NIELIT, Gorakhpur

Course Name: A-level (1st Sem.) **Subject: IoT**

Topic: ADC in Arduino **Date: 19.03.2020**

Introduction

- When we interface sensors to the microcontroller, the output of the sensor many of the times is analog in nature. But microcontroller processes digital signals.
- Hence, we use ADC in between sensor and microcontroller. It converts an analog signal into digital and gives it to the microcontroller.
- There are many applications of ADC like in a biometric application, Environment monitoring, Gas leakage detection etc.

Arduino Uno has 6 0n-board ADC channels which can be used to read analog signal in the range 0-5V.
It has 10-bit ADC means it will give digital value in the range of 0 – 1023 (2^10). This is called as resolution which indicates the number of discrete values it can produce over the range of analog values.

Digital Output value Calculation

ADC Resolution = Vref / ((2^n) - 1)

Digital Output = Vin / Resolution

Where,

Vref - The reference voltage is the maximum value that the ADC can convert.

To keep things simple, let us consider that Vref is 5V,

For 0 Vin, digital o/p value = 0

For 5 Vin, digital o/p value = 1023 (10-bit)

For 2.5 Vin, digital o/p value = 512 (10-bit)

Functions for Arduino ADC

- **analogRead (pin)**

  This function is used to read analog value from specified analog pin.

  pin - number of analog pin which we want to read

  returns - digital value 0 – 1023

  e.g. analogRead(A0) //read analog value at A0 channel

- **analogReference (type)**

  This function is used for configuring the reference voltage used for analog input.

Exercise:

1) Write a program to read varying analog value generated using potentiometer which is connected to A0 analog channel. Display the digital value on Serial monitor which we got from the Arduino ADC.
2) Write a program to control the brightness of led using Arduino by varying potentiometer knob