

Inputs		outputs	
A	B	Σ	Co
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

Truth Table:

✓ ✓ ✓ ✓

5-oct-23

Electronics - II (CIT- 244)

Thursday

Practical # 01

To construct Half adder circuit and verify its logic operation.

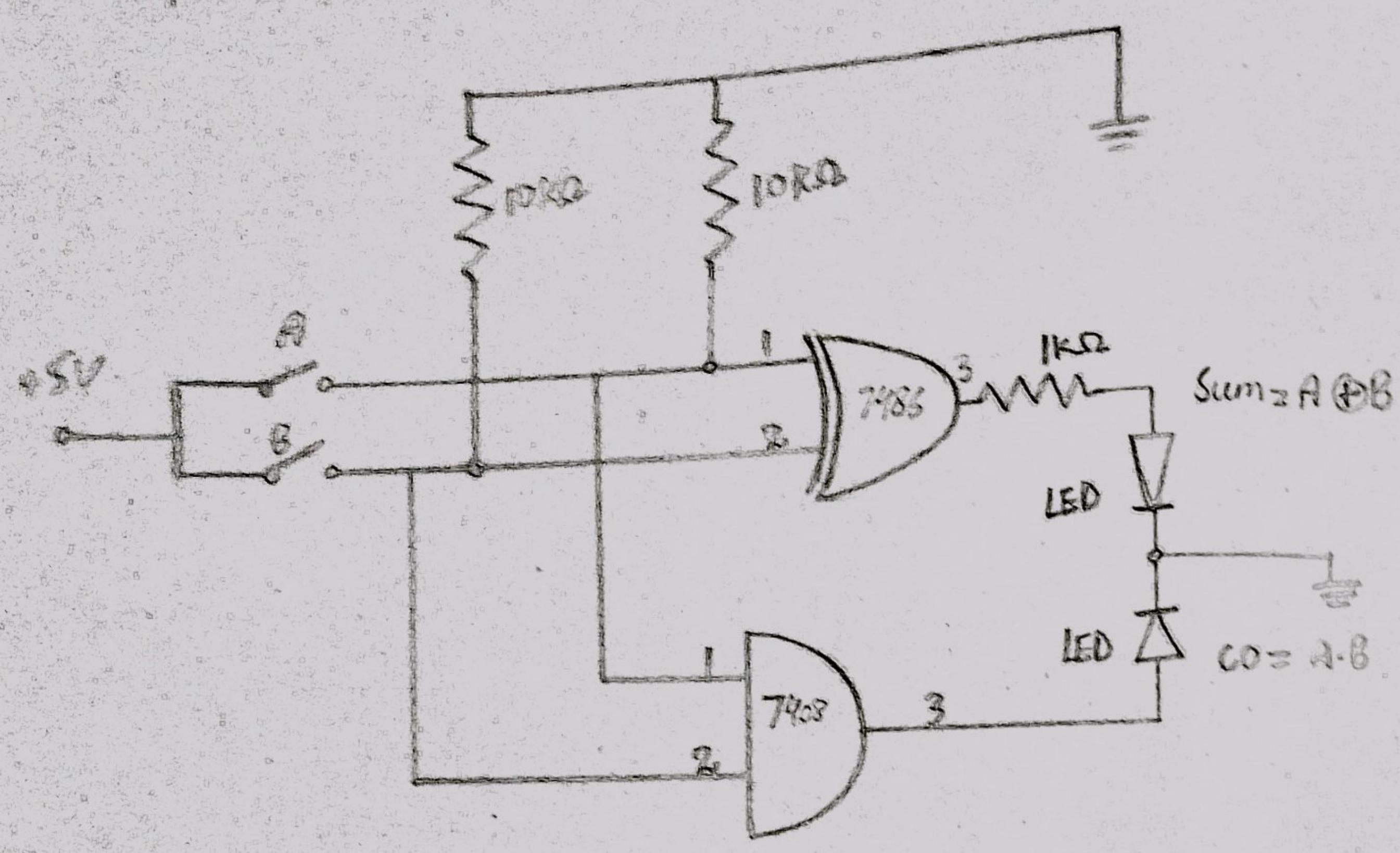
material Required:- Bread Board, LED's, connecting wires, Toolkit, DMM, IC = 7486, 7408. Resistors $1\text{ k}\Omega$, $10\text{ k}\Omega$ (2 nos), Logic Trainer, DC supply.

procedure :-

1. By keeping power supply OFF assemble the circuit as shown in fig.
2. put switch 'A' and 'B' at open position and observe the outputs. Sum and Co LED will remain OFF indicating sum and Co both low.
3. Apply logic high (1) at input 'B' by putting switch 'B' at close position and observe the output. Sum LED will come ON and Co LED will remain OFF. It indicates $0+1=1$.

4. Now apply logic high (1) at input A by closing switch 'A' and logic low (0) at input 'B' by opening switch 'B'. Observe the output sum. LED will remain ON and Co LED will remain OFF. It means $1+0=1$.

5. Now apply logic high (1) at both inputs by closing both switches (A, B). Observe the



Circuit Diagram

output. sum LED will goes OFF while CO LED will comes ON which indicate $1+1=10$ (sum of 0 with carry off 1).

6. write down your observations neatly in notebook.

Precautions :-

1. Use regulated DC Supply.
2. Handle the IC, carefully.

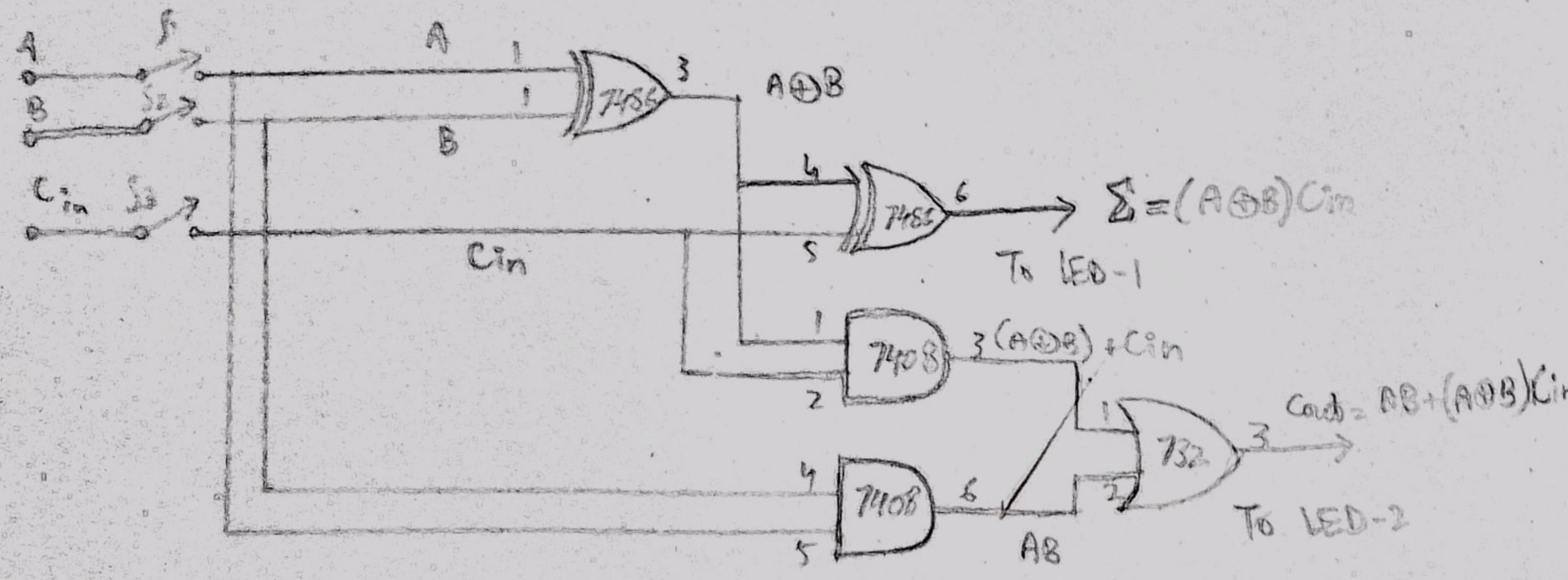
(a) Logic symbol



(b) Truth Table

A	B	Cin	Co	Σ
0	0	0	0	0
0	0	1	0	1
0	1	0	0	1
0	1	1	1	0
1	0	0	0	1
1	0	1	1	0
1	1	0	1	0
1	1	1	1	1

input
carry



(c) logic

Diagram

19.oct.23

Electronics - II (EIT-244)

Practical # 2

Binary Full Adder

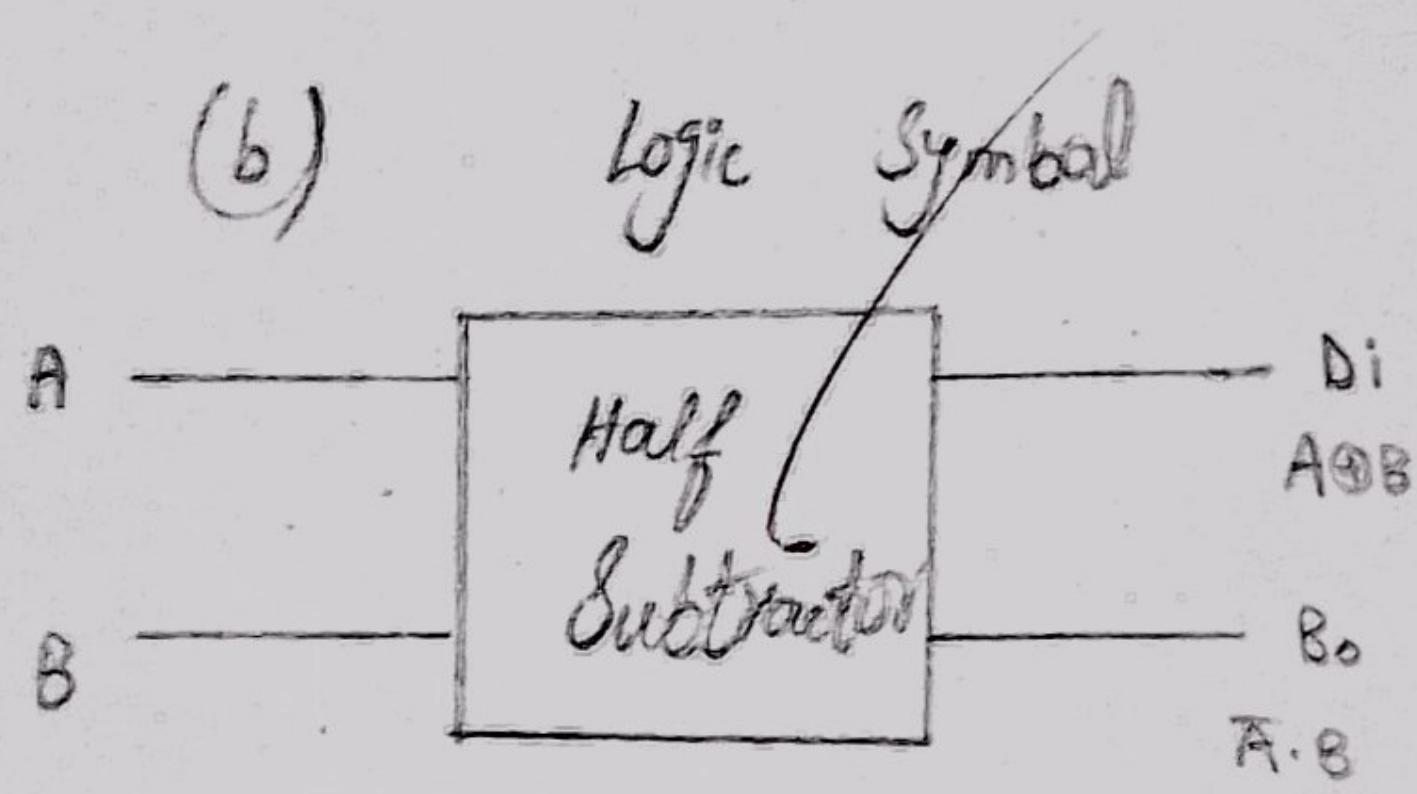
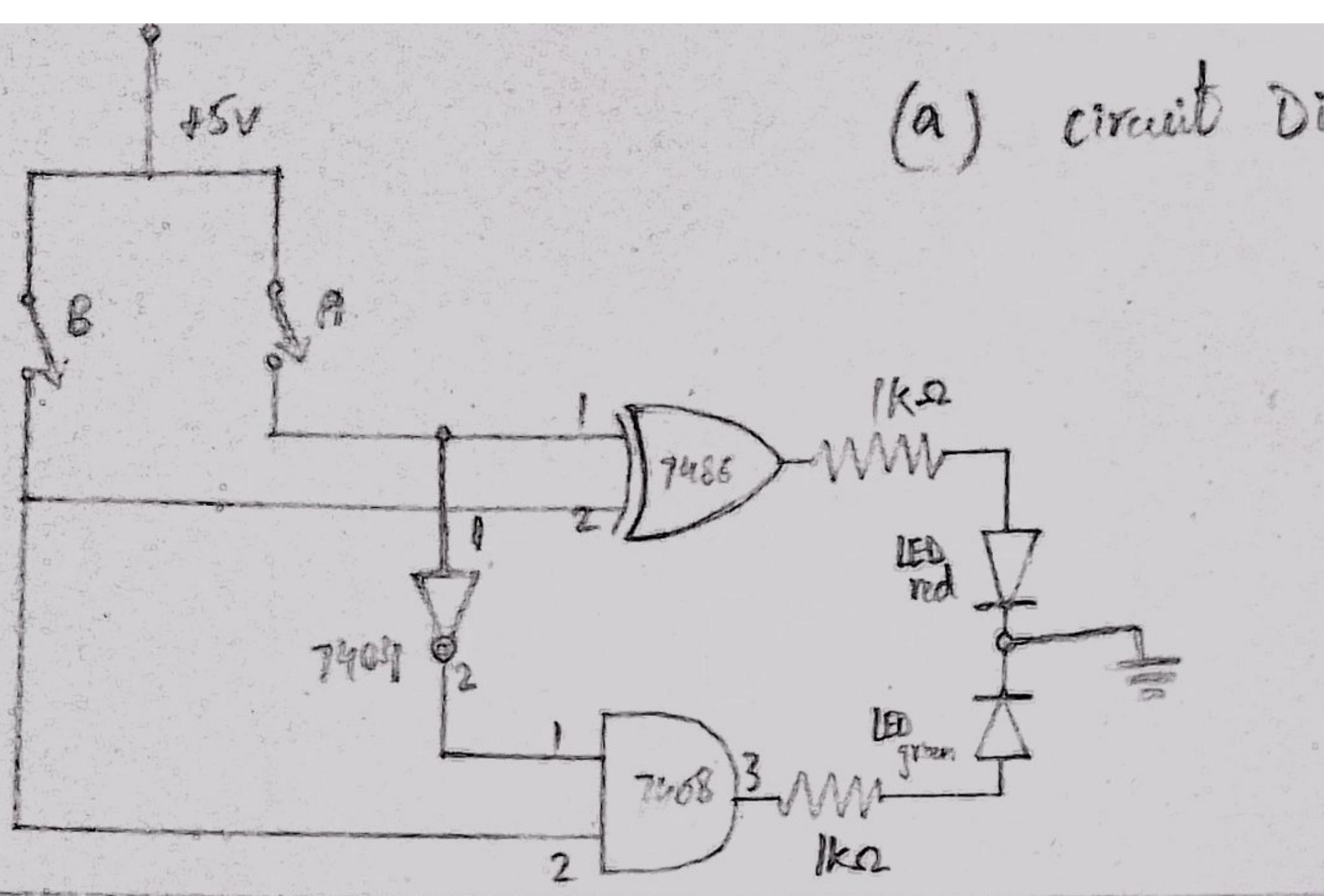
material :- Breadboard, DC supply, 2 LED, 2 $1k\Omega$ resistor, IC (7408, 7486, 7432), 2 switch, DMM, Toolkit, connecting wires

Procedure :-

1. By keeping power supply 'OFF' assemble the circuit.
2. keep all three input switches (S_1, S_2, S_3) open and switch on the power supply. Observe the output LEDs. Both the LEDs will remain OFF indicating sum = 0 and cout = 0.
3. Close switch S_3 and observe the output. LED 1 will glow and LED 2 will remain OFF indicating sum = 1 and cout = 0.
4. Verify all states as per truth-table. Draw neat diagram of circuit and complete truth-table.

Precautions :-

1. Use regulated DC supply.
2. Handle ICs carefully.
3. Avoid short circuiting.



Truthtable

Inputs		Outputs	
A	B	D _i	B _o
0	0	0	0
0	1	1	1
1	0	1	0
1	1	0	0

~~3f 6 10 27~~

19-oct-23 Electronics - II (CIT-244) Thursday

Practical # 3 (Study of Binary Subtractor)

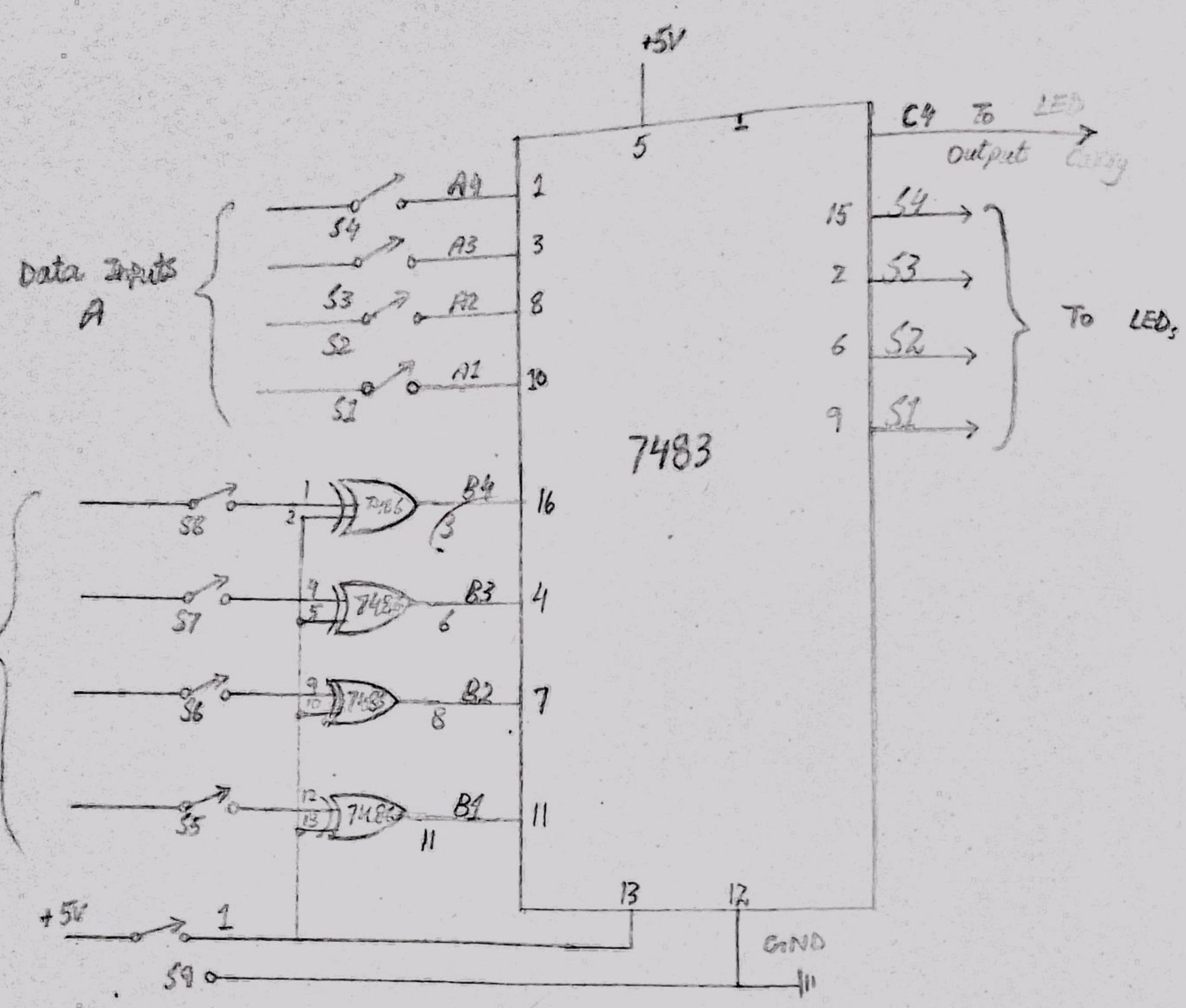
Materials:- Breadboard, DC supply, DMM, ICs (7486, 7408, 7404), LED (green, red), 2 1kΩ resistor, 2 switch (SPST), Toolkit, connecting wires.

Procedure:-

1. By keeping power supply OFF assemble the circuit.
2. Put switch 'A' and 'B' at open position and Switch ON power supply. Observe the output. Both LEDs will remain OFF showing D_i and B_o outputs low (0-0=0).
3. Close switch 'B' to apply logic -1 at input B, observe the outputs. Both LEDs will come ON showing D_i and B_o high. (0-1 = one with B)
4. Open switch 'B' and close 'A' observe outputs.
5. Repeat above steps 2 to 5 and write down your observations.

Precautions:-

1. Use regulated supply.
2. Take care ICs pins.
3. Avoid short circuiting.



(Binary adder/Subtractor)

✓
✓
✓
✓

2-Nov-23 Electronics - II (CIT-244) Thursday

Practical # 4
(Binary adder / Subtractor)

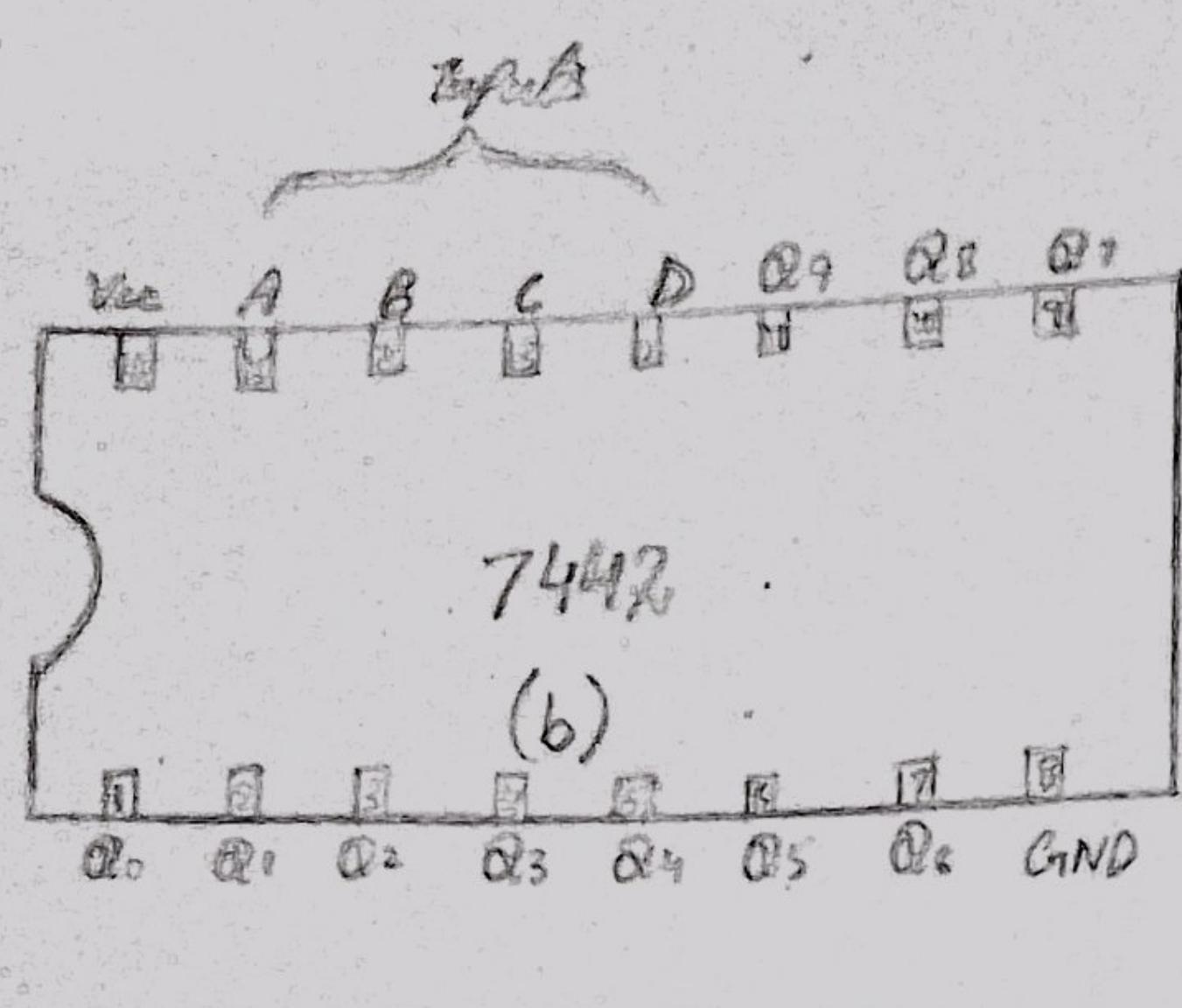
Materials :-
 logic trainer, IC (7483, 7486), DMM, connecting wires, tools kit

Procedure :-

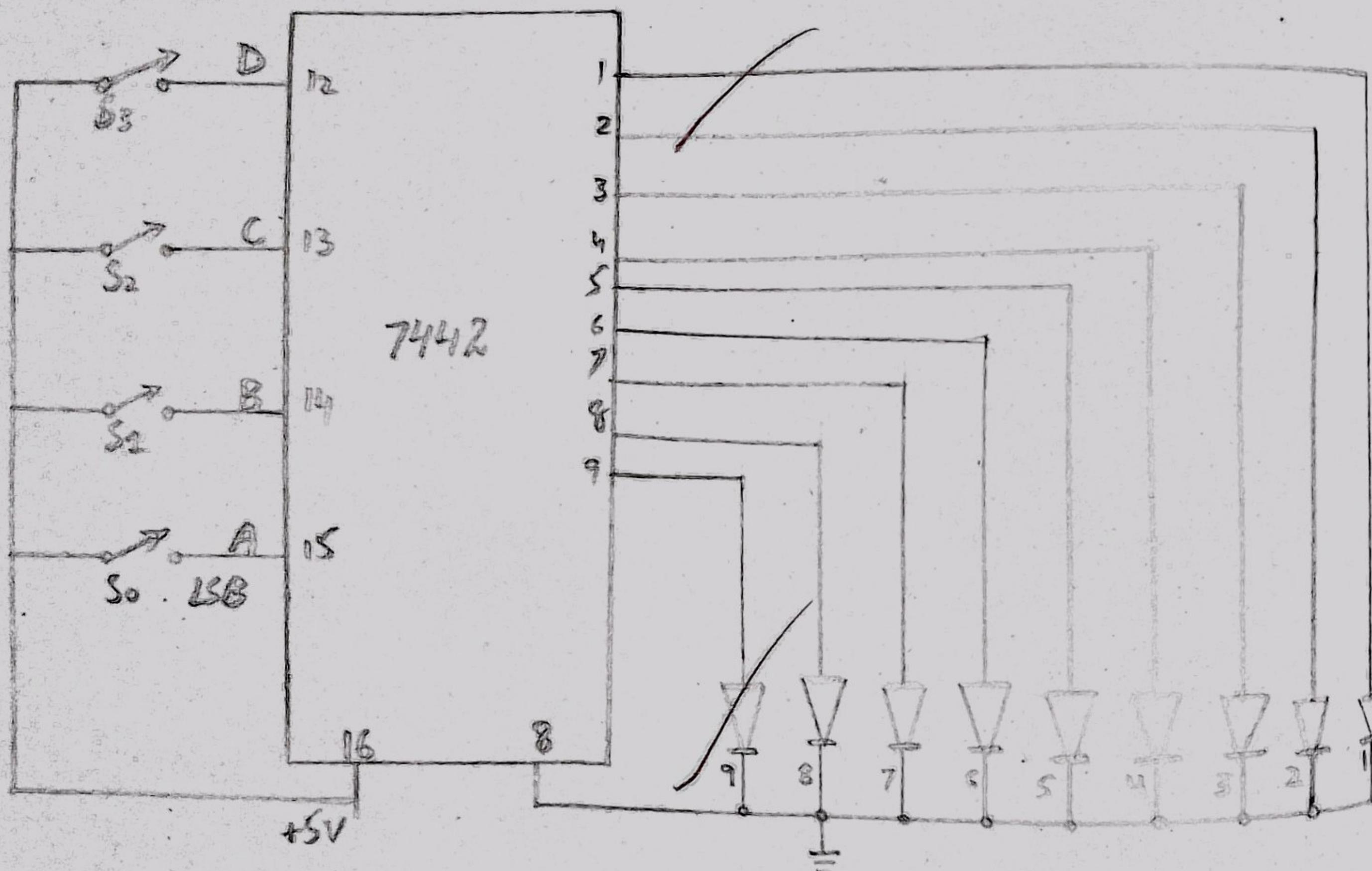
1. Assemble the circuit as shown in diagram.
2. Select mode by S9. For addition put S9 at position 1 and for subtraction at position 2.
3. Select data binary numbers required for input A by switches S7 to S4.
4. Select data for input B by switches S5 to S2.
5. Observe / note output and verify.
6. Verify one by one both modes (addition & subtraction).
7. Repeat above steps for various different data inputs.
8. Draw neat diagram and write your observations in your note book.

Precautions :-

1. Handle the IC carefully.
2. Use regulated DC supply.
3. Ensure tight connections.



Pin Diagram



Circuit Diagram

17 November 23

Electronics - II (CIT-244)

Friday

Practical # 5 (BCD To Decimal Conversion)

Materials :-

Logic trainer, IC 7442, Tools kit, DMM, connecting wires & notebook.

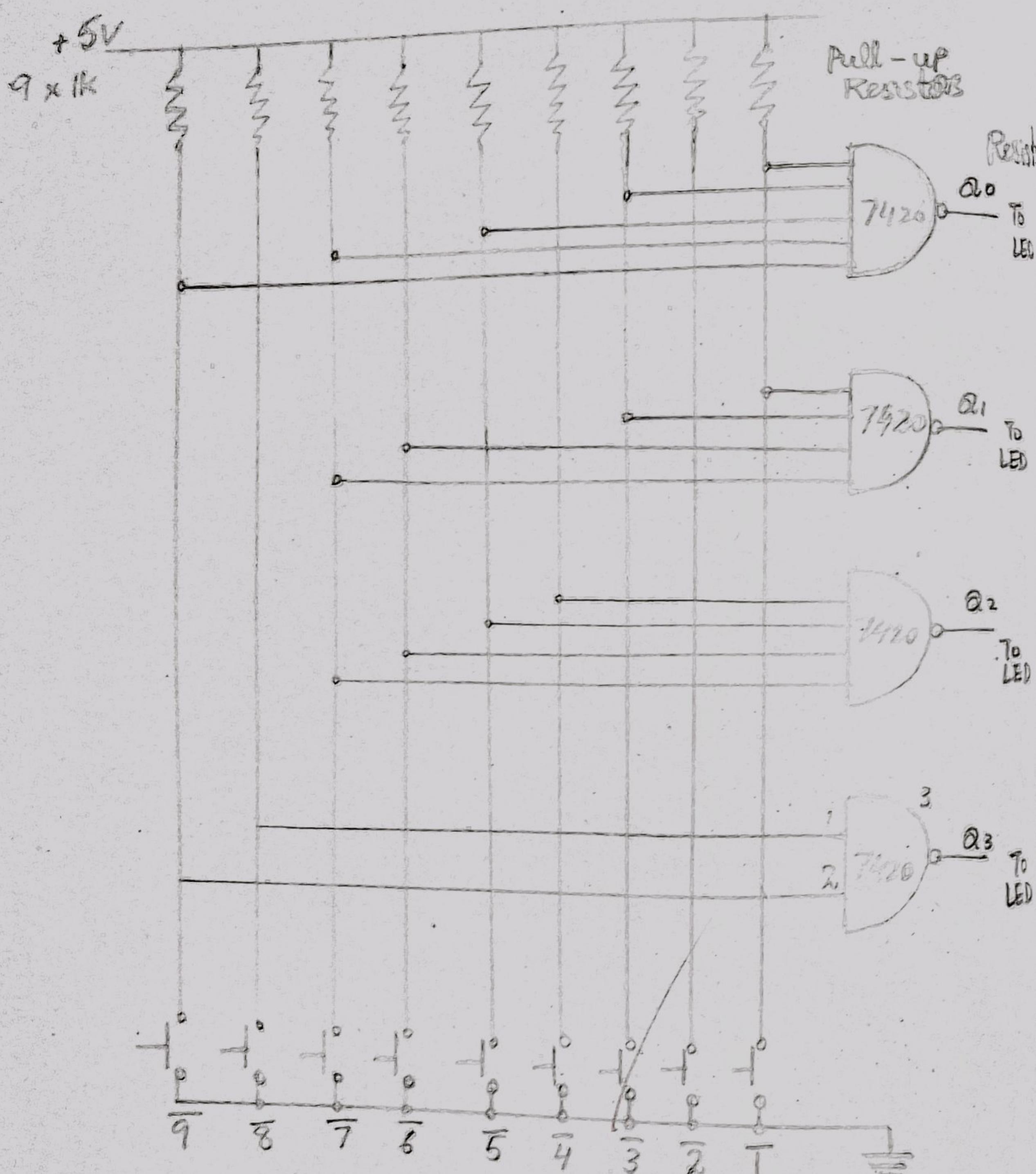
Procedure :-

1. Assemble the circuit as shown.
2. By putting all switches open, switch on the circuit.
3. Observe LEDs. As the input BCD code is, 0000, no LED will come ON.
4. Close the switch S_1 . LED number '1' will comes ON indicating decimal number '1', equivalent to BCD code 0001.
5. Apply all the input combinations of BCD as per truth table one - by - one. Record your observations in the note book.

Precautions :-

1. Identify IC pins carefully.
2. Use regulated DC supply.

(A) Simple decimal to BCD Encoder



19-nov-23

Electronics - II (CIT-244)

Sunday

Practical # 6

(Decimal to BCD conversion)

material :-

logic trainer, IC-74LS147, 7404, 7400, 7420, 3PST switch, 10K Ω , 2K Ω resistors, key-pad, tools-kit, DMM, connecting wires as required.

procedure :-

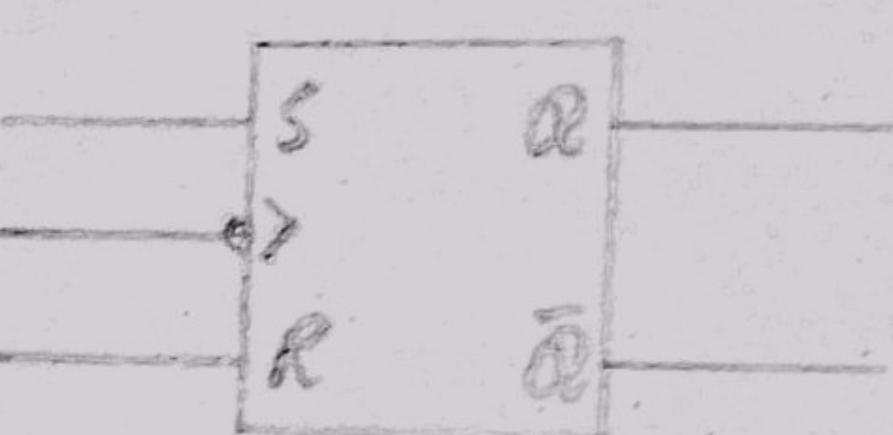
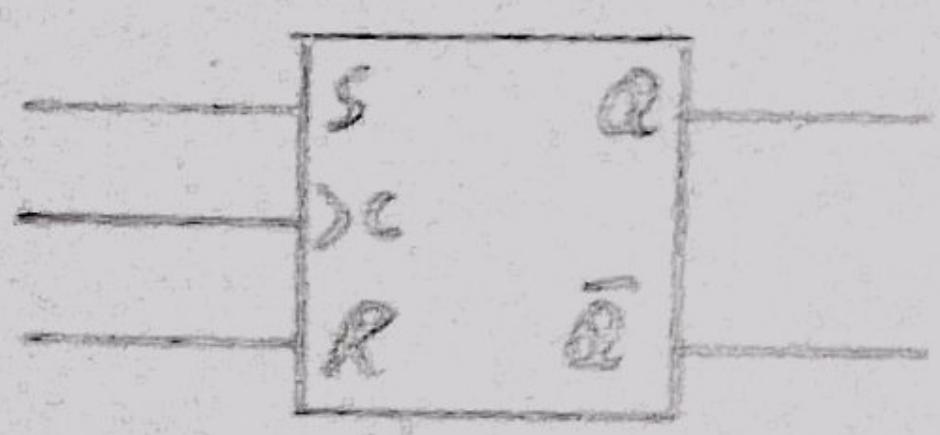
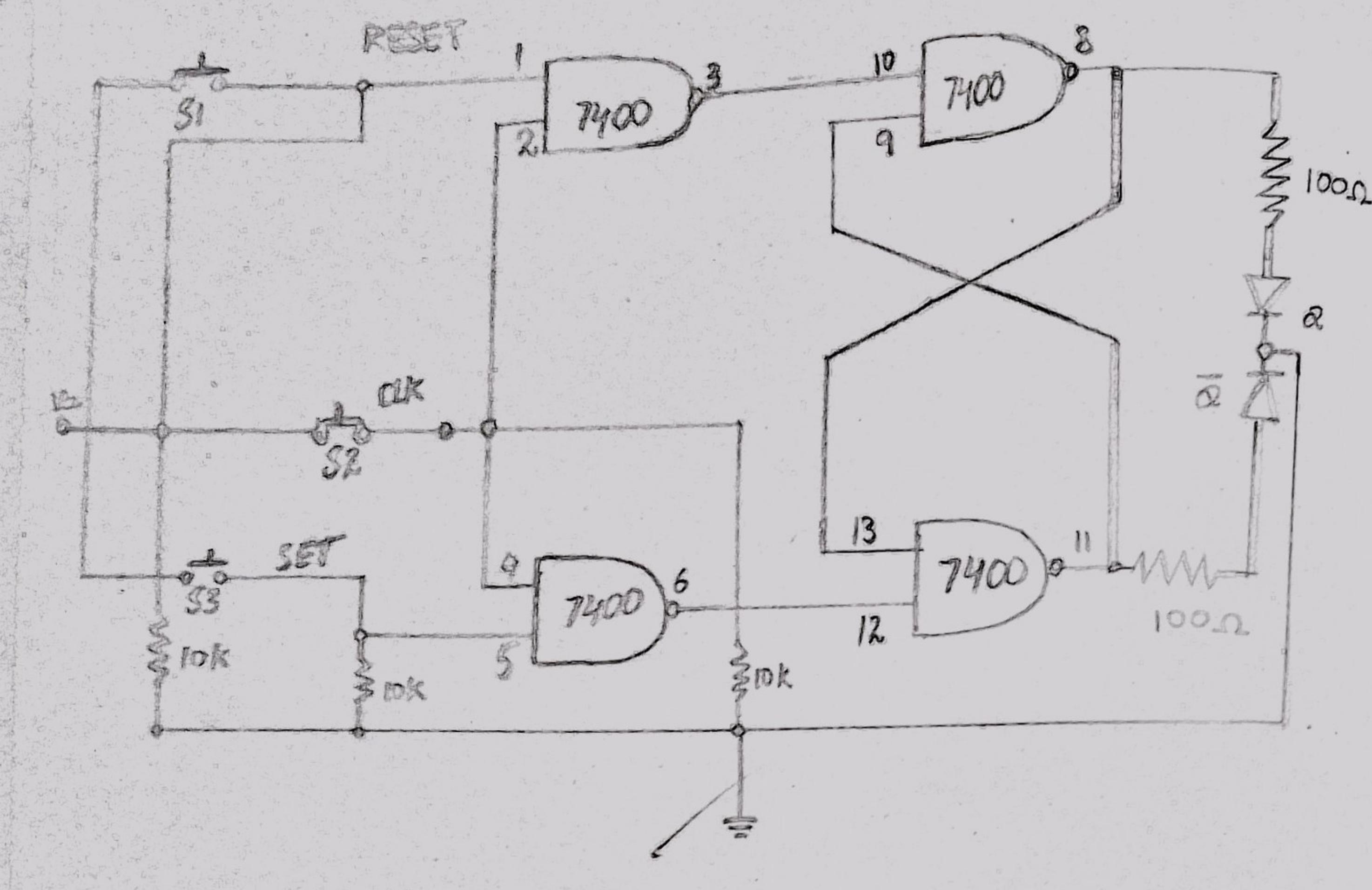
1. Assemble the circuit as shown.
2. Switch ON the power supply and close switch 1. Observe the output LED. LED Q0 will glow while other three LEDs (Q1, Q2, Q3) will not glow indicating BCD code 0001. BCD 0001 is equivalent to decimal 1.
3. Open switch 1 and close switch 2. Observe O/P LED. Only LED Q1 will glow indicating BCD output 0010. It is decimal number 2.
4. Go through (step-by-step) upto decimal number 9 (switch 9) and observe O/P BCD code.

(B) 74LS147 Encoder: It is a 10-to-4 line encoder. It provides same function as described in simple decimal to BCD encoder.

It is prior encoder.

precautions :-

1. Use regulated DC supply.
2. Handle IC, carefully.
3. Ensure tight connections.



(a)

(b)

Inputs		Output		Remarks
S	R	Q	Q̄	
0	0	Q ₀	Q̄ ₀	NC
0	1	?	?	Reset
1	1	?	?	Set
1	1	?	?	Invalid

Diagrams

Electronics - II

Thursday

Practical NO :- 7

Study of clocked SRFF)

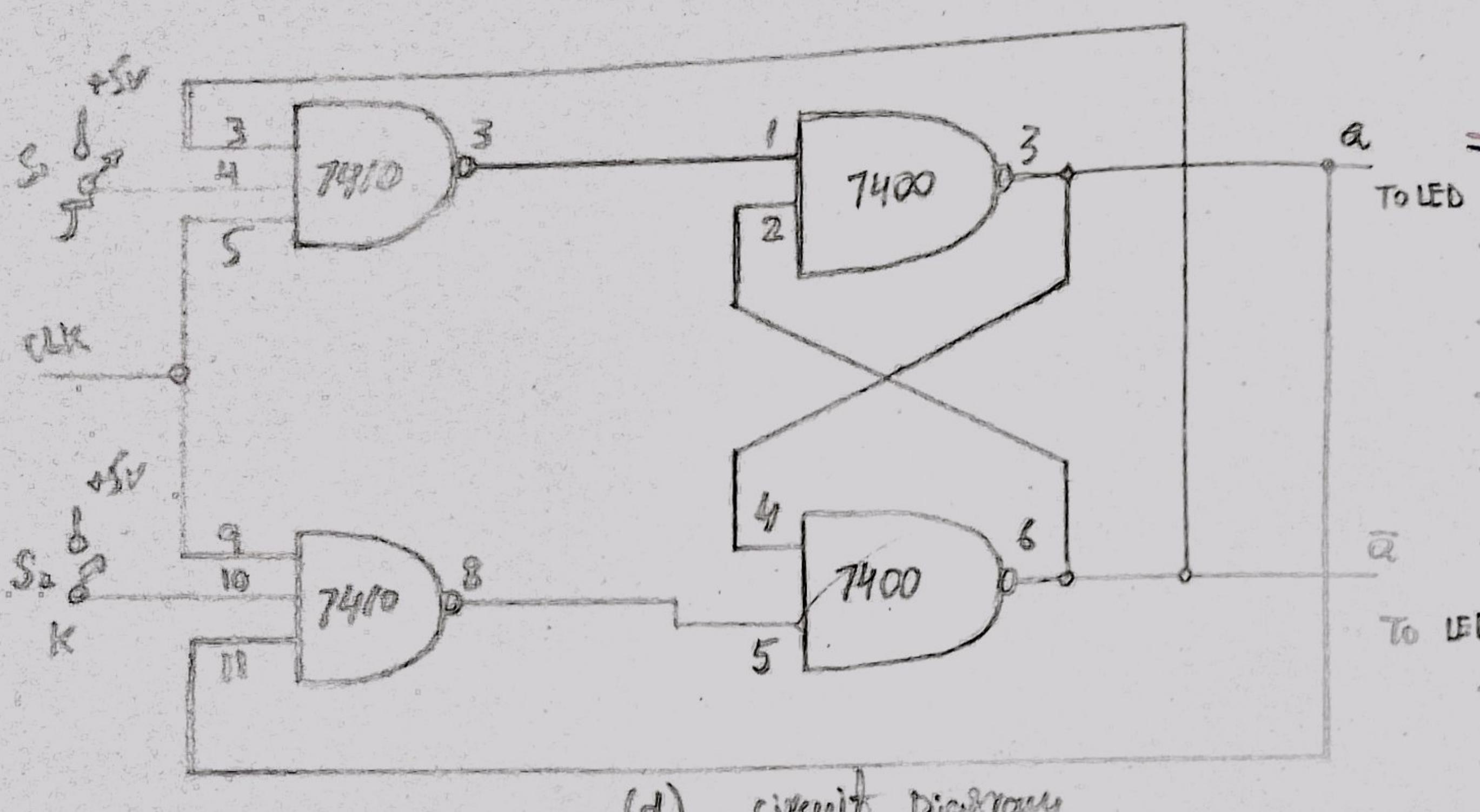
material Required:- logic trainer 1, tech kit 1, DMM, IC - 7400 1, resistors 10kΩ 2, resistor 100Ω 2, connecting wires as required.

procedure :-

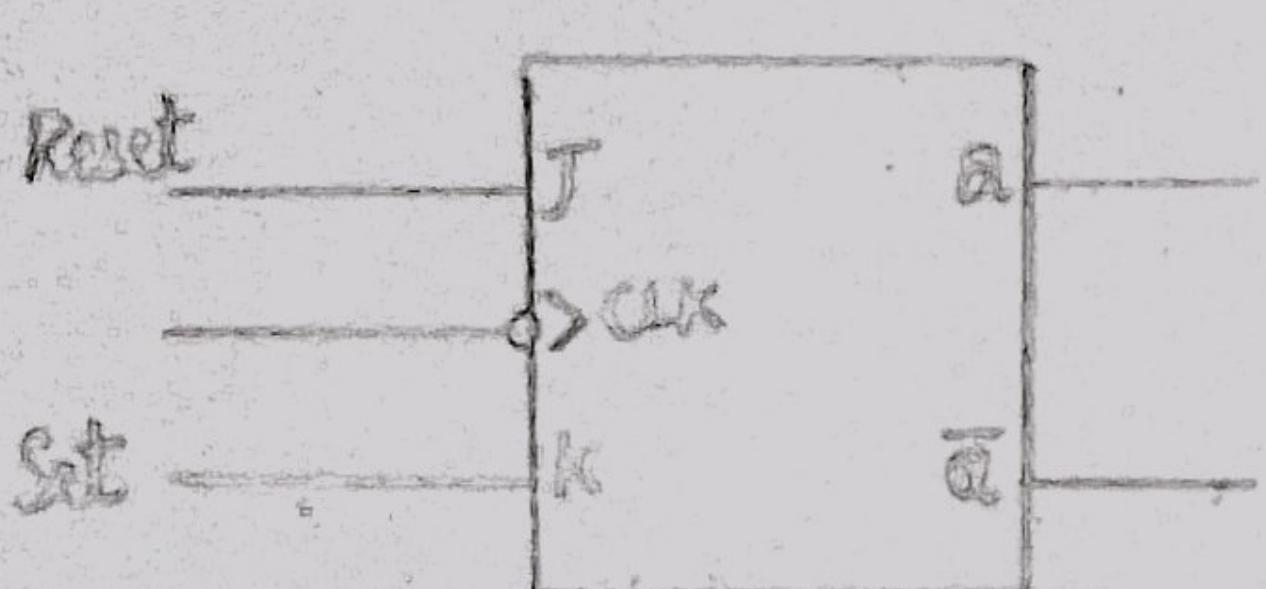
1. Assemble the circuit as shown. Switch on the power supply and note state of Q output.
2. Set 'S' and 'R' inputs to logic low(0) and apply clock pulse. There will be no change in output state of FF.
3. Apply logic high at 'S' input and apply clock pulse. The Q output will change from '0' to '1' or will remain '1', if already it was '1'. It's FF.
4. Set 'S' input low and 'R' high. This result RESET state of FF.
5. put both inputs at logic high and observe output
6. Repeat the above steps, draw neat diagram And draw truth table.

Precautions :-

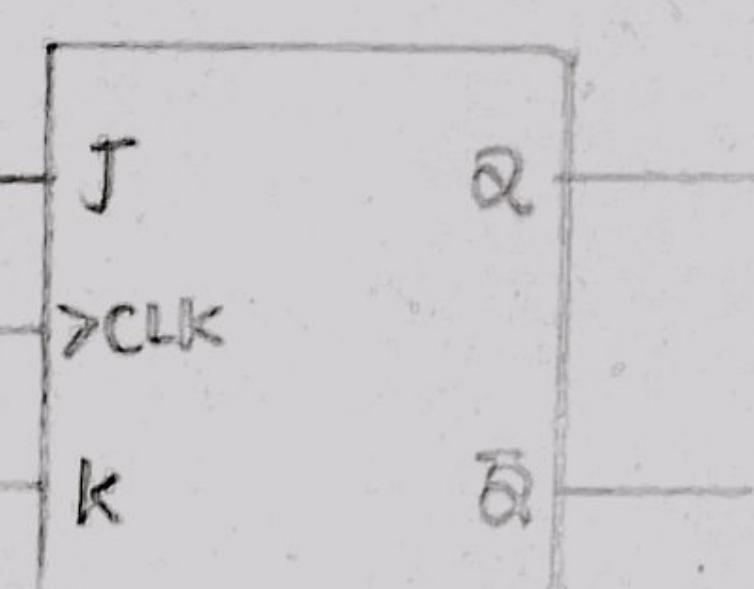
1. Use regulated DC supply.
2. Handle the IC carefully.
3. Avoid smoking during practical.
4. Ensure tight connections.



(d) circuit diagram



(a) -ve edge triggered



(b) +ve edge triggered

J	K	CLK	Q
0	0	↓	NC
0	1	↓	1
1	0	↓	0
1	1	↓	Q _o

(c) Truthtable

7 Dec. 23

Electronics-II

CIT-244

Thru

Practical # 8 (Study of JK Flip Flop)

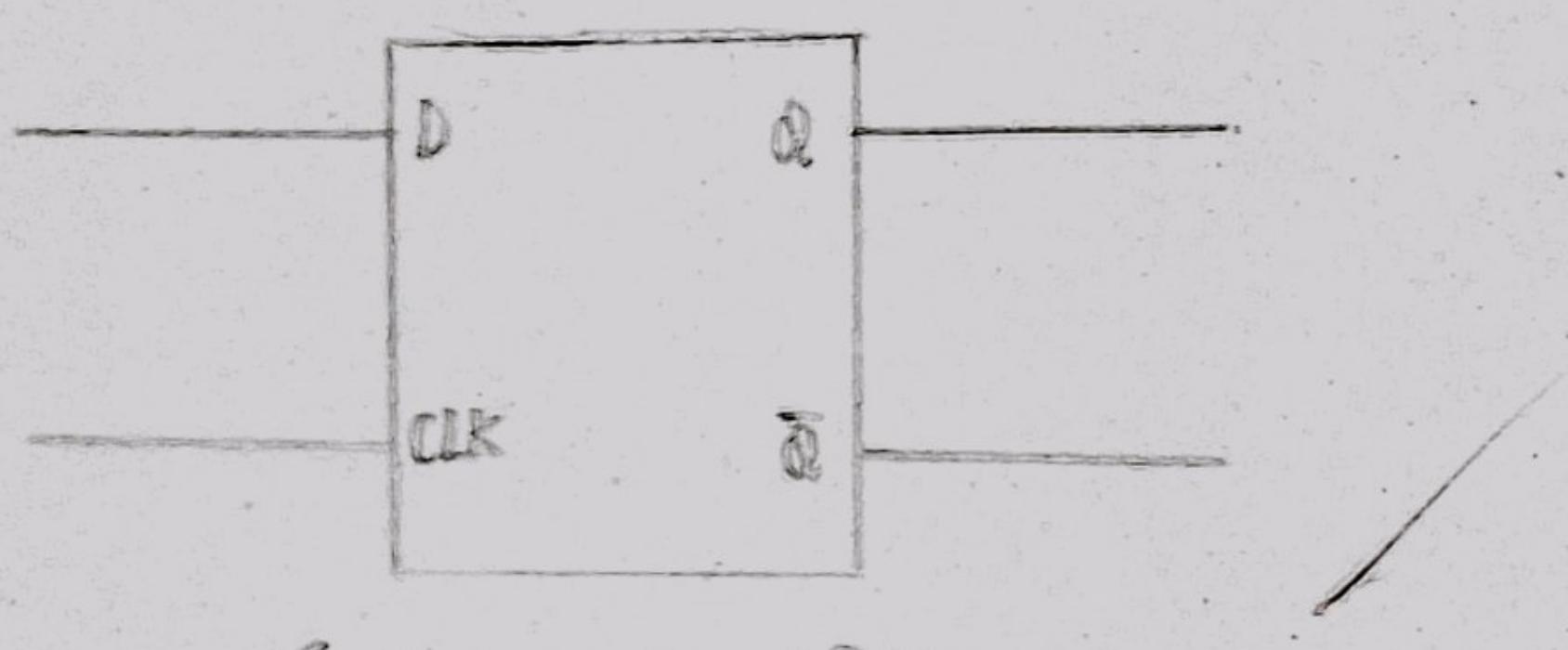
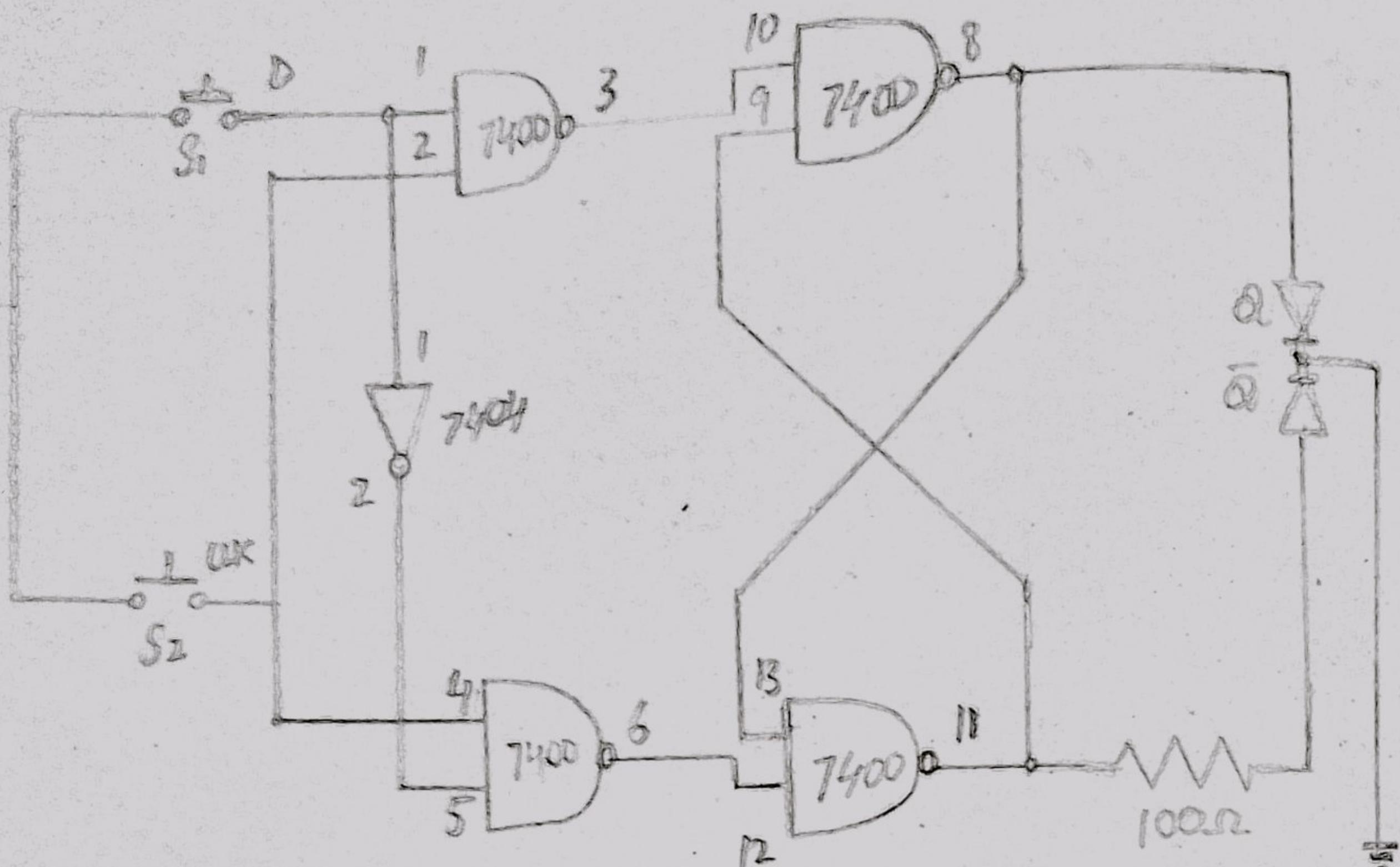
Materials:- Logic trainer, power supply, MM, connecting wires, tool kit, IC (7410, 7400), switch D, oscilloscope, dual trace and logic probe.

Procedure :-

1. Assemble the circuit on logic trainer. Select a suitable frequency of clock pulses.
 2. Use function generator available on the trainer for clock pulses. Better to use push buttons for clocking.
 3. Apply logic low at J and K inputs, then apply clock pulse. Observe output and record some in truth table.
 4. Now apply clock pulse by keeping J input high and K low. Observe output and record in the truthtable.
 5. Now J high and K low. Record in table.
 6. Now apply logic high at both. Observe it. This is toggle mode of JK FF.
- Draw neat diagram of FF and complete truthtable.

Precautions:-

1. Identify IC pins carefully.
 2. Use regulated DC supply.
 3. Avoid shorting during practical.
- Observe outputs carefully.



(a) Logic Diagram

Input		Output
CLK	D	Q
1	0	0
1	1	1

(b) Truth table

7 Dec - 23

Electronics II

CIT-204

Three

Practical # 09 (Study of D Flip Flop)

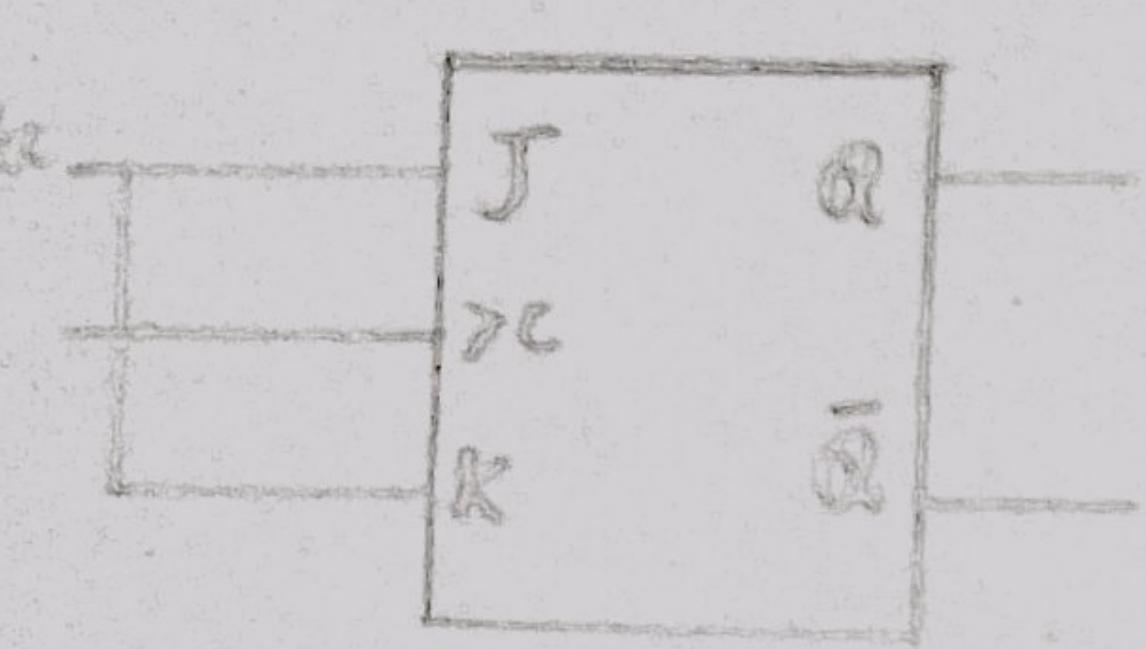
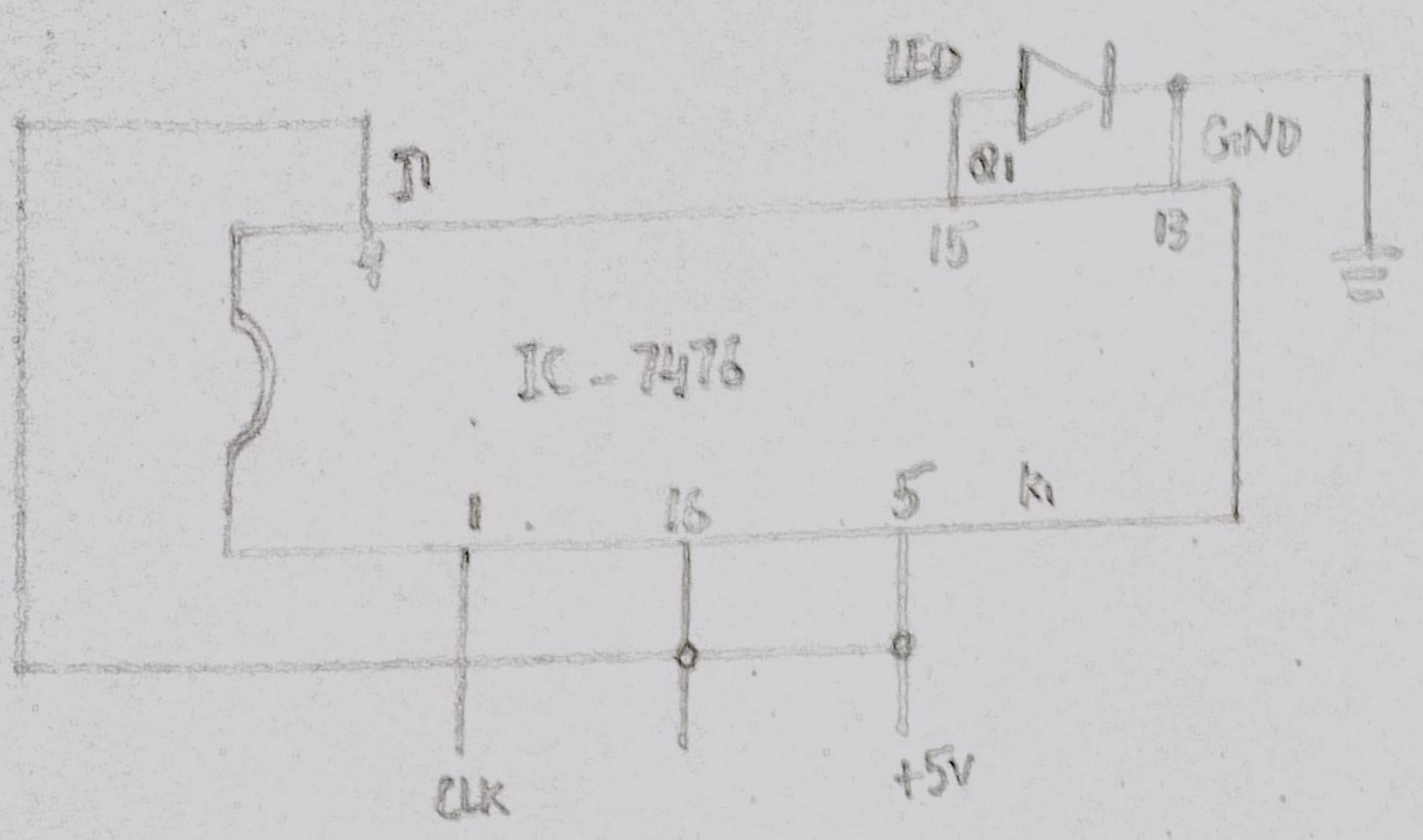
Materials : Breadboard, Jumper wires, Power supply, IC 7400, 7404, Tools kit, Switch (PB), connecting wires, Red, green LEDs and notebook.

Procedure :-

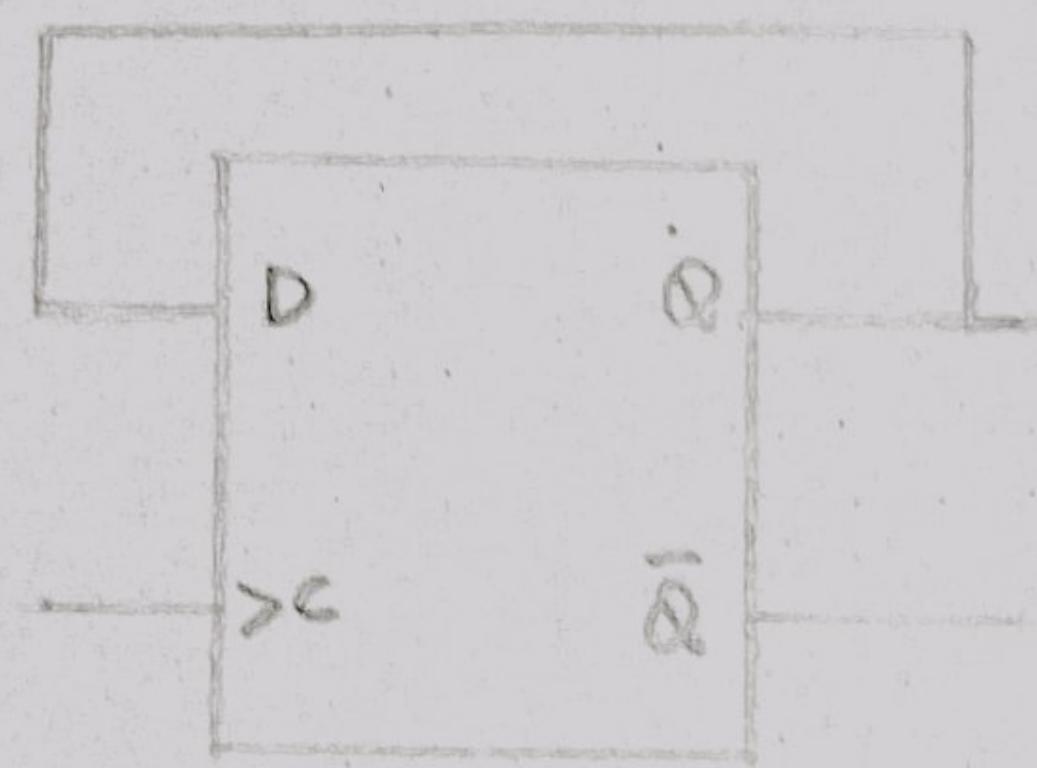
1. By keeping the power supply OFF, assemble the circuit.
2. By keeping both switches open, switch on power supply.
3. Apply logic high at D input by closing S1. Observe the output Q LED will glow.
4. Open 'S1' and close S2. Apply clock. D LED will goes OFF and Q will glow.
5. Observe Q will glow.
6. Repeat steps 3, 4 & 5.
7. Record your observations in truth table.

Precautions :-

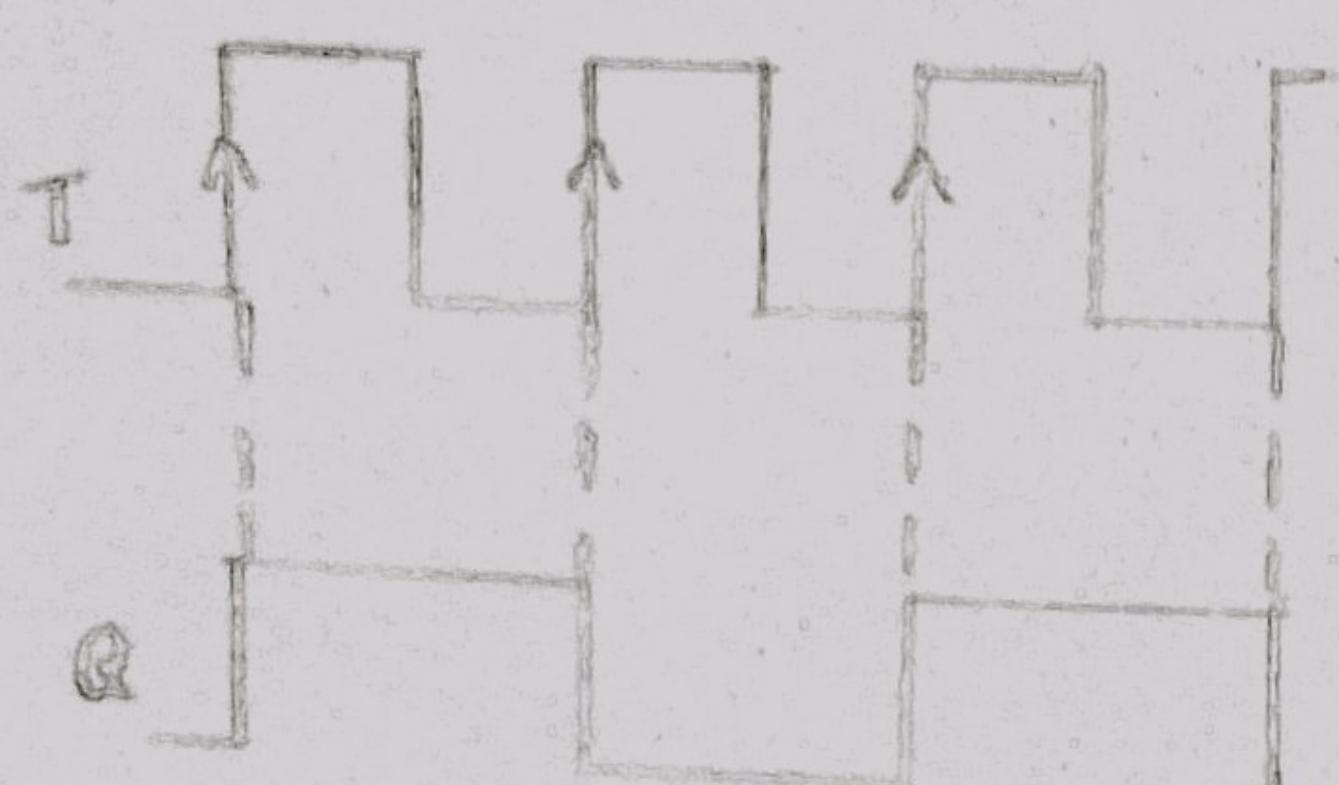
1. Use regulated DC supply.
2. Keep supply OFF while assembling.
3. Ensure right connection.



(a) T from JK



(b) T from D



(c)

7-Dec-23

Electronics II

CIT-244

Thru

Practical # 10 (Study of T-Type Flip Flop)

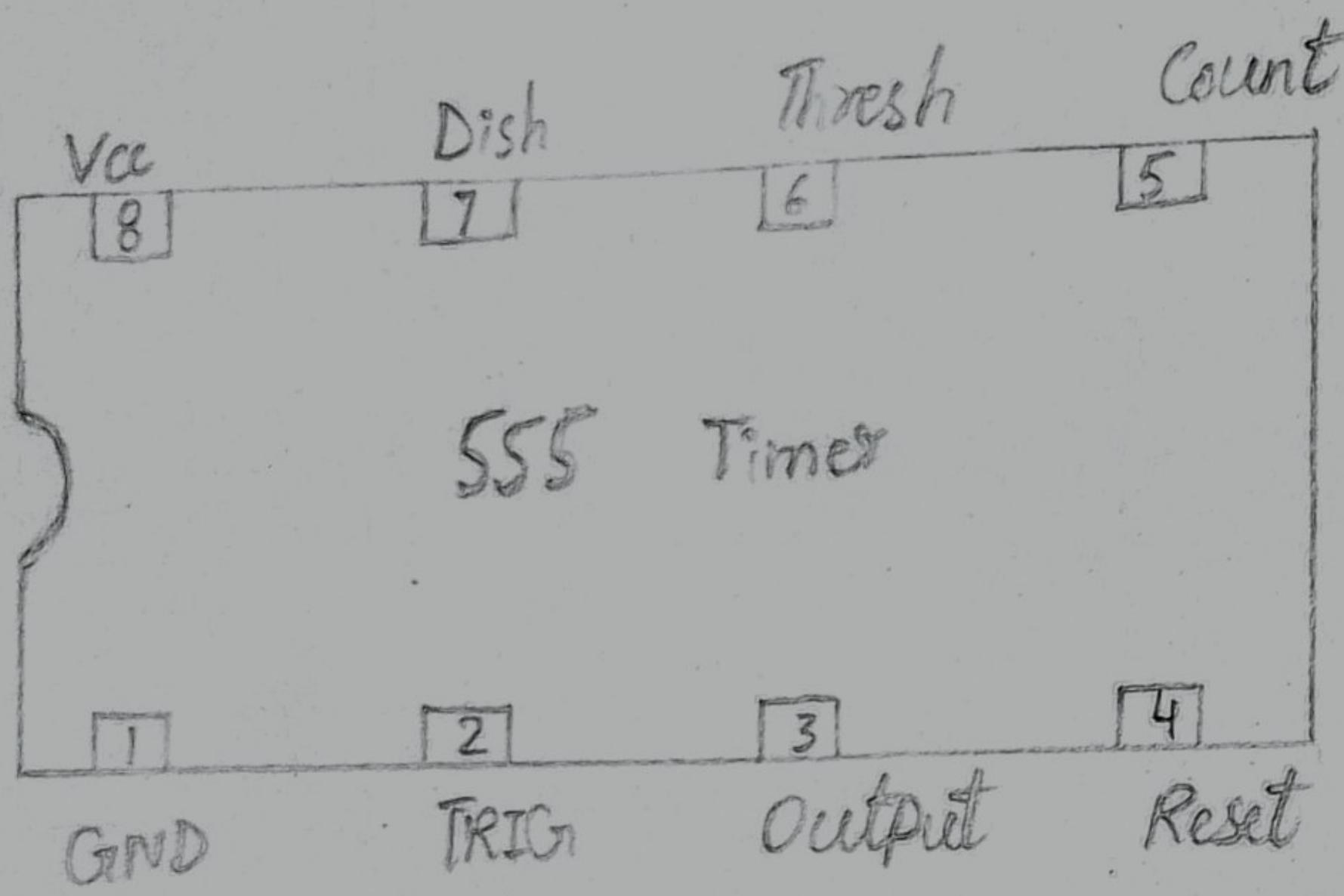
Materials:- logic trainer, power supply, connecting wires, DMM, Oscilloscope Dual Trace, IC: 7476, 741873, tools kit, HD ;

Procedure:-

1. Assemble the circuit as shown.
2. connect oscilloscope CH-1 with CLK input and CH-2 with Q1 output.
3. Switch on the circuit and apply clock pulses at pin number 1 as shown.
4. Observe the output (Q1). LED will alternately goes on and off. Observe timing of input pulses versus output at oscilloscope. Draw neat timing diagram in your note book.

Precautions:-

1. Use regulated DC supply.
2. Ensure tight connections.
3. Handle oscilloscope carefully.



(Pin Diagram
of 555 Timer)

wjd

7-april-24

CIT-244

Sun

Electronics - II

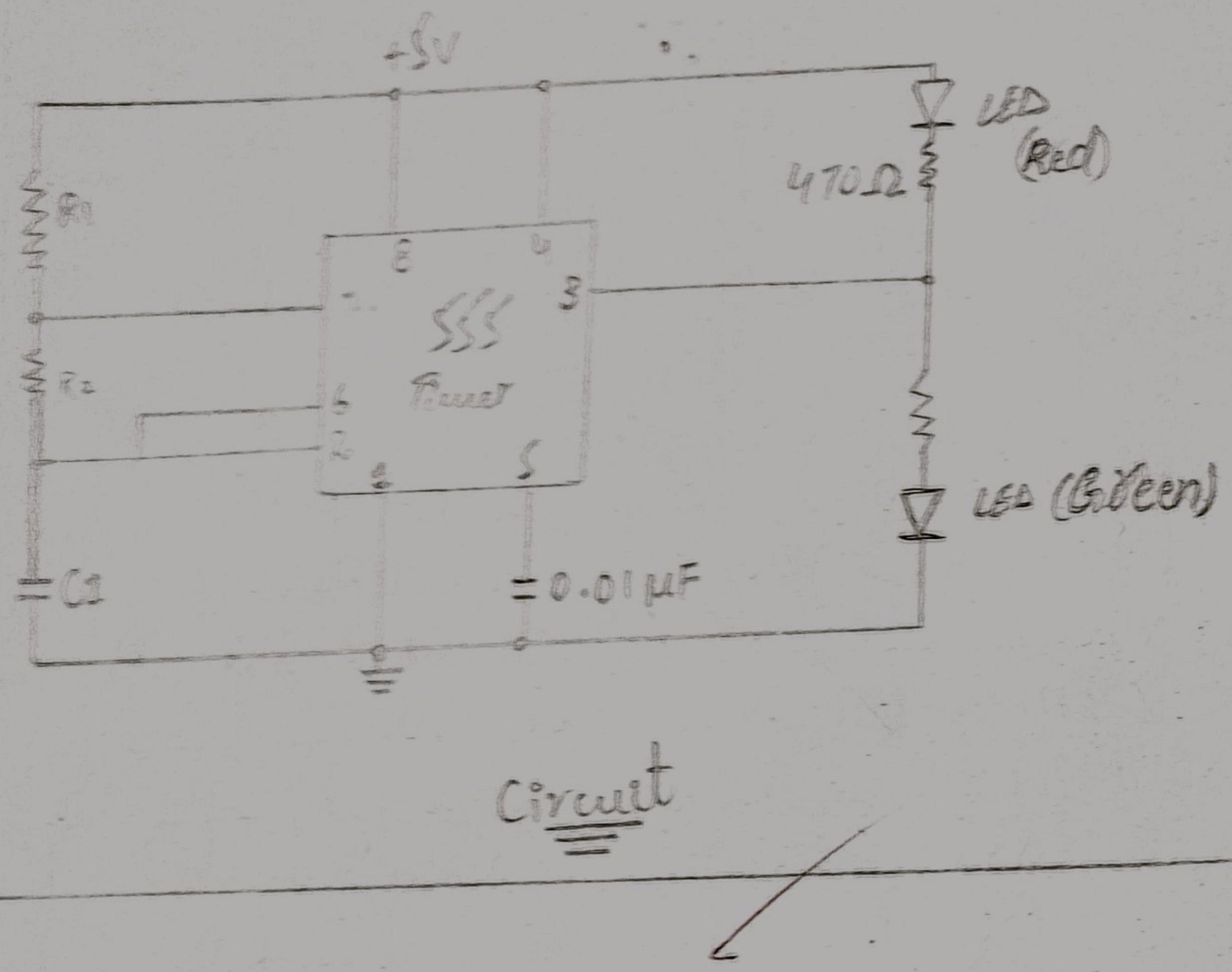
Practical # 11

Study of 555 Timer
as multivibrator.

Tools :- Logic trainer, Resistor : 1k, 10k,
1M and 10M, Capacitor : 1μF, 0.1μF,
0.01μF, Resistor : 470 ohm
DMM, Oscilloscope
Tools kit, Connecting wires
IC - 555, Resistor of 100 ohm
3 10k resistors and power supply

Procedure :-

1. Select resistors and capacitor values for desired frequency.
2. Assemble the circuit as shown.
3. Keep power supply OFF.
4. Switch ON and observe LEDs.
5. Calculate frequency.
6. change capacitor values and observe the output.
7. Using oscilloscope, observe



C_1	$R_2 = 10k$ $R_1 = 1k$	$R_2 = 100k$ $R_1 = 1k$	$R_2 = 1M$ $R_1 = 100k$
$0.001 \mu F$	68 kHz	6.8 kHz	680 kHz
$0.01 \mu F$	6.8 kHz	680 Hz	68 Hz
$0.1 \mu F$	680 Hz	68 Hz	6.8 Hz
$1 \mu F$	68 Hz	6.8 Hz	0.68 Hz

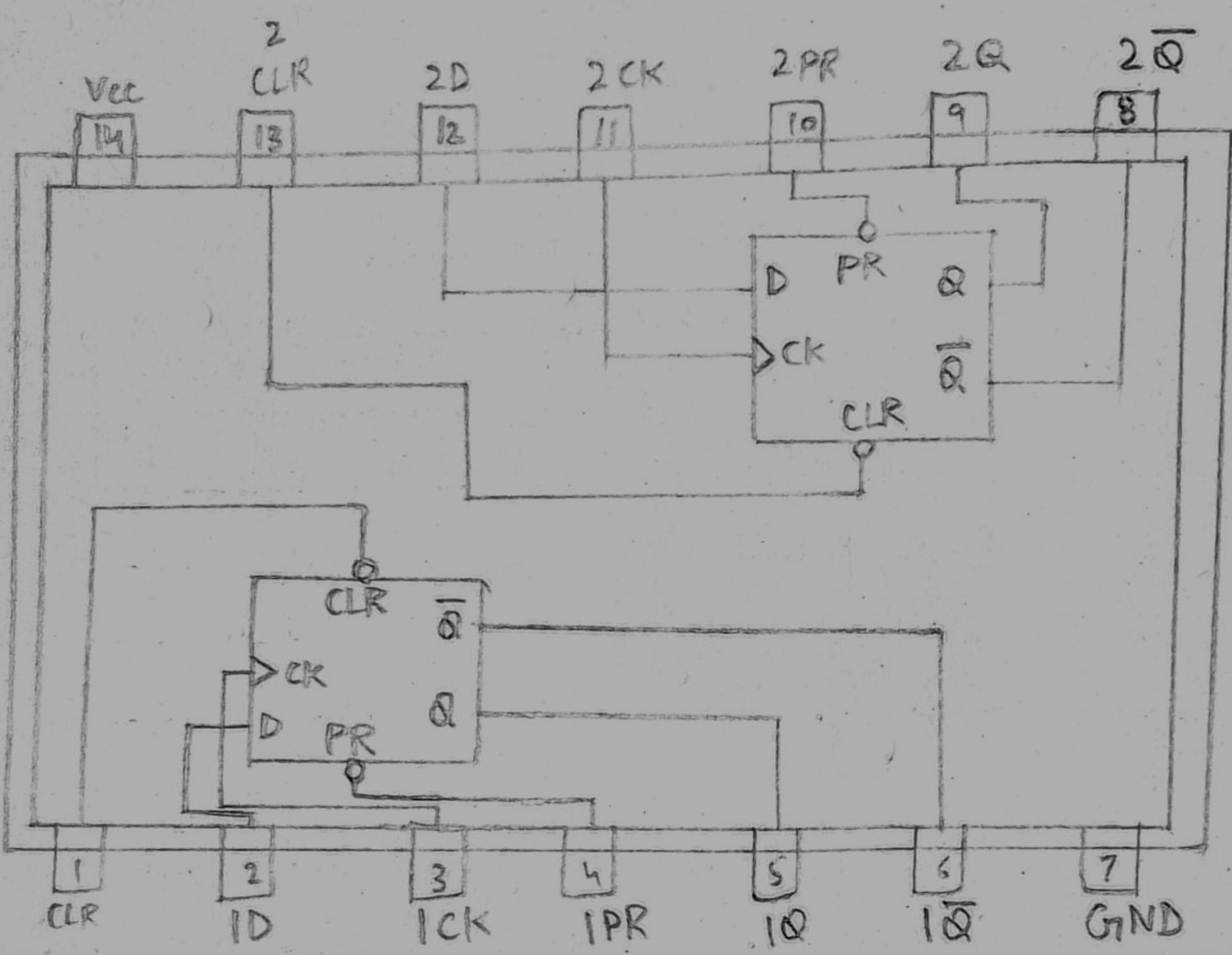
Frequency Table

waveform across points A and B and find out frequency.

- Repeat the experiment two times more by using different values of R_1, R_2 and C_1 .

precautions :-

- Use regulated DC supply.
- Handle/use carefully oscilloscope.
- Ensure tight connections.



(Pin
of
Diagram
IC : 7474)

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CIT-244

Sunday

Electronics - II
practical # 12

(Shift Registers)

materials Required :-

- One logic trainer,
- Four LEDs and logic probe,
- One Dmm,
- One Toolkit,
- Connecting wires as required,
- Two ICs of 7474,
- Four Resistors of $330\ \Omega$,
- One practical notebook.

procedure :-

1. By keeping the power supply OFF.
2. Apply logic high at clear input.
3. Apply logic high at serial input and clock the circuit.
Observe the LEDs.
4. Record observation in table.
5. Apply logic low in input.

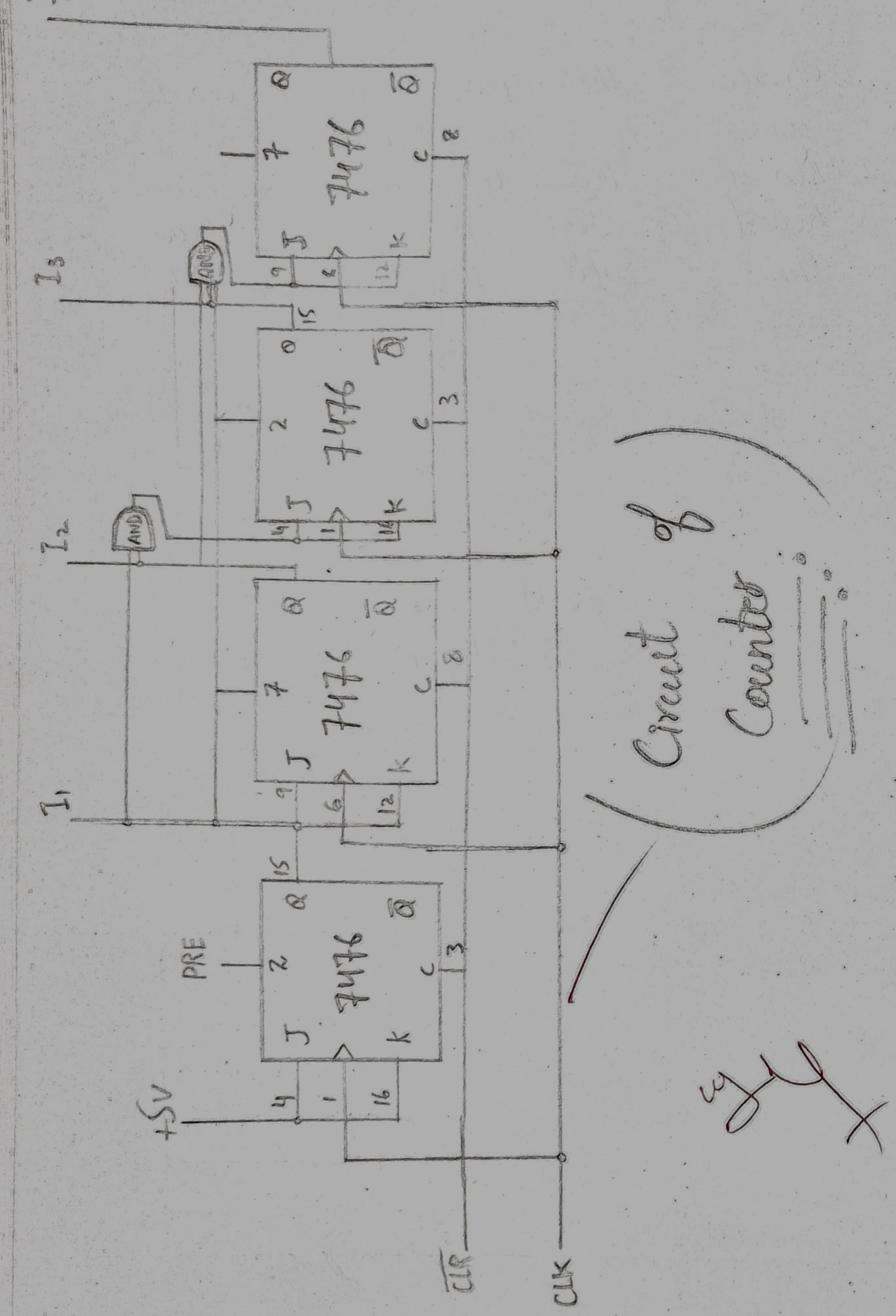
Clock pulse No	QA	QB	QC	QD
0	0	0	0	0
1	1	0	0	0
2	0	1	0	0
3	0	0	1	0
4	0	0	0	1
5	0	0	0	0

(Output of
Shift Register)

6. Observe the LEDs and record again in the table.
7. Repeat step 4 and 5 again.
8. Repeat above practical times with different inputs.

precautions :-

1. Use regulated DC supply.
2. Ensure tight connections.
3. Keep power supply OFF while assembling circuit.



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Sunday

Electronics - II

Practical # 13

(Study of counters)

Required materials:-

- One logic trainer,
- Four 7476 IC ,
- One DMM ,
- One Toolkit .
- Connecting wires as required,
- Four 220 Ω resistors,
- One seven segment display,
- Four LEDs ,
- ICs : 7400, 74LS48 , 7408.

Procedure :- (Synchronous counter)

Assemble the circuit as shown in diagram.

Switch ON the circuit and observe the LEDs.

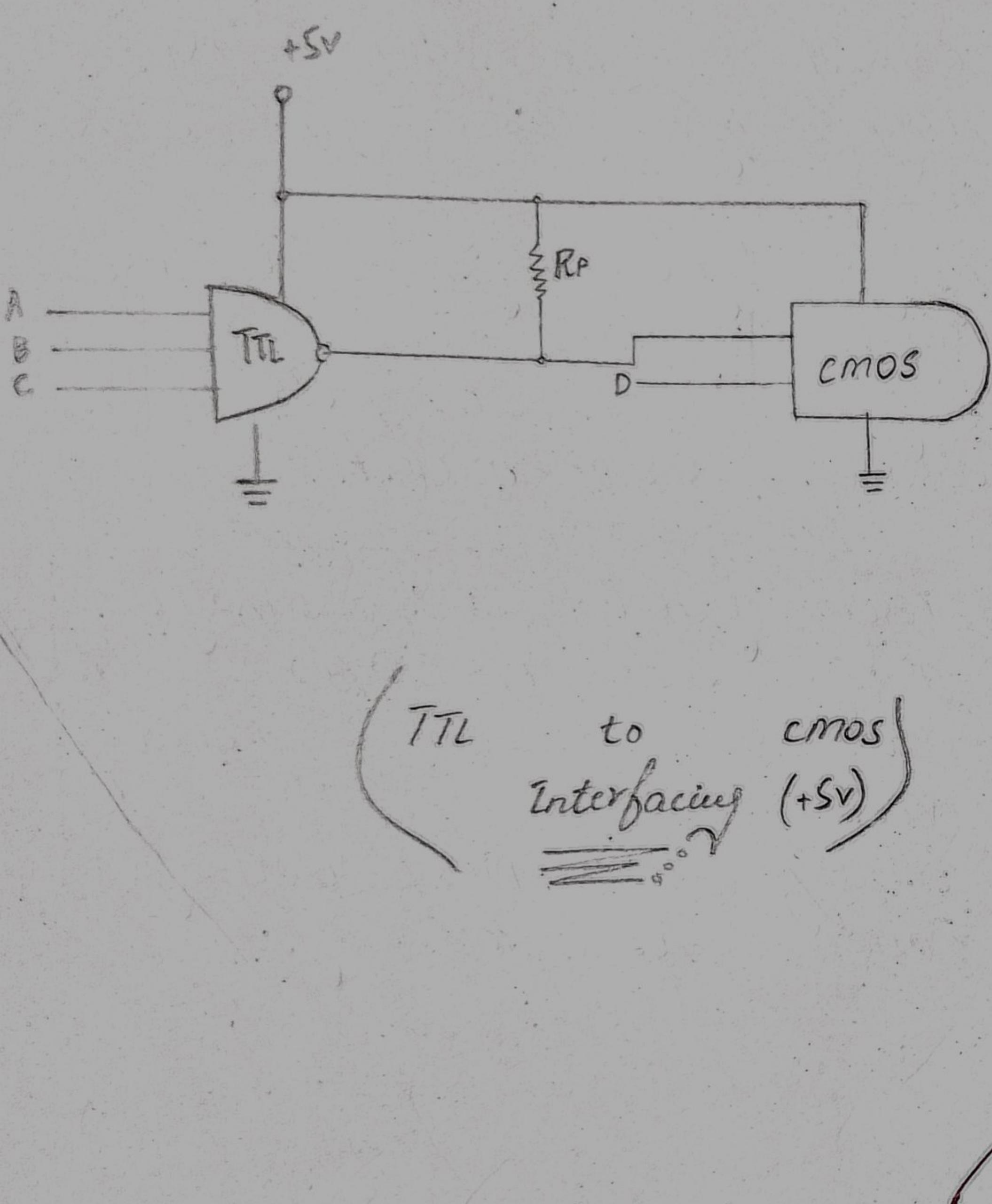
It will be OFF as input and output is '0'.

now Apply clock pulses to input.

- procedure :- (Asynchronous counter)
1. Assemble the circuit as shown in diagram.
 2. Connect input with +5V. Apply logic low at CLEAR input.
 3. Apply logic high at JK input.
 4. Apply clocks at CLK input. Observe the output.

precautions :-

1. Use regulated DC supply.
2. Always connect GND with the circuit, before providing Vcc.
3. Identify IC pins carefully.
4. Handle ICs carefully.



1-april-24

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Sunday

Electronics - II
Practical # 14

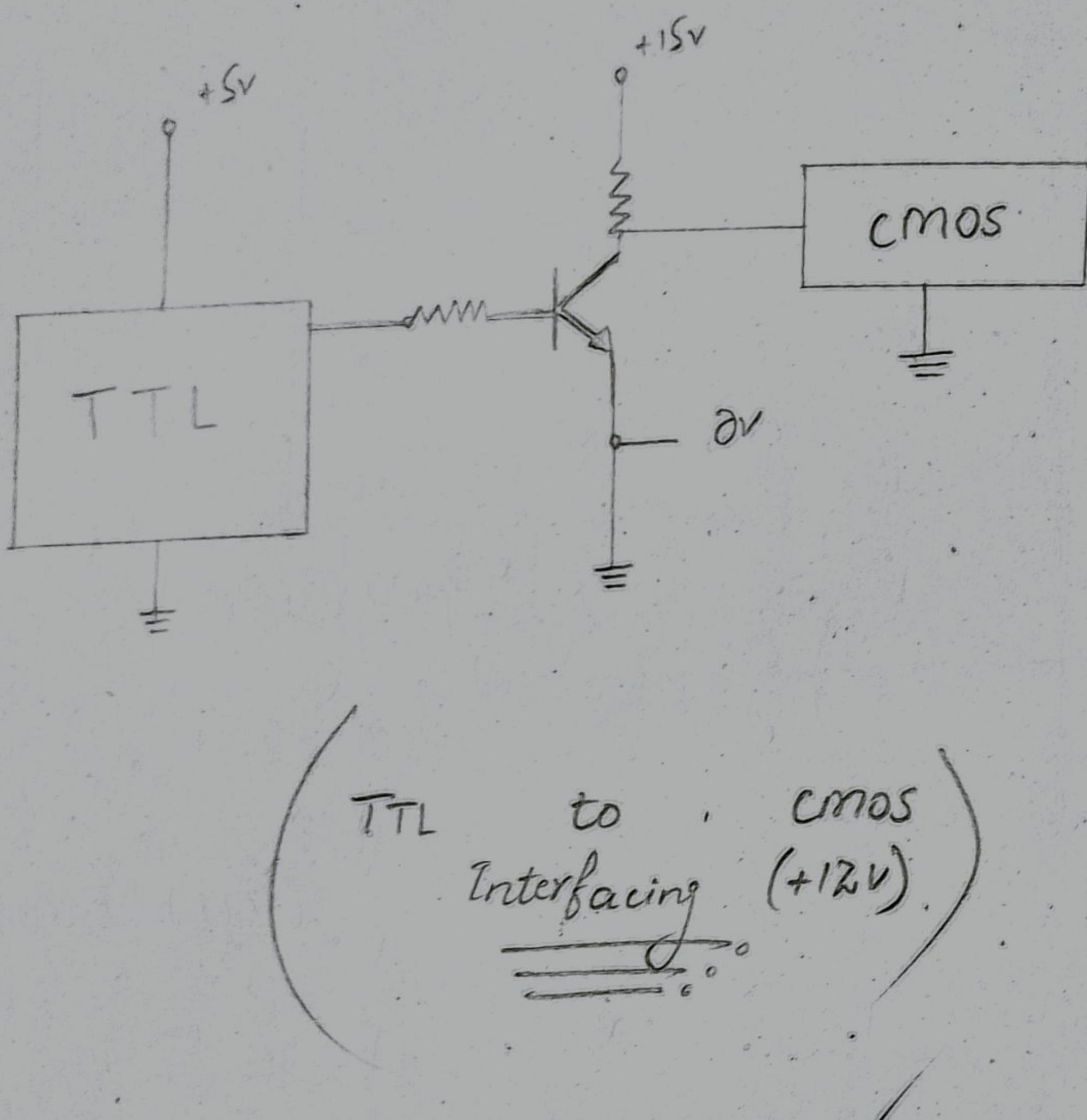
(Interfacing of different families)

Materials Required :-

- One IC 74HC00 (cmos),
- Three logic switches,
- One IC 7404 (TTL),
- One LED,
- One IC 7432 (TTL),
- One DC supply,
- One 74LS244 (TTL) Buffer,
- Connecting leads as required,
- One DMM,
- One Bread board,
- Two resistors 1K, 1/4, 1/4Ω

Procedure :-

1. Assemble the circuit as shown in figure.
2. Apply inputs as per combinations in the truth table.
3. Switch OFF the supply and assemble the circuit.



4. Switch ON the power assembly after switches and the input combinations given in truth table step by step.
5. Use logic all
6. Record output at each step. Switch OFF the power supply.
7. Now assemble the circuit without using buffer.
8. Switch ON the circuit.
9. Repeat step 5.
10. Compare both results and note it in table.

precautions :-

1. Use regulated supply.
2. Identify IC pins carefully.
3. Make strong connections.

Truth Table

Row No.	INPUT (Digital)	D	C	B	A	Analog Output Volts
1	0	0	0	0	0	0
2	0	0	0	1	1	0.2
3	0	0	1	0	0	0.4
4	0	0	1	1	1	0.6
5	0	1	0	0	0	0.8
6	0	1	0	1	1	1.0
7	0	1	1	0	0	1.2
8	0	1	1	1	1	1.4
9	1	0	0	0	0	1.6
10	1	0	0	1	1	1.8
11	1	0	1	0	0	2.0
12	1	0	1	1	1	2.2

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Electronics - II

Practical # 15

(Study of
Binary weighted D/A converter)

Material Required :-

- One Bread board ,
- One DC power supply ,
- One 741 IC ,
- Four SPST switches ,
- One resistor of 150k, 75k, 37.5k , 18.7k and 10k ,
- One DMM ,
- Connecting wires as required
- One Toolkit

procedure :-

1. By keeping the power supply OFF , assemble the circuit.
2. keep all the four switches open. and switch ON the circuit. measure output voltages using DMM. Record them in table.
3. Close switch 'A' and record measures in table.

4. Now open switch 'A' and close switch 'B'. Record the output in table.

5. Now compare all records present in table and draw truthtable.

$$V_{out} = I_f \cdot R_f$$

\therefore In case of $0001 -$

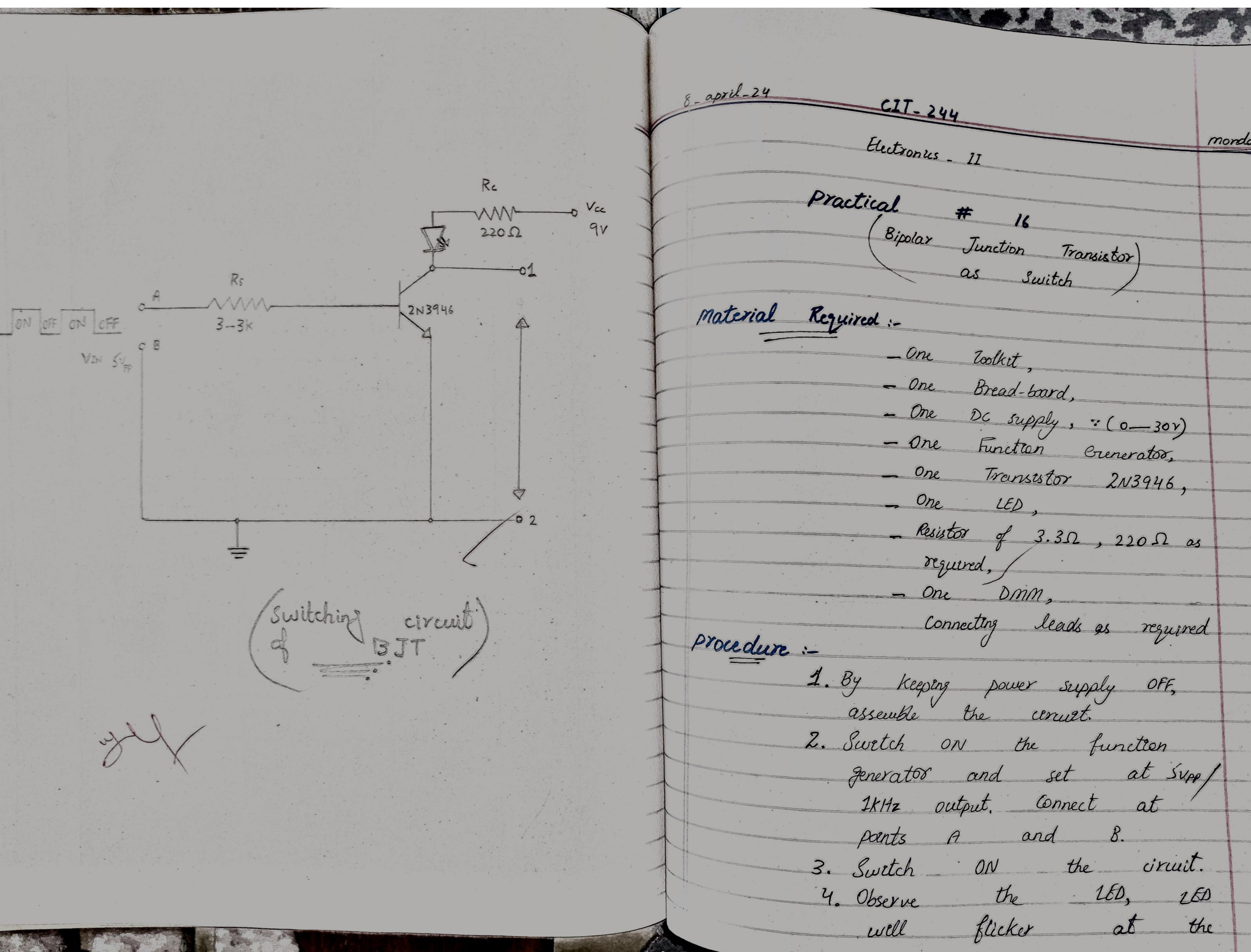
$$V_{out} = \frac{3V}{150k} \times 10k = 0.2V$$

Precautions :-

1. Use regulated supply.

2. Make strong connections.

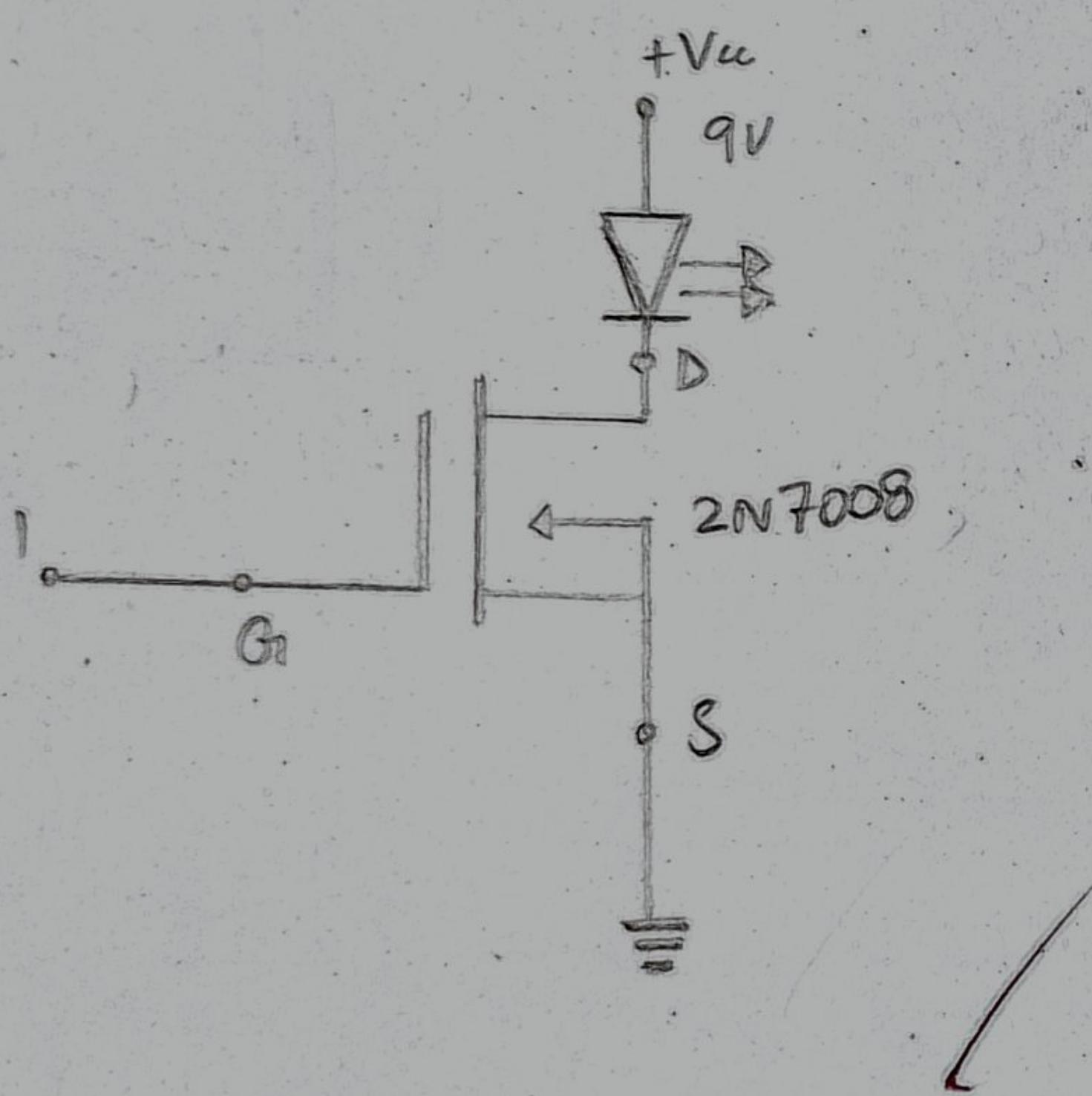
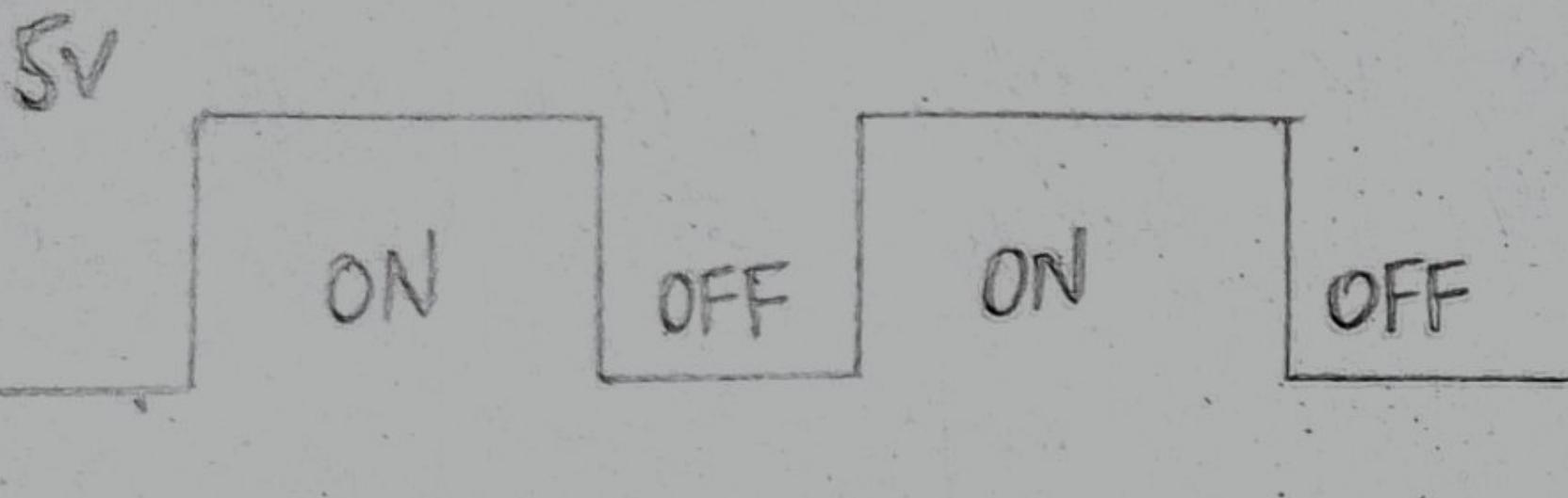
3. Take measurements with great care.



rate of 1kHz.
5. measure voltage across points
1 and 2, it will be
0.7 V when LED is on
9V when LED is OFF.

precautions :-

1. perform practical in the presence of instructor
2. Avoid mocking during practical.
3. Use regulated DC supply.
4. Handle function generator carefully.



~~WTF~~

8-april-24

CIT-244

Electronics - II

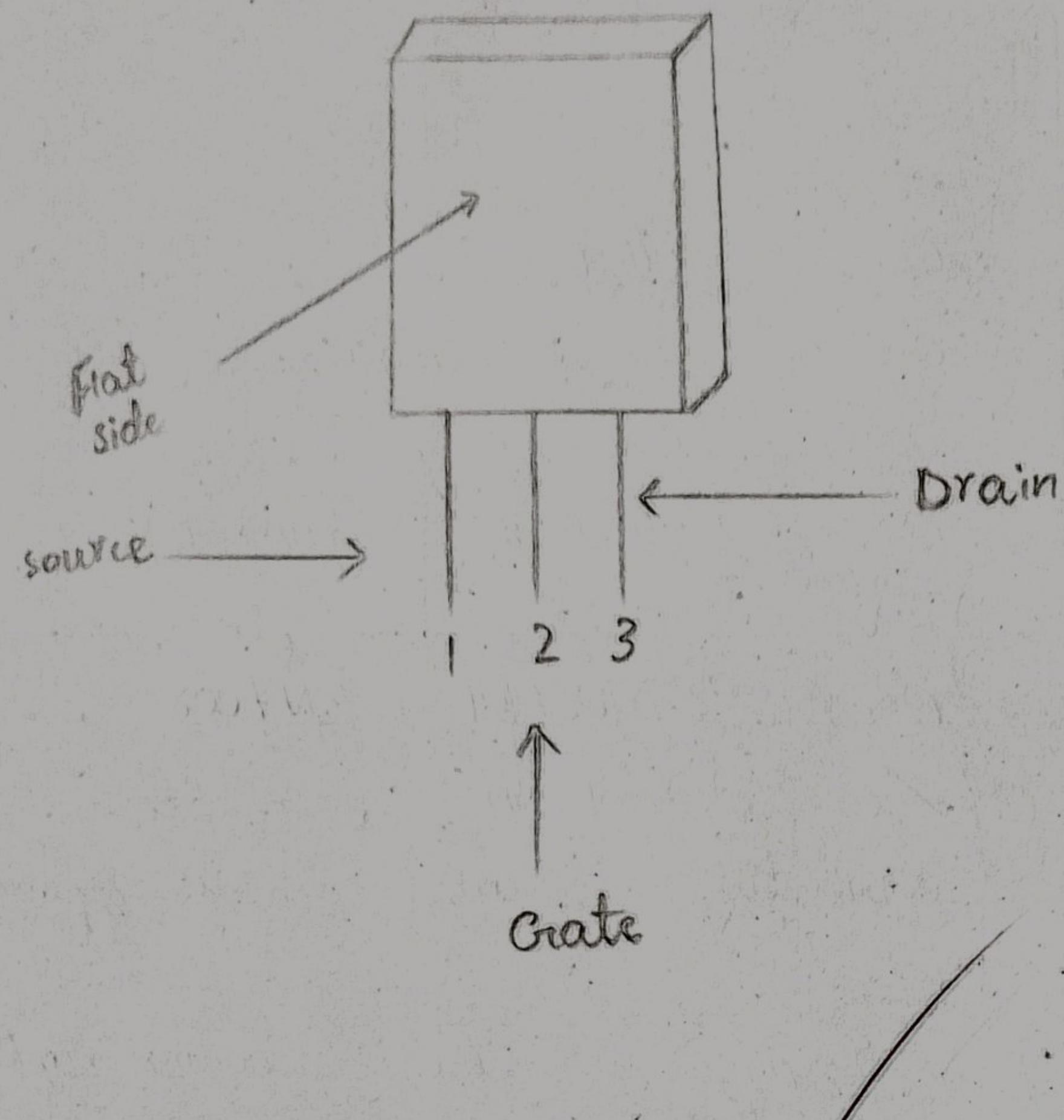
Practical # 17
(MOSFET as Switch)

Material Required:-

- One Toolkit ,
- One Bread-board ,
- One DC supply ,
- One Function generator,
- Two LEDs ,
- One MOSFET 2N7008 ,
- One DMM ,
- Connecting wires as required.

procedure :-

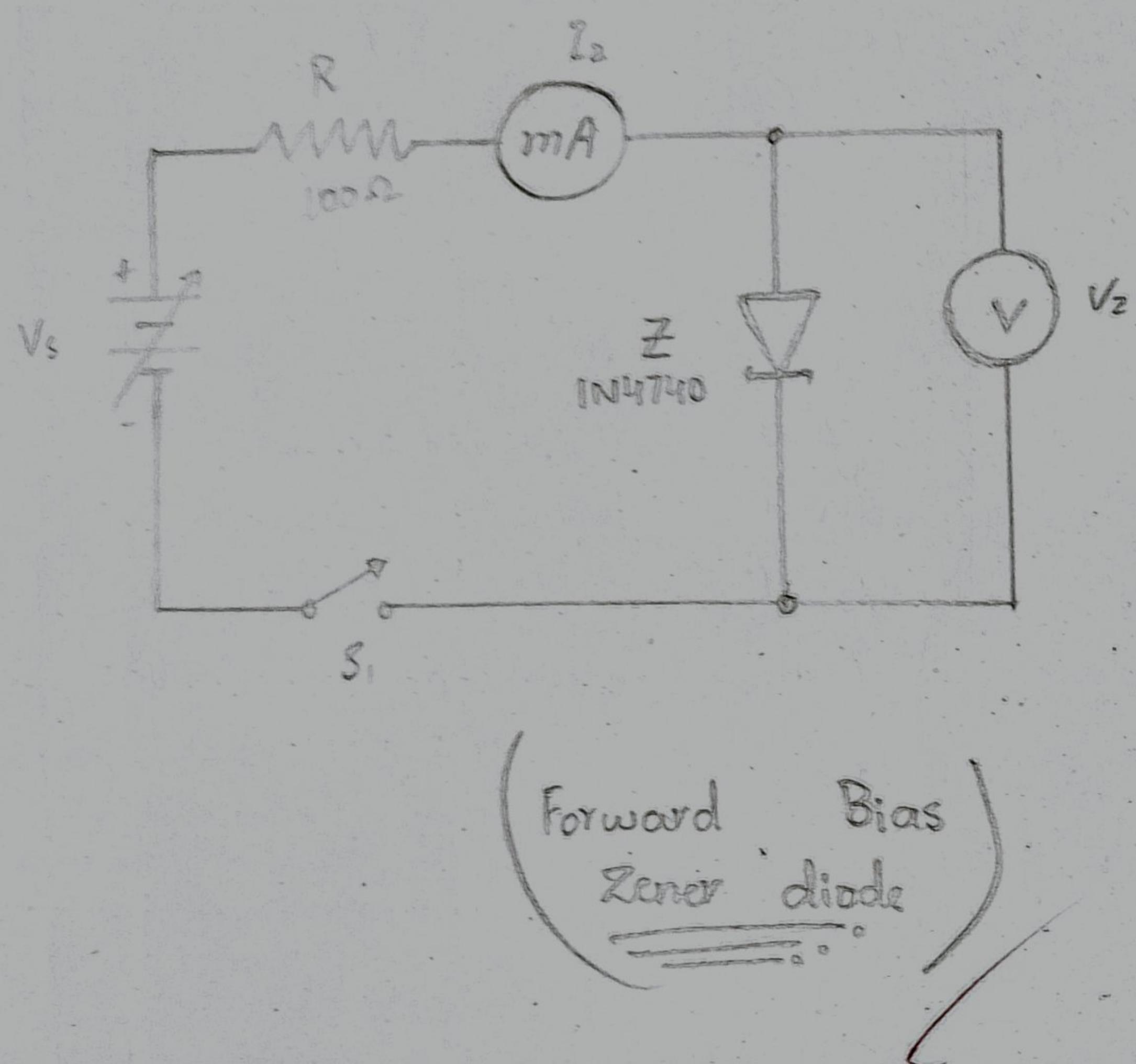
1. By keeping the power supply OFF , assemble the circuit.
2. Switch ON the power supply.
3. Switch ON the function generator, Adjust output voltage at V_{pp} at 1kHz frequency square wave.
4. Observe the LED , when voltage at gate



of MOSFET is $5V$, the
MOSFET act as close
switch and at zero
volt ($0V$) it act as
open switch.

precautions :-

1. Ensure presence of instructor.
2. Avoid mocking during practical.
3. Take readings with great care.



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Electronics - II

practical # 18

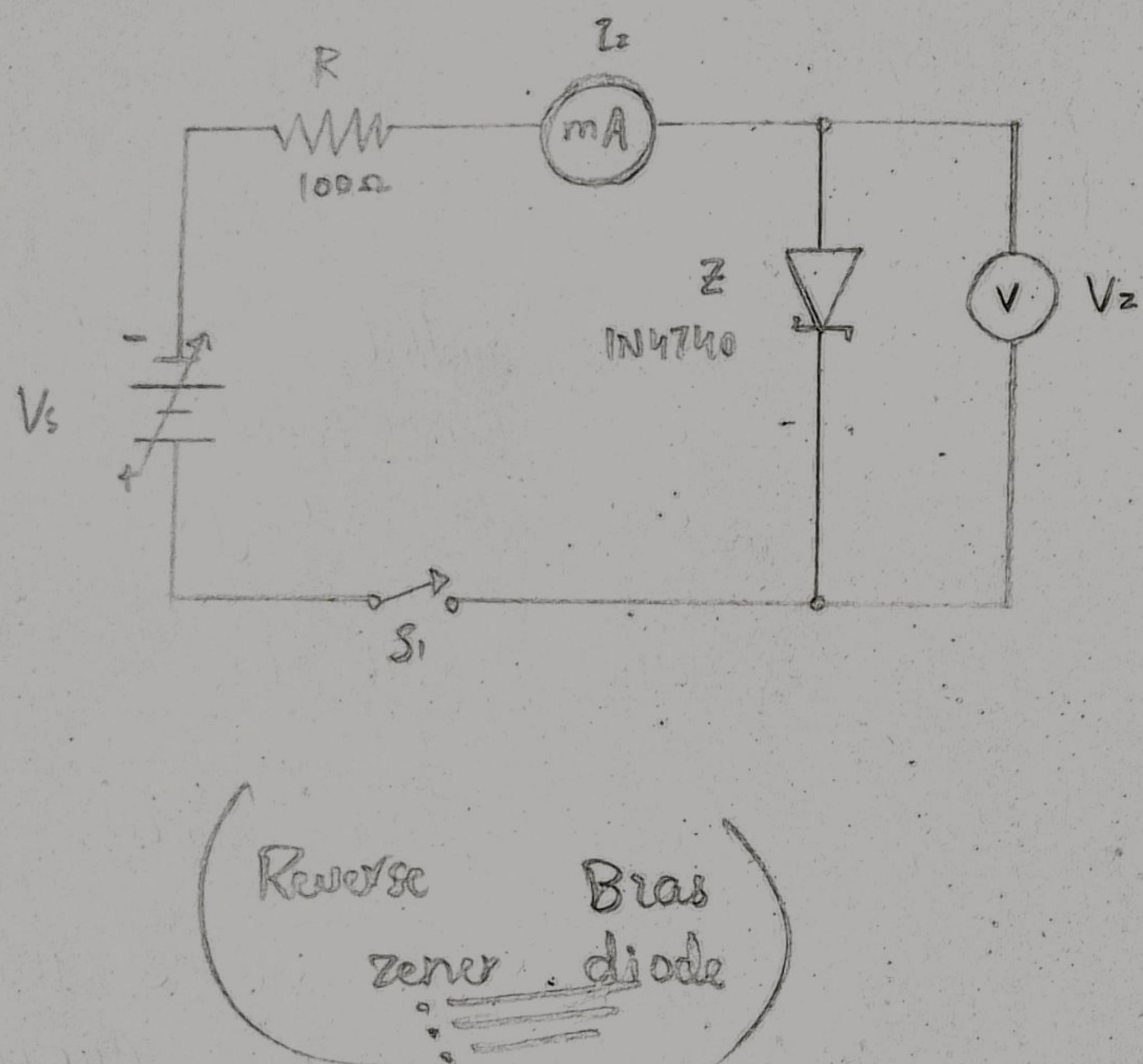
(characteristics
curve of zener diode)

material Required:

- One Toolkit,
- One Bread-board,
- One DC supply,
- One Milliammeter,
- One Voltmeter,
- One DMM,
- One SPST switch,
- Connecting leads as required,
- Resistors of 100Ω & $1k\Omega$,
- One Zener diode (IN4740)

procedure :-

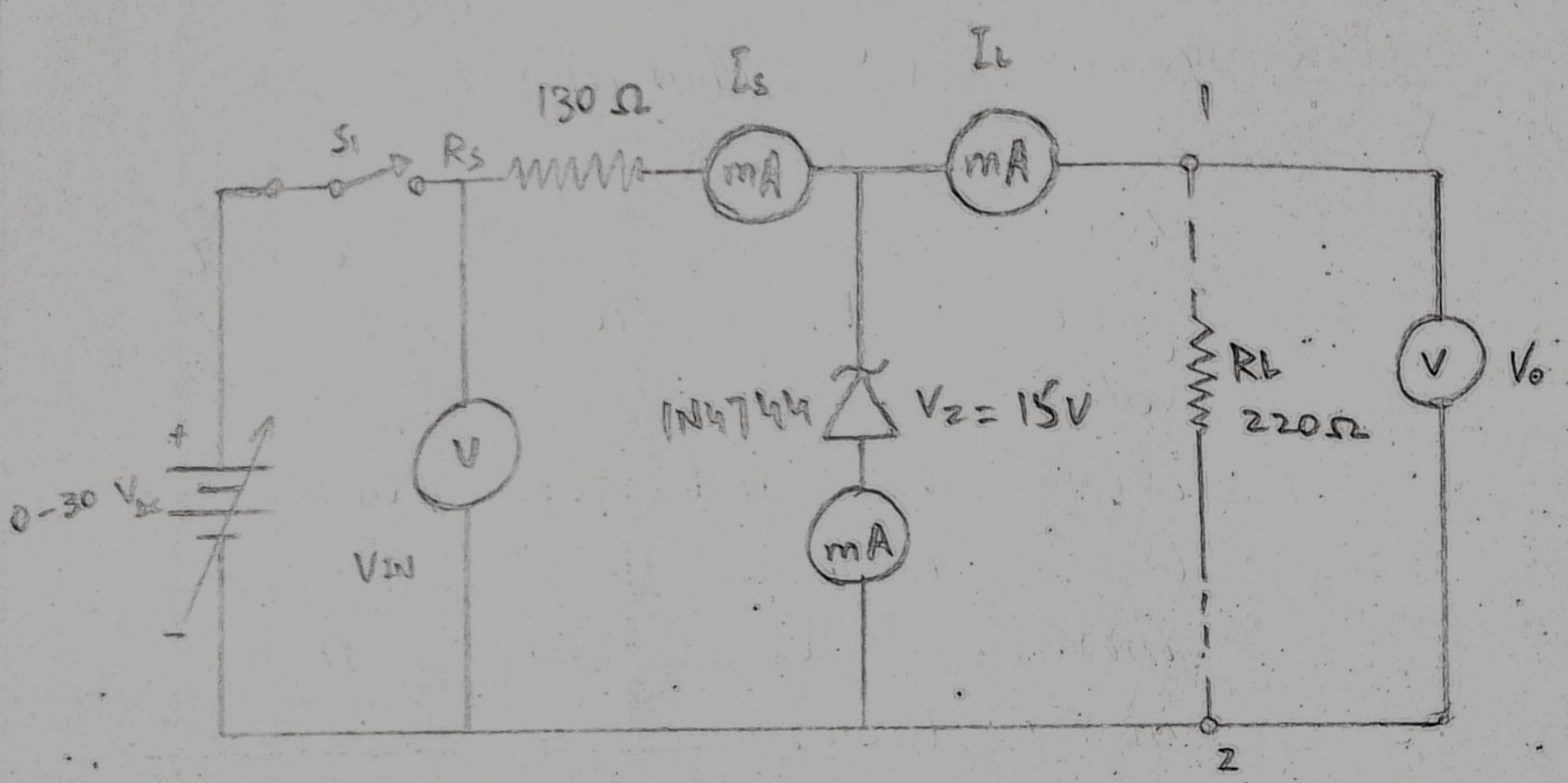
1. By keeping the power supply off, assemble the circuit as shown.
2. Adjust V_s to zero volt and switch ON the circuit.
3. Enter Zener current and voltage readings in table.



4. Increase V_s in steps given in table and I_z and V_z readings in table.
5. Draw V_I characteristics curve as per values.
6. Now assemble the circuit. Adjust V_s to zero volt.
7. Enter V_z and I_z values in table.
8. Increase V_s in steps in table.
9. Observe and note down the reverse breakdown voltage.

Precautions :-

1. Ensure presence of your instructor.
2. Avoid mocking during practical.
3. Take readings carefully.



circuit of
zener voltage
regulator

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Electronics - II

monday

Practical # 19
(Zener diode voltage
Regulator)

Material Required :-

- One Toolkit,
- One Bread board,
- One DC supply (0-30V),
- Three milliammeter,
- Two DC voltmeter,
- One zener diode,
- Two resistor of $130\ \Omega$,
- $220\ \Omega$, $500\ \Omega$ and $1k\ \Omega$.
- One DMM,
- Connecting leads as required,
- One SPST switch

procedure :-

1. By keeping power supply OFF, assemble the circuit as shown.
2. Switch ON the circuit and adjust (V_{IN}) for 14V.
3. Enter values of I_L , I_Z , I_S and V_O in table.

4. change
in V_{IN} as per step
table.

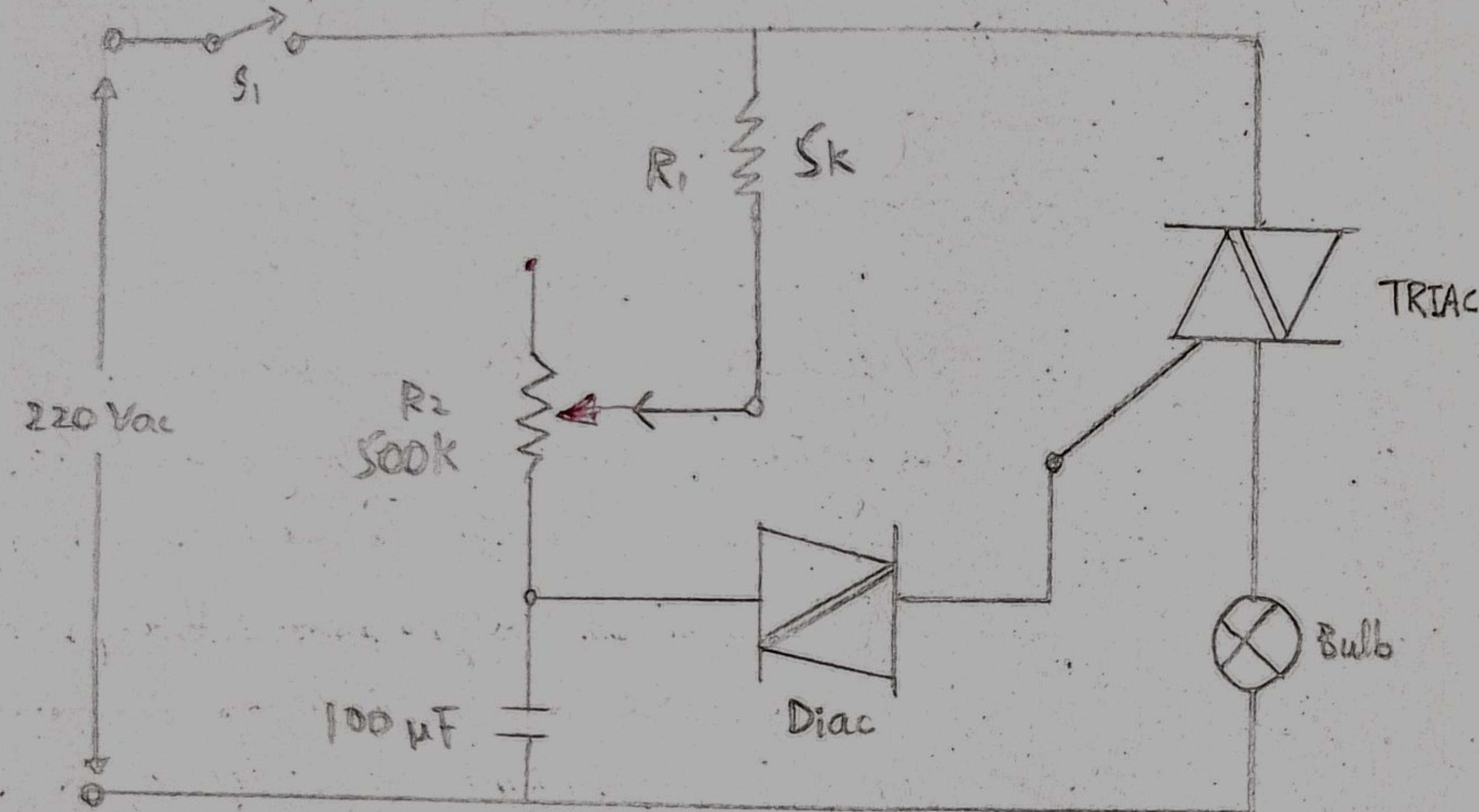
5. Fix V_{IN} at 18V, complete
the according to values
of V_{IN} , R_1 , R_2 etc.

precautions :-

1. Assemble the circuit by
keeping the supply OFF.

2. Take recordings carefully

3. Avoid mocking during
practical.



(Light Dimmer circuit using DIAC & Triac)

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Electronics - II

Monday

Practical # 20
Light Dimmer circuit
using DIAC and Triac)

Material Required:-

- One Toolkit ,
- One Bread-board ,
- One AC source (220v 50 Hz),
- One Bulb (60w),
- One DIAC (D83),
- One TRIAC (BT134),
- One Resistor 50 kΩ (variable),
- One Resistor 5 kΩ ,
- One Capacitor 10 μF ,
- One SPST switch ,
- Connecting leads as required.

Procedure :-

1. By keeping power supply OFF, assemble the circuit.
2. Adjust variable resistor R₂ for zero ohm and switch ON the S₁.
3. Observe light of bulb. Open S₁ and adjust R₂ at midpoint.

4. close S₁ and observe light of bulb.
5. Open S₁ and adjust R₂ for maximum value of resistance.
6. close S₁ and observe the light of bulb.
7. Compare step numbers: 3, 5 & 7 and note down.

Precautions :-

1. Keep supply OFF while assembling the circuit.
2. Ensure presence of the instructor.
3. Avoid mocking during practical.