0.000004 + 0.000004 + 0.000016}{12}}$$

$$= \sqrt{0.00000275}$$

$$= 0.0016 \text{ kgm}^2$$

RESULT

The moment of inertia (MI) of different masses is 0.021 $kgm^2$, 0.022 $kgm^2$, 0.026 $kgm^2$ & 0.028 $kgm^2$.

CONCLUSION

By ~~use~~ above procedure, moment of inertia of flywheel can be determined.

PRECAUTION

i) The rotations must be observed properly.
ii) Time should be properly recorded.
iii) The rope connecting weight should be tight.

# PHYSICS PRACTICAL SHEETS

Date 2079-
Class BSc CSIT 1st Sem
Roll No. 21-00031-5
Shift Morning
..........Campus
Experiment No.
Group
Subject Physics
Set
Subject of the Experiment (Block Letter)

TO DESIGN AND STUDY THE LOGIC GATES AND, OR, NOT, NAND & NOR

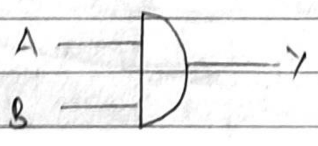
APPARATUS: Bread Board, Transistors, Resistors, Jumper Wires, Voltmeter, Power Supply

THEORY: Logic gates are the electronic circuits, which operates one or more input signals to produce a standard output. They are basic blocks of digital electronics. There are one or more inputs & only one output. They respond to only High voltage (called 1s) & Low (ground) voltage (called 0s). ~~Ba~~ The relationship between the input & the output is based on a certain logic. Based on this, logic gates are named as OR gate, AND gate, NOT gate, NOR gate & NAND gate. First 3 are basic gates & last 2 are universal gates.

a) AND Gate
- AND Gate produce high output only if all inputs are high which is also the physical representation of ~~log~~ logical multiplication. It ~~is~~ is called 'all or nothing gate'. It has 2 or more inputs but only one output.

Boolean Expression:- $Y = A \cdot B$

Logical Symbol




Truth Table

| A | B | Y |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 1 |

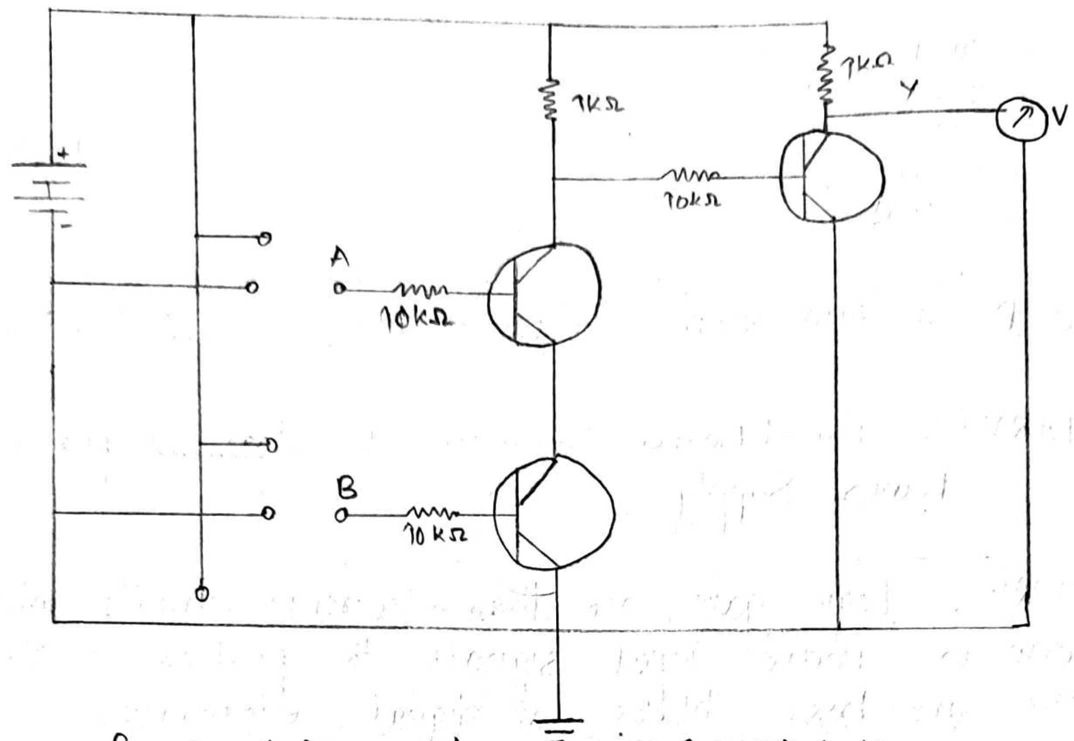



fig. Circuit Diagram of AND Gate & NAND Gate

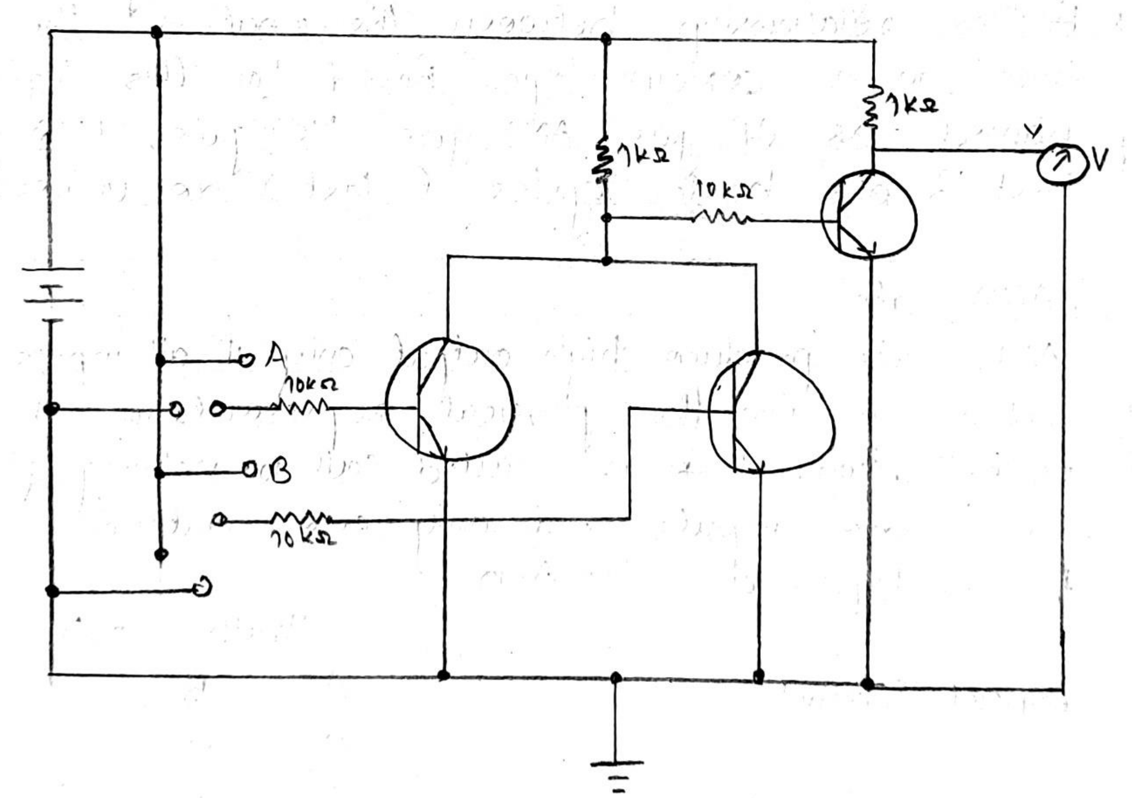



fig. Experimental Circuit Diagram of OR Gate & NOR Gate.

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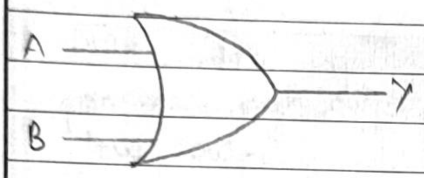
b) OR Gate

- OR Gate produce high output when any one of the inputs is high. It is physical representation of logical addition. It is 'any or all gate' with two or more inputs & one output.

Boolean Expression: $Y = A + B$

Logical Symbol




Truth Table

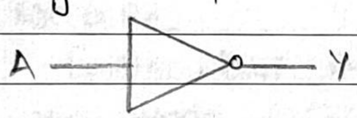
| A | B | Y |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 1 |

c) NOT Gate

- NOT Gate produce high output when input is low & vice versa. It has only one input & one output. It complements the input & also known as inverter.

Boolean Expression: $Y = \bar{A}$

Logical Symbol




Truth Table

| A | Y |
|---|---|
| 0 | 1 |
| 1 | 0 |

d) NAND Gate

- NAND Gate is the combination of AND & NOT Gate which produces low ~~input if~~ output if all inputs are high & produces high output if any input is low.

Boolean Expression: $Y = \overline{AB}$

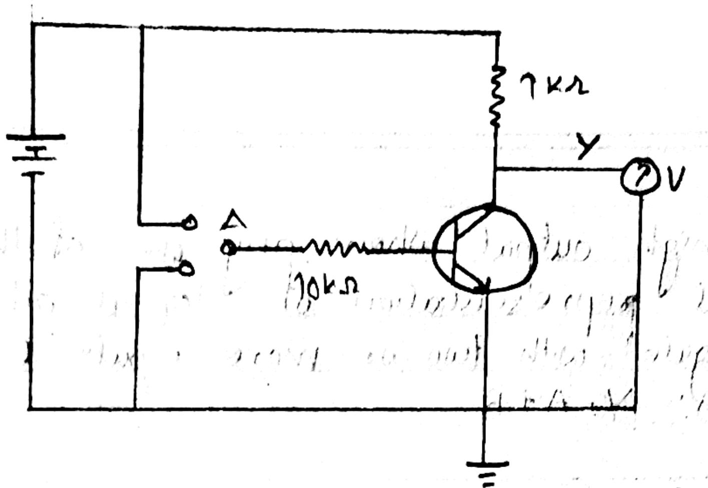
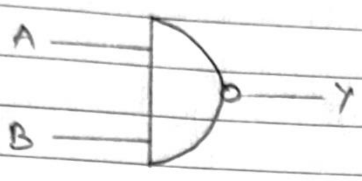



Fig. Experimental circuit diagram for NOR gate.

Logical Symbol




Truth Table

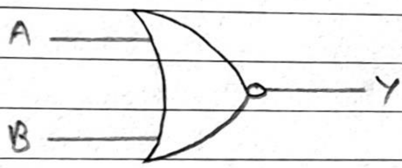
| A | B | Y |
|---|---|---|
| 0 | 0 | 1 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

e) NOR Gate

- NOR Gate is the combination of OR & NOT gate which produces high output if all inputs are low otherwise it produces low output.

Boolean Expression: $Y = \overline{A + B}$

Logical Symbol




Truth Table

| A | B | Y |
|---|---|---|
| 0 | 0 | 1 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 0 |

PROCEDURE

Emitter, base, collector of transistor was identified & connections were made as per circuit diagram one by one.
Inputs 1s & 0s were given as needed & Voltage at output Y was ~~re~~ recorded using voltmeter

OBSERVATIONS

L.C of voltmeter = 0.1V & L.C of Ammeter = 1mA

a) AND Gate:

| A(V) | B(V) | Y(V) |
|---|---|---|
| 0 | 0 | 0.1 |
| 0 | 5 | 0.1 |
| 5 | 0 | 0.1 |
| 5 | 5 | 4.3 |

b) OR Gate:

| A(V) | B(V) | Y(V) |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 5 | 3 |
| 5 | 0 | 3 |
| 5 | 5 | 3 |

c) NOT Gate:

| A(V) | Y(V) |
|---|---|
| 0 | 3.4 |
| 5 | 0 |

d) NAND Gate:

| A(V) | B(V) | Y(V) |
|---|---|---|
| 0 | 0 | 4.3 |
| 0 | 5 | 4.3 |
| 5 | 0 | 4.3 |
| 5 | 5 | 0.1 |

e) NOR Gate:

| A(V) | B(V) | Y(V) |
|---|---|---|
| 0 | 0 | 3 |
| 0 | 5 | 0.1 |
| 5 | 0 | 0.1 |
| 5 | 5 | 0.1 |

## RESULT

In AND Gate, output was high (4.3V) when both inputs were high (5V). Low output (0.1V) was recorded in other cases.

In OR Gate, Output was high (3V) when any one input was high (5V).

In NOT Gate, Output was high (3.4V) when input was low (0V) & Output was low (0V) when input was high (5V).

In NAND Gate, Output was low (0.1V) when both inputs were high (5V). Output was high (4.3V) ~~in othe when~~ in other cases.

In NOR Gate, Output was high (3V) when both inputs were low (0V). Output was low (0.1V) in all other cases.

## CONCLUSION

AND, OR, NOT, NAND & NOR logic gates were designed using TTL & studied. We concluded that, "Truth Table of respective logic gates is verified."

## PRECAUTION

i) Emitter, base & collector should be identified properly.
ii) Connection should be done according to specified circuit diagram.
iii) Proper voltage should be given to avoid damaging components & preventing injuries or accidents.

# PHYSICS PRACTICAL SHEETS

Date 2079-
Class B.Sc. CSIT 1st Sem
Roll No. 21-00037-5
Shift. Morning
Subject of the Experiment (Block Letter)

.........Campus

Experiment No.
Group.
Subject. Physics
Set.

TO DETERMINE THE MOMENT OF INERTIA OF GIVEN BODY BY USING TORSIONAL PENDULUM

APPARATUS: Disk, Wire, Ring, Stopwatch, Screw gauge, Vernier Callipers

THEORY: Torsional pendulum is a heavy circular disc suspended from one end of a wire attached to its center, the other ends of the wire is fixed in a torsional head. When the disk is turned in a horizontal plane so as to twist the wire & then released, it executes torsional pendulum. The time period of the torsional vibration is given by,

$$T = 2\pi\sqrt{\frac{I}{C}} \quad \text{—— (1)}$$

where 'I' be the MI of disk about the wire an axis & 'C' is couple per unit angle of twist or torsional constant given by,

$$C = \frac{\pi \eta r^4}{2l} \quad \text{—— (2)}$$

where '$\eta$' is modulus of rigidity of wire
'r' is radius of wire
'l' is length of wire

The whole system (disk & ring) oscillates with time period

$$T_1 = 2\pi\sqrt{\frac{(I+I_1)}{C}} \quad \text{—— (3)}$$

where '$I_1$' is moment of inertia of ring.

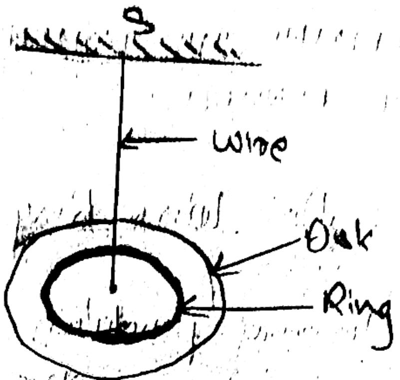



fig. Torsional Pendulum.

Now,

$$T_1^2 - T^2 = 4\pi^2\left(\frac{I+I_1}{c}\right) - 4\pi^2\frac{I}{c} = \frac{4\pi^2 I_1}{c}$$

$$\Rightarrow I_1 = \frac{c(T_1^2 - T^2)}{4\pi^2}$$

$$\Rightarrow I_1 = \frac{\pi\eta r^4}{2l}\left(\frac{T_1^2 - T^2}{4\pi^2}\right) \quad [\because \text{from } ②]$$

$$\therefore I_1 = \frac{\eta r^4 (T_1^2 - T^2)}{8\pi l}$$

OBSERVATIONS

Least Count of Screw Guage (L.C) = $\frac{\text{Pitch}}{N} = \frac{P}{N} = \frac{1}{100} = 0.01$ mm

Length of wire ($l$) = 74.5cm = 0.745m

Value of modulus of rigidity of wire ($\eta$) = $4.5 \times 10^{11}$ N/m²

Zero error = 6 divisions above = $-6 \times$ L.C = $-0.006$mm

$\therefore$ Correction = $+0.006$mm

Table for determination of diameter of wire

| S.N | M.S.R (x) | C.S.R (c) | Value of CSR ($y = c \times L.C$) | Total diameter ($x + y$) | Mean diameter (d) | Corrected diameter ($d' = d + 0.06$ mm) |
|---|---|---|---|---|---|---|
| 1. | 0 | 75 | 0.75 | 0.75 | | |
| 2. | 0 | 82 | 0.82 | 0.82 | 0.79 | 0.85 |
| 3. | 0 | 80 | 0.80 | 0.80 | | |

Diameter ($d'$) = 0.85

Radius ($r$) = $d'/2$ = $0.85/2$ = 0.425 mm

= $0.425 \times 10^{-3}$ m

Table for determination of time period.

| S.N | Time for 20 Oscillation without load ($t$) | Time Period ($T = t/20$) | Mean ($T$) | Time for 20 Oscillation with load ($t_1$) | Time Period $T_1 = t_1/20$ | Mean ($T_1$) | $T_1^2 - T^2$ |
|---|---|---|---|---|---|---|---|
| 1. | 104.97 | 5.248 | | 116.44 | 5.822 | | 33.304 − 27.815 |
| 2. | 105.91 | 5.295 | | 115.41 | 5.770 | 5.771 | = 2.489 |
| 3. | 106.72 | 5.336 | 5.274 | 115.35 | 5.767 | | |
| 4. | 104.12 | 5.206 | | 114.25 | 5.712 | | |
| 5. | 105.75 | 5.287 | | 115.11 | 5.788 | | |

CALCULATIONS

We have,

$$I_1 = \frac{\eta r^4 (T_1^2 - T^2)}{8\pi l}$$

$$= \frac{4.5 \times 10^{11} \times (0.425 \times 10^{-3})^4 \times 2.489}{8 \times \pi \times 0.745}$$

$$= 0.00195$$

$$= 1.95 \times 10^{-3}\ kg/m^2$$

RESULT

The moment of inertia of given body was found to be $1.95 \times 10^{-3}$ kg/m³.

CONCLUSION

The moment of inertia of any given body can be found using torsional pendulum by above process.

PRECAUTIONS

i) The wire must be tight & straight.
ii) The turnings should be carefully observed.
iii) Time should be carefully recorded.

# PHYSICS PRACTICAL SHEETS

Date 2079-
Class BSc CSIT 1st Sem
Roll No. 21-000375
Shift Morning
Subject of the Experiment (Block Letter)

..........Campus

Experiment No.
Group
Subject Physics
Set

TO DESIGN AND STUDY SERIES LCR CIRCUIT FOR FINDING RESONANCE FREQUENCY AND QUALITY FACTOR OF ELEMENTS

APPARATUS: An inductor, Capacitor, Resistor, Connecting wires, Audio frequency oscillator (10Hz - 10kHz), One way key, Voltmeter, Ammeter.

THEORY: When the resistor (R), inductor (L) & capacitor (C) are connected in series with a source of emf (E), the circuit is called Series resonance circuit.

Under certain conditions, the voltage & current are in phase, even though the circuit consists of L, C, R & the circuit behaves as pure resistor. This phenomenon is called resonance. This occurs at single frequency known as resonant frequency ($f_r$). At this frequency, the capacitive ~~reson~~ reactance $\left(X_C = \frac{1}{\omega C}\right)$ & inductive reactance ($X_L = \omega L$) are equal & opposite.

i.e $\frac{1}{\omega C} = \omega L \Rightarrow \omega^2 = \frac{1}{LC} \Rightarrow \omega = \frac{1}{\sqrt{LC}}$

$$\Rightarrow 2\pi f_r = \frac{1}{\sqrt{LC}}$$

$$\Rightarrow f_r = \frac{1}{2\pi\sqrt{LC}} \quad \text{—— (1)}$$

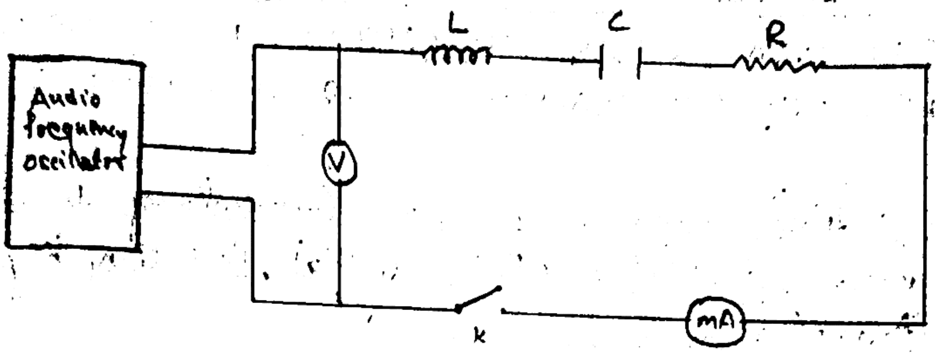



Fig (1) Series LCR Circuit

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The quality factor of series LCR circuit is given by,

$$Q = \frac{2\pi f_r}{f_2 - f_1} \quad —(2)$$

where $f_2$ & $f_1$ are the values of frequency above & below the resonant frequency for which the current in the circuit is $\frac{I_r}{\sqrt{2}} = 0.707 I_r$

where '$I_r$' is current at resonance which is obtained by plotting graph of ~~circuit I~~ current ($I$) vs frequency ($f$) as shown in figure.

## OBSERVATION

Inductance ($L$) = 10mH = $10 \times 10^{-3}$ H
Resistance ($R$) = 100 Ω, 150 Ω & 200 Ω
Capacitance ($C$) = 0.31 F
L.C of voltmeter = 0.1V
L.C of ammeter = 0.2 A

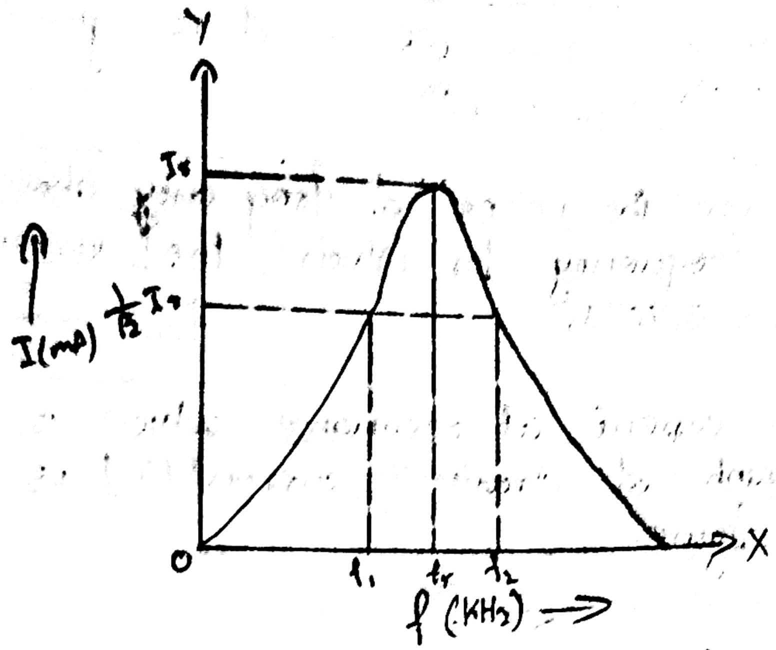



Fig ②: Graph of current vs frequency.

Table for measurement of current

| S.N | frequency (f) in KHz | Current (I) in mA at | | |
|---|---|---|---|---|
| | | $R_1 = 100\Omega$ | $R_2 = 150\Omega$ | $R_3 = 200\Omega$ |
| 1 | 0 | 0 | 0 | 0 |
| 2 | 1 | 0.89 | 0.91 | 0.90 |
| 3 | 1.5 | 1.3 | 1.36 | 1.33 |
| 4 | 2 | 1.97 | 1.93 | 1.8 |
| 5 | 2.5 | 2.60 | 2.54 | 2.44 |
| 6 | 3 | 3.45 | 3.28 | 3.08 |
| 7 | 3.5 | 4.64 | 3.33 | 3.12 |
| 8 | 4 | 6.21 | 5.27 | 4.52 |
| 9 | 4.5 | 8.12 | 6.29 | 5.06 |
| 10 | 5 | 9.34 | 6.75 | 5.27 |
| 11 | 5.5 | 8.68 | 6.45 | 5.07 |
| 12 | 6 | 7.11 | 5.27 | 4.67 |
| 13 | 6.5 | 5.79 | 4.96 | 4.22 |
| 14 | 7 | 4.81 | 4.22 | 3.70 |
| 15 | 7.5 | 4.05 | 3.66 | 3.30 |
| 16 | 8 | 3.45 | 3.21 | 2.94 |

CALCULATION

From graph of current (I) vs frequency (f), plotted for current at $100\Omega$ resistance, We can observe.

$I_r = 9.34\,mA$

$\frac{1}{\sqrt{2}} I_r = 6.5\,mA$

Resonance frequency $(f_r) = 5\,kHz$

$f_1 = 4.05\,kH_2$

$f_2 = 6.25\,kH_2$

Now,

Quality factor (Q) = $2\pi \dfrac{f_r}{f_2 - f_1}$

$= \dfrac{2 \times \pi \times 5}{6.25 - 4.05}$

$= 14.27$

RESULT

The resonance frequency & quality factor of series LCR circuit was found to be 5 kHz & 14.27 respectively.

CONCLUSION

The resonance frequency & quality factor of series LCR circuit can be determined by above procedure.

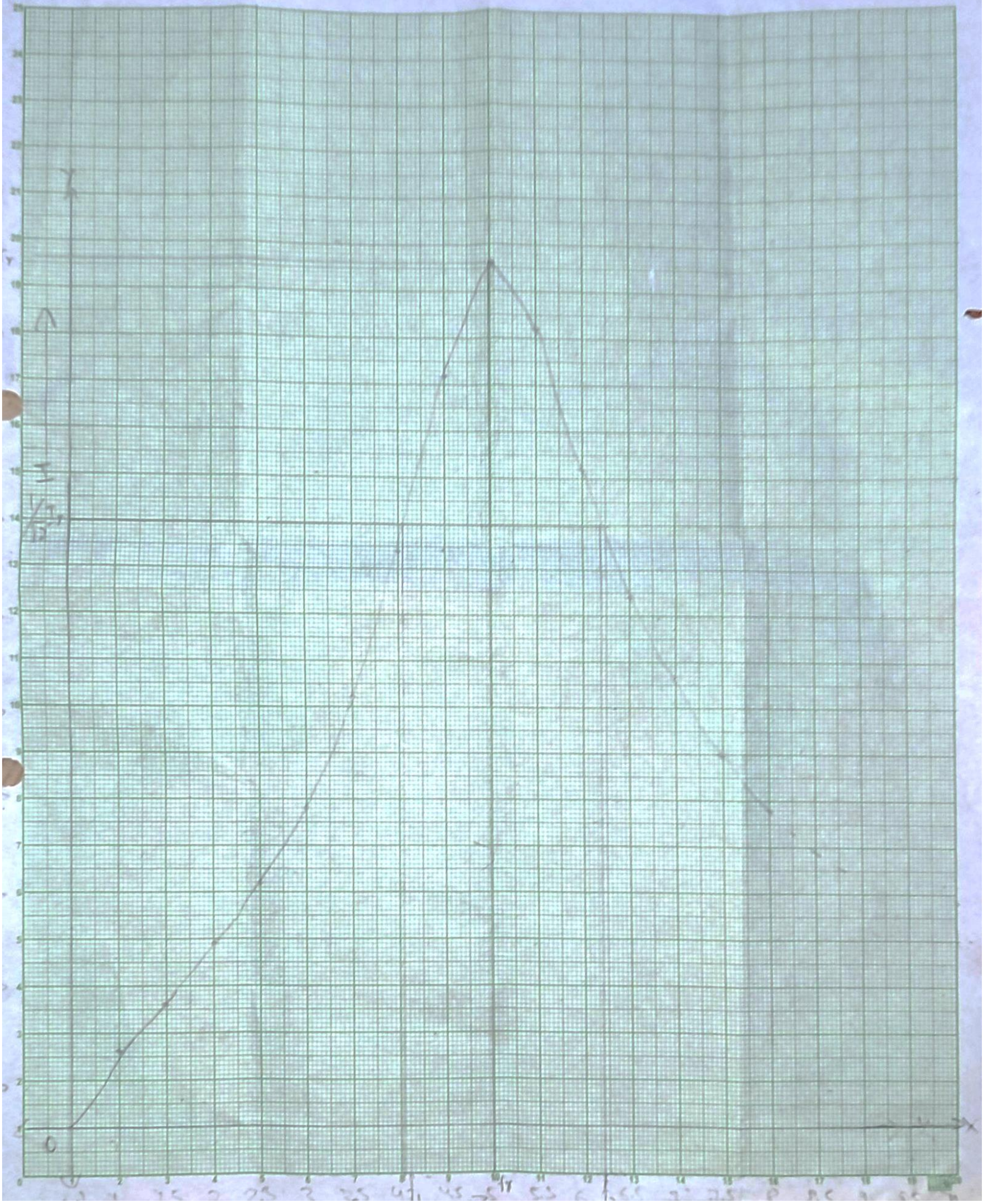
PRECAUTIONS

i) The components must be connected in series.

ii) Fluctuations in readings must be carefully monitored.

27-00037-5 (Bimochan Paudel)

10 small divisions = 1 unit



# PHYSICS PRACTICAL SHEETS

Date 2079-
Class BSc CSIT 1st Sem
Roll No. 21-00081-5
Shift. Morning
Subject of the Experiment (Block Letter)

..........Campus

Experiment No.
Group
Subject. Physics
Set

TO CONSTRUCT AND STUDY THE CHARACTERISTICS OF R-S FLIPFLOP BY USING 7400 OR 7402IC

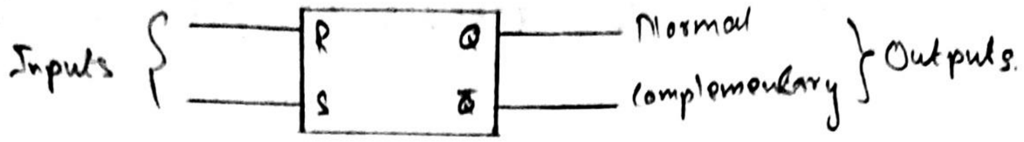
APPARATUS: Power supply 5V, ICs, Bread Board, Connecting wires, Voltmeter

THEORY: RS fliptlop consists of two input R & S with two output $Q$ & $\bar{Q}$. We can construct RS fliptlop using NAND & NOR Gates.

A. RS flip flop using NOR Gate.
RS flip flop can be constructed by cross coupling two NOR gates as in figure. The inputs are R & S & outputs are $Q$ & $\bar{Q}$. The input/output possibilities are discussed below:

1. When $R=0$ & $S=0$
Since NOR gate is high sensitive, 0 at input has no effect on output. Thus flip flop remains at present state i.e Q remains unchanged.

2. When $R=0$ & $S=1$
In this input condition, the output of NOR gate B is low. Both inputs of NOR gate A are now low so input must be high. Thus a 1 at the S input is said to SET the flip-flop & it switches to the stable state where $Q=1$ or $\bar{Q}=0$.



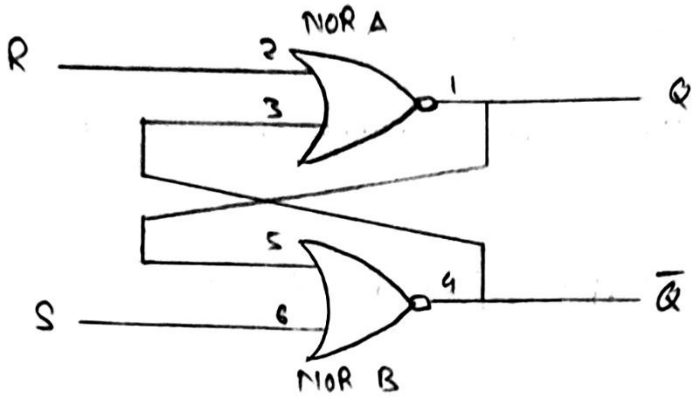




Fig. Circuit Diagram of RS flip-flop using NOR Gates

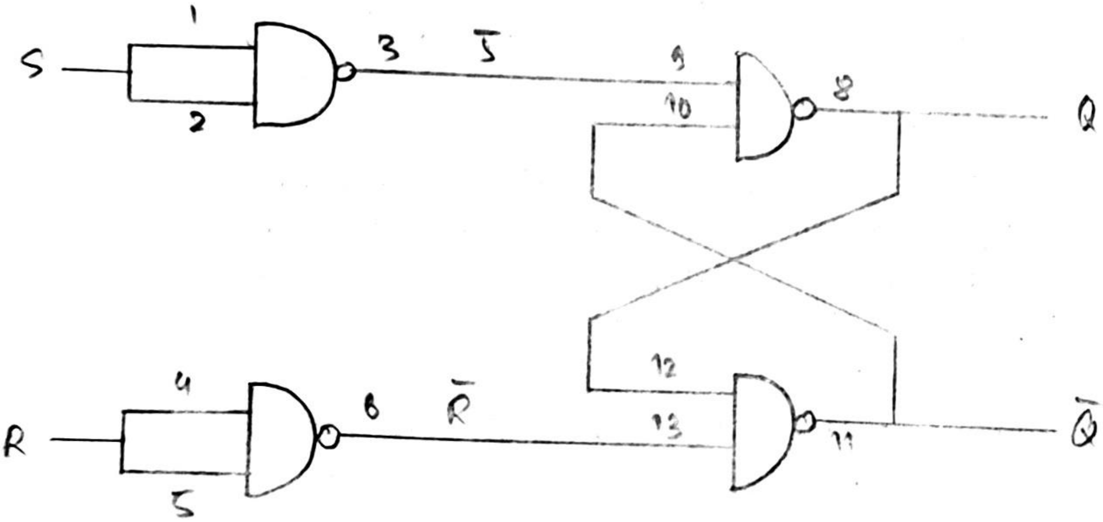



Fig. Circuit Diagram of RS flipflop using NAND Gates

3. When $R=1$ & $S=0$

This condition forces the output of NOR gate, a low & since both inputs to NOR gate B are low, the output must be high. Thus, '1' at the R input is said to RESET the flip-flop & it switches to stable state where $Q=0$ or $\bar{Q}=1$.

4. When $R=1$ & $S=1$

This is forbidden condition, as it forces the outputs of both NOR Gate to the low state. Which violates the basic defination of flipflop that requires $Q$ & $\bar{Q}$ be complement to each other. If this condition is imposed, the state of Q is not predictable.

Truth Table of NOR Gate RS flip flop

| R | S | Q | Action |
|---|---|---|---|
| 0 | 0 | last state | No change |
| 0 | 1 | 1 | SET |
| 1 | 0 | 0 | RESET |
| 1 | 1 | ? | Forbidden |

B. RS flipflop using NAND Gate

RS flipflop can be constructed by cross coupling two NAND gates as shown in figure. There are two inputs $\bar{S}$ & $\bar{R}$ which are complements of S & R & has two outputs Q & $\bar{Q}$. The input/output possibilities are discussed below:

1. When $R=0$ & $S=0$ (or $\bar{R}=1$ & $\bar{S}=1$)

Since NAND gate is low sensitive, 1 at the input has no effect on output. Thus, flip-flop remains at previous state. i.e Q remains unchanged.

2. When $R=0$ & $S=1$ ($\bar{R}=1$ & $\bar{S}=0$)
In this input condition, the output of NAND gate A is high. Both inputs of NAND Gate B is high so $Q=1$ & $\bar{Q}=0$ is SET state

3. When $R=1$ & $S=0$ ($\bar{R}=0$ & $\bar{S}=1$)
This condition forces the output of NAND Gate B high, & both inputs of NAND gate A are high. Hence $Q=0$ & $\bar{Q}=1$ is RESET state.

4. When $R=1$ & $S=1$ ($\bar{R}=0$ & $\bar{S}=0$)
This condition is forbidden, as setting $\bar{R}$ & $\bar{S}$ both low forces $Q$ & $\bar{Q}$ high which is against the principle of flip-flop as the outputs are not complementing each other.

Truth Table for NAND gate RS flip-flop

| $\bar{R}$ | $\bar{S}$ | $Q$ | Action |
|---|---|---|---|
| 1 | 1 | last state | Unchanged |
| 1 | 0 | 1 | SET |
| 0 | 1 | 0 | RESET |
| 0 | 0 | ? | Forbidden |

PROCEDURE

Correct IC (IC 7402 for NOR Gate & IC 7400 for NAND Gate) was choosen & placed at middle of bread board. Pin 14 was connected to power supply & Pin 7 was connected to ground after identification. The other inputs & output pins were also identified & connections were made as per circuit diagram. Input & Output voltages were recorded using voltmeter.

## OBSERVATIONS

Least Count of Voltmeter = 0.1V

Table for NOR gate RS flip flop

| S.N | Inputs | | Outputs | | Action |
|---|---|---|---|---|---|
| | R | S | Q | $\bar{Q}$ | |
| 1 | 0 | 0 | 4.4 | 0.3 | No change |
| 2 | 0 | 5 | 4.5 | 0.3 | SET |
| 3 | 5 | 0 | 0.3 | 4.5 | RESET |
| 4 | 5 | 5 | 4.5 | 4.5 | forbidden |

Table for NAND Gate RS flip flop

| S.N | Inputs | | Outputs | | Action |
|---|---|---|---|---|---|
| | R | S | Q | $\bar{Q}$ | |
| 1 | 0 | 0 | 0 | 1.1 | No change |
| 2 | 0 | 5 | 0.9 | 0 | SET |
| 3 | 5 | 0 | 0 | 0.9 | RESET |
| 4 | 5 | 5 | 0.9 | 0.9 | forbidden |

## RESULTS

In NOR gate RS Flipflop,

i) When $R=0$ & $S=0$, $Q=4.4$ & $\bar{Q}=0.3$. ~~Hence~~ i.e flip flop remains at last state & Q shows no change.

ii) When $R=0$ & $S=5$, $Q=4.5$ & $\bar{Q}=0.3$ i.e SET state takes place.

iii) When $R=5$ & $S=0$, $Q=0.3$ & $\bar{Q}=4.5$ i.e RESET state takes place.

iv) When $R=5$ & $S=5$, $Q=5$ & $\bar{Q}=5$ which is forbidden as $Q$ & $\bar{Q}$ are not complementing each other.

In NAND Gate RS flip flop,

i) When $R=0$ & $S=0$, $Q=0$ & $\bar{Q}=1.1$ i.e flip flop remains at last state & Q shows no change.

ii) When $R=0$ & $S=5$, $Q=0.9$ & $\bar{Q}=0$ i.e SET state occurs.

iii) When $R=5$ & $S=0$, $Q=0$ & $\bar{Q}=0.9$ i.e RESET state occurs.

iv) When $R=5$ & $S=5$, $Q=0.9$ & $\bar{Q}=0.9$ which is forbidden as Q & $\bar{Q}$ are not complementing each other.

CONCLUSION

RS Flip-flop can be constructed & studied by above procedure.

PRECAUTIONS

i) ~~Pins of~~ Correct IC must be used.

ii) Pins of IC must be correctly identified.

iii) Circuit diagram should be followed while making connections.

iv) Readings must be taken correctly.