TITLE	Conduct an experiment to understand the working principle of	Expt No. : 1
		Date : 15/09/22

i) potentiometer,

ii.) comparator,

components required:-

a.	Multimeter	- 1
b.	Wire	- 2
c.	Bread Board	- 1
d.	Resistor	- 2
e.	Trainer Kit	- 1

Color Resistor	1st Band	2nd Band	3rd Band	Multiplier	Tolerance
Black	0	0	0	×1	—
Brown	1	1	1	×10	1 ./.
Red	2	2	2	×100	—
Orange	3	3	3	×1000	—
Yellow	4	4	4	×10⁴	—
Green	5	5	5	×10⁵	—
Blue	6	6	6	×10⁶	—
Violet	7	7	7	—	—
Grey	8	8	8	—	—
White	9	9	9	—	—
Gold	—	—	—	—	—
Silver	—	—	—	—	5 ./.
None	—	—	—	—	10 ./.

Marks :

Staff :

2nd

1st   3rd 4th   Tolerance
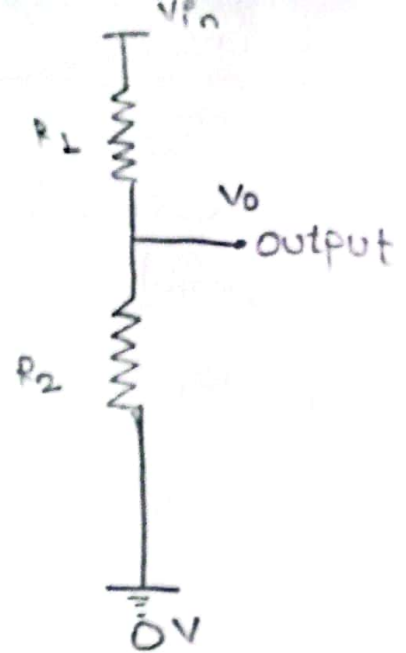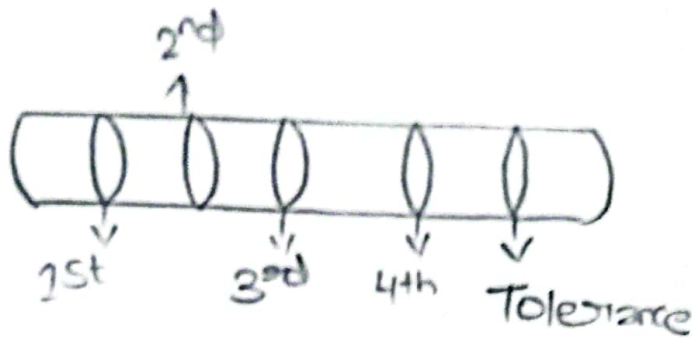
Tolerance = variation in resistor

Problems:- i. $R_1 = 1K\Omega$

$R_2 = 1K\Omega$

$V_{in} = 5V$

$V_0 = \dfrac{5 \times 1}{1+1} = \dfrac{5}{2} = 2.5V$

ii. $V_0 = 1V$ $\qquad V_0 = \dfrac{5 \times R2}{1 + R2}$

$V_{in} = 5V$

$R_1 = 1K\Omega$

$R_2 = ?$ $\qquad$ 6×1) $\qquad 1 = \dfrac{5R2}{1+R2}$ $\qquad$ 09×1) $1 + R2 = 5R2$

$\qquad\qquad R_2 = \dfrac{1}{4} = 0.25\Omega$

iii) $V_{in} = 5V, R_1 = 1K\Omega, R_2 = 2K\Omega$ and $V_0 = ?$

$V_0 = \dfrac{5 \times 2}{1+2} = \dfrac{10}{3} = 3.33\Omega$

Result:- ~~understanded~~ understood the working principal of potentiometer. and verified successfully.

$$V_O = \frac{V_{in} \times R_2}{R_1 + R_2}$$ $[R_2 = \text{opposite Resistance}]$

$R_1 = 1K2.4\ \Omega$

$R_2 = 46.4\ \Omega$

$V_O = 4.81$

$V_{in} = 5V$

<u>Procedure</u> i) collect the components necessary to complete the circuit.

ii) connect to two resistor i.e R_1 and R_2 in series.

iii) Connect DC power supply $5V/or\ 10V/12V$ to one point of resistor. i.e R_1.
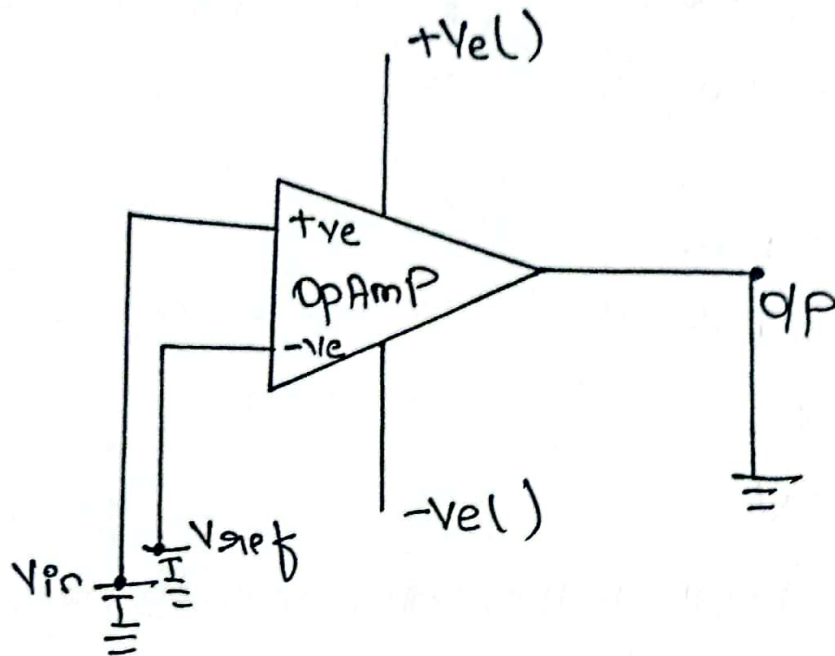
iv) Connect ground (Gnd) and other terminal of Resistor i.e R_2.

v) After finishing the circuit take the reading or note down the readings from Multimeter.

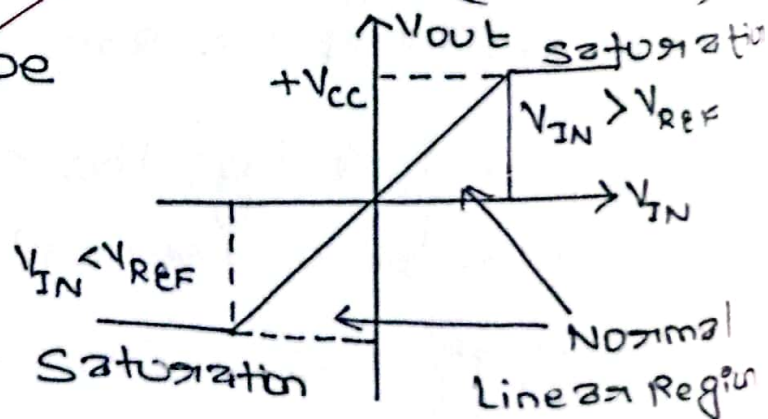vi) Repeat the above steps by taking the different resistors values.
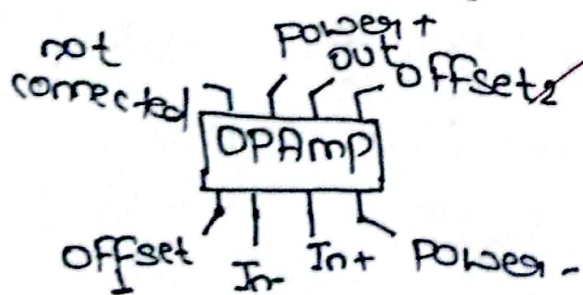
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$$V_{in} > V_{ref} \text{ the } O/P V = +ve$$
$$V_{in} < V_{ref} \text{ the } O/P Y = -ve$$

- Input voltage is always should be less than $(+ve \text{ or } -ve)$
- CRO: Cathode Ray Oscilloscope

TITLE : b) Comparator		Expt No. : 1 b
		Date : 20/09/22

Components Required :-

S. NO.	Component	Quantity
1	IC741 (OpAmp)	1
2	Power supply	34
3	Multimeter	1
4	connecting wires	-
5	Bread Board	1

Procedure :- i) First of all, collect all the compone-nts necessary to complete the circuit.

ii) Connect IC741 (OpAmp) in Bread Board hori-zontally.

iii) Ic has 8pins but 1pin is not connected; connect 4 power supply in respect pins.

iv) 1st power supply in In- ; $2^{nd}, 3^{rd}$ and 4th in In+, Power- and power+ with positive wire

v) Connect all the negative wires in ground (gnd)

vi) Now, connect Multimeter in output (positive one) and connect negative to Ground (Gnd).

Marks :
Staff :

AIM:-

a. conduct an experiment to determine the sensivity of the liquid sensor.

b. Design a system to indicate the petrol level in the vehicle using liquid level sensor.

circuit Diagram:-

Components Required:-

S.NO	Components Name	Quantity
1	water level Sensor	1
2	Bread Board	1
3	Buzzer	1
4	LED	1
5	Connecting wires	2
6	Trainer Kit	1
7	Multimeter	1

Marks :
Staff :

Circuit Diagram
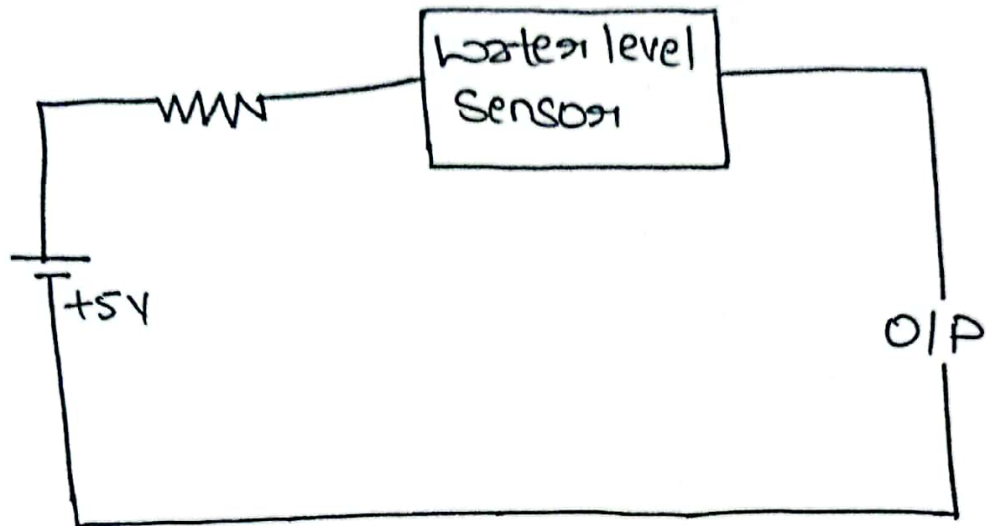
Observation:

Depth (in cm)	observed voltage(v)	Strip Emerged in Water Initial (Dry)
0	0	
0.5	2.8	
1.0	3.0	Half
1.5	3.3	
2.0	3.32	
2.5	3.4	full
3.0	3.5	

Result:- Water Level sensor completed successfully.

TITLE : Light Sensor		Expt No : 3
		Date : 09/28/2022

Procedure +

Aim:-

a. conduct an experiment to determine the sensitivity of the light sensor.

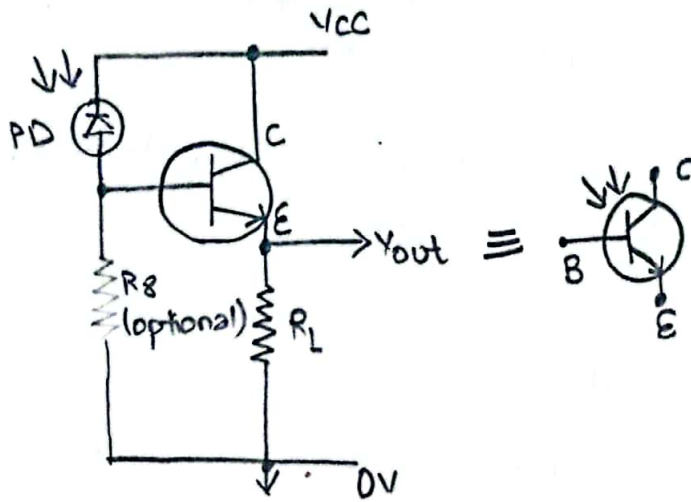b. Analyze the application of light sensor using LDR.

Components Required:

S·NO	Components Name	Quantity
i	LDR	1
ii	Volt meter	1
iii	Buzzer	1
iv	connecting wires	2
v	Trainer Kit	1
vi	Multimeter	1

Marks :

Staff :

Circuit Diagram:-

VCC

PD

C

E

→ Yout

≡

R8
(optional)

R_L

0V

B

C

E

S.NO.	Intensity of the light	OlP voltage	Status of the Buzzer
1	Low	0.8	High sound
2	Medium	0.15	Medium sound
3	high	0.06	No sound

Result: we sucessfully conducted light sensor.

Marks :

Staff :

| TITLE : Ultrasonic Sensor | Expt No. : 4 |
| | Date : 27/10/2022 |

Aim:-

a) Conduct an experiment to determine the sensitivity of the Ultrasonic Sensor.

b) Analyze the application of ultrasonic sensor using distance meter circuit.

Components Required:-

S.NO.	Components Name	Quantity
1	Arduino Board	1
2	Ultrasonic Sensor	1
3	connecting Wires	6
4	Buzzer	1
5	program	

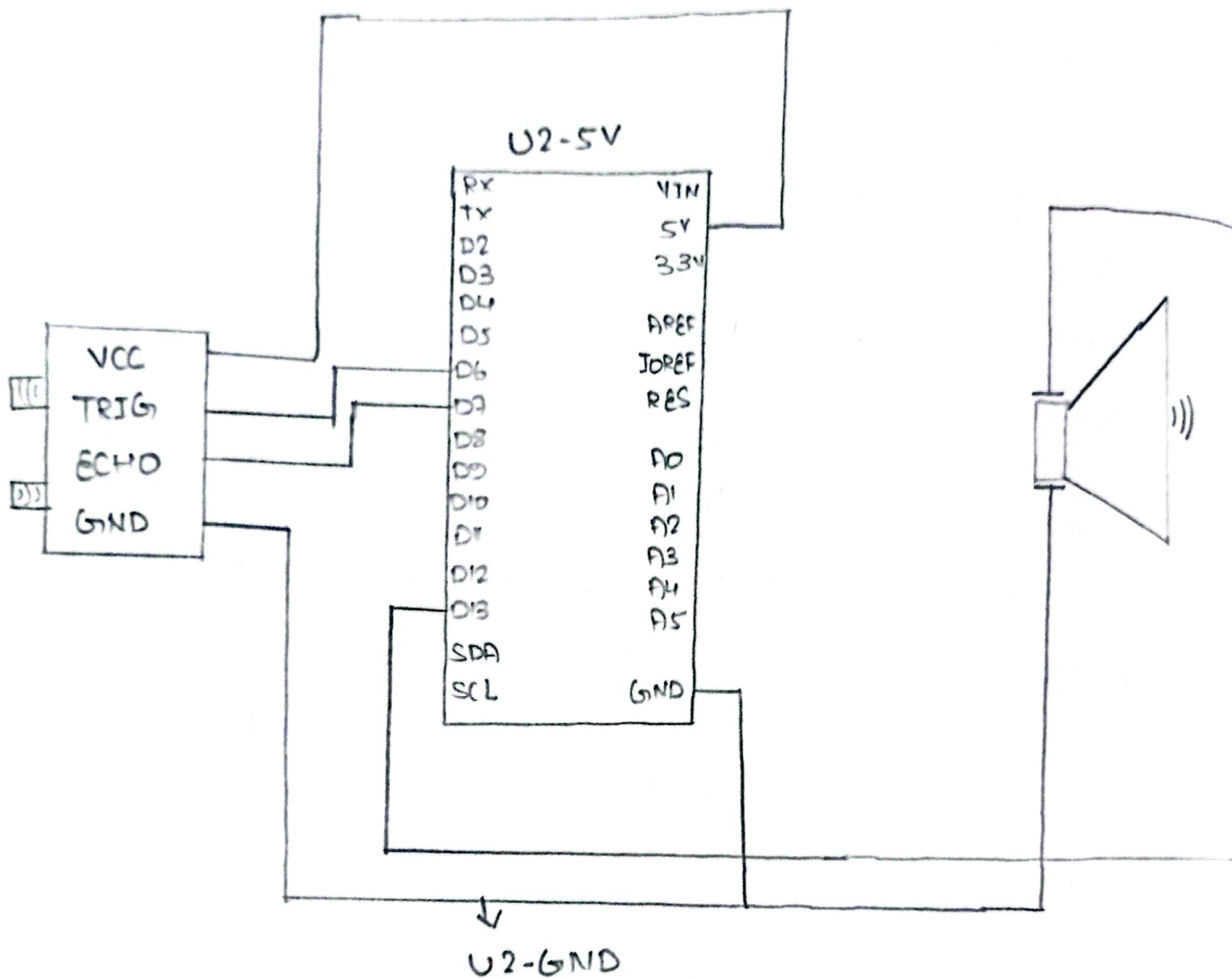## Procedure:-

i) Collect the components necessary to complete the circuit.

ii) There are 4 pins in ultrasonic sensor i.e Trig, Echo, Vcc and GND.

iii) Connect trigger in pin no. 6 and echo in pin no.7 as well as Vcc in 5V and GND in GND of the arduino board.

Marks :

Staff :

Circuit Diagram

U2-5V

RX	VIN
TX	5V
D2	3.3V
D3	
D4	APEF
D5	IOREF
D6	RES
D7	
D8	A0
D9	A1
D10	A2
D11	A3
D12	A4
D13	A5
SDA	
SCL	GND

VCC
TRIG
ECHO
GND

U2-GND

iv) Connect the buzzer, one terminal in ground i.e cathode and anode in pin no.13 of Arduino Board.

v) Simulate the program in Arduino Board.

vi) Exposerre the sensor near and far for obstacles to take the measurements.

vii) Repeats above steps by taking different measurements.

Program or Source code :-

```
#define pingTrig 6
#define pingEcho 7
#define IdrValue 0
int led = 13;
void setup() {
Serial.begin(9600);
pinMode(pingTrig, OUTPUT);
PinMode(pingEcho, INPUT);
delay(200);
PinMode(led, OUTPUT);
}
void loop() {
long duration, inches, cm, value;
digitalWrite(pingTrig, LOW);
```

Marks :

Staff :

Observation:

SI NO.	Centimeters	Inches	LED(ON/OF
1	3.8cm	1.5inch	ON
2	42.7cm	16.4inch	OFF
3	2.8cm	1.6 inch	ON
4	27.9cm	11.0 inch	ON
5	31.6 cm	12.5inch	OFF

```
delayMicroSeconds (2);
digitalWrite(pingTrig, HIGH);
delayMicroSeconds (10);
digitalWrite(pingTrig, LOW);
duration = pulseIn (ping Echo, HIGH);
cm = duration /29/2;
inches = cm/2.5;
serial.print ("-->");
serial.print(cm);
serial.print (" -->");
serial.print (inches);
if (cm < 30) {
digital Write(led, HIGH);
delay(200);
digitalWrite(led, LOW);
delay(200);
}}
```

Result:- Sensitivity of the sensor was determined and output was verified.

| Marks : |
| Staff : |

TITLE : Temperature Sensor	Expt No. : 5
	Date : 27/10/2022

Aim :-

a. Conduct an experiment to determine the sensitivity of the temperature sensor.

b. Design a System to display the temperature in the location.

Components Required:-

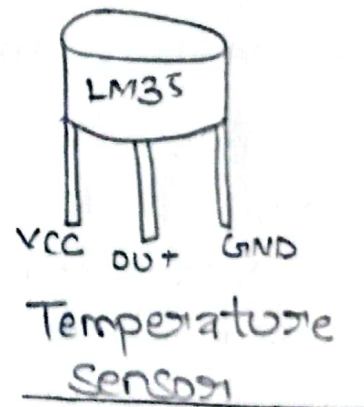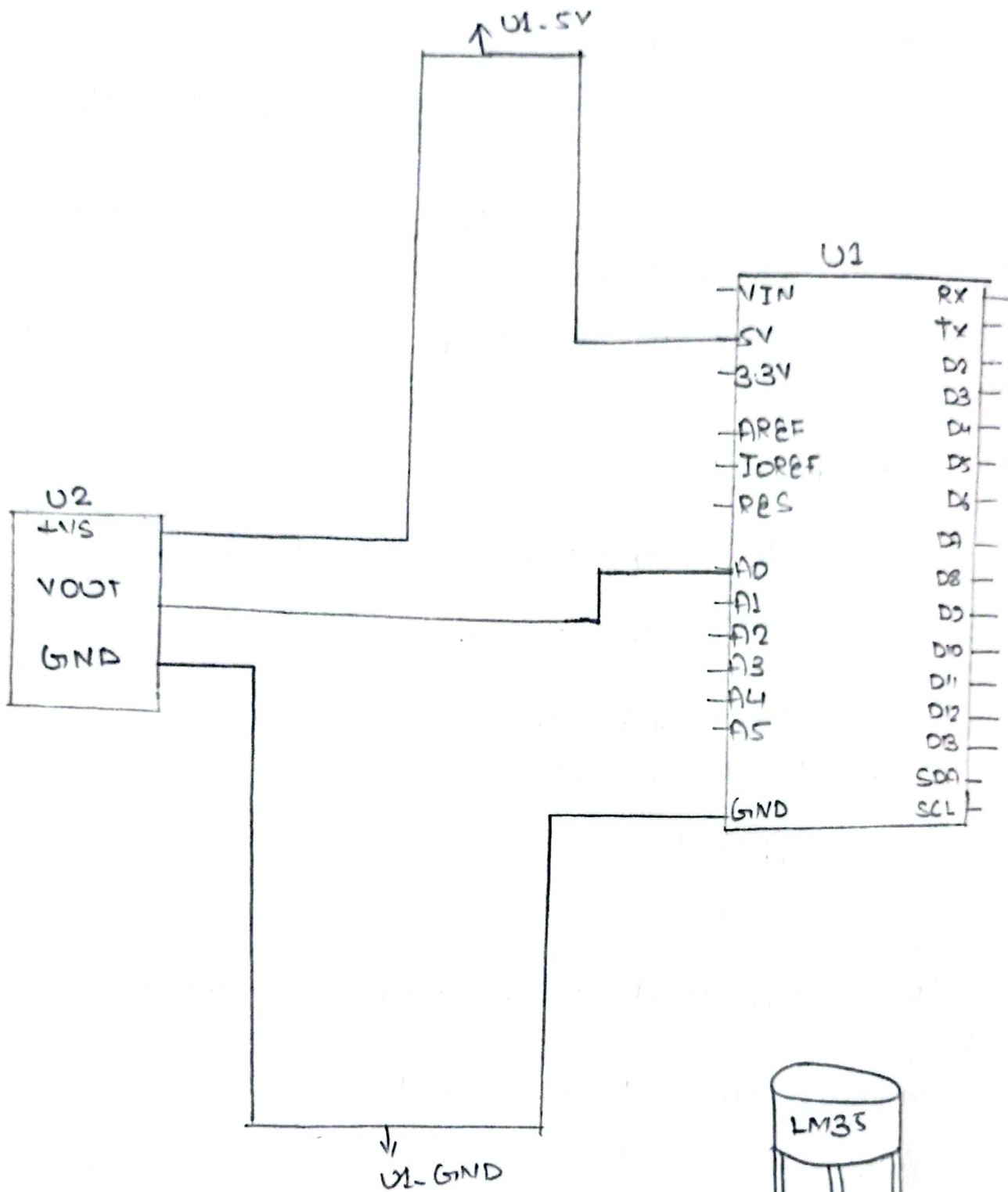| SI·NO	Components Name	Quantity
1	LM35 (Temperature Sensor)	1
2	Connecting Wires	3
3	Arduino Board	
4	program	1

Procedure:-

i) Collect the components necessary to complete the circuit.

ii) Connect LM35 with Arduino Board.

iii) There are 3 terminals in sensor i.e Vcc, Vout and GND.

iv) Connect Vcc with 5V, GND with GND and Vout with A0 of Arduino Board.

v) With the variation of temperature, Vout will change and simulate code.

Marks :
Staff :

Circuit diagram

U1.5V

U1

VIN	RX
5V	Tx
3.3V	D2
	D3
AREF	D4
IOREF	D5
RES	D6
	D7
A0	D8
A1	D9
A2	D10
A3	D11
A4	D12
A5	D13
	SDA
GND	SCL

U2

+VS

VOUT

GND

U1-GND

LM35

VCC   OUT   GND

Temperature
Sensor

vi) Repeat above the steps by taking different Measurements.

Program or Source code:-

```
int val;
int tempPin = 1;
void setup() {
Serial. begin(9600);
}
void loop() {
val = analogRead (tempPin);
float mv = (val /1024.0) * 5000;
float cel = mv/ 10;
float farh = (cel * 9)/5 +32;
float kel = 273 + cel;
Serial. print(" Temperature in Celsius =');
Serial. print (cel);
Serial. print ("*c");
Serial. println();
delay(1000);
Serial. print (" Temperature in fahrenheit =");
Serial. print (farh);
Serial. print (" * F");
Serial. println();
Serial. print (" Temperature in
        kelvin =");
```

Marks :
Staff :

Observations:

SI NO	Temp in cel(*c)	Fahrenheit (F)	Kelvin (K)
1	30°C	86°F	303.15 K
2	23°C	73.4°F	296.15 K
3	50°C	122°F	323.15 K
4	96°C	204.8°F	369.15 K

```
Serial.print(Kel);
Serial.print("*K");
Serial.println();
delay(1000);
```

Result:- Sensitivity of the Temperature sensor was determined and output in various scales were verified.