**TASK 1**

Task 1

Aim:

Implementing a FIR filter that filters a single input sample at a time with a function header:

float myFIR(float insample, float \* state, const float \* coeff, const int length)

Objective:

The input parameters are:

* **insample**: the current input sample
* **state**: the filter state, i.e., memory of previous input samples same length as number of coefficients
* **coeff**: FIR filter coefficients as a constant vector of length length.
* **length**: the length of the FIR filter

Conclusion:

The resulting output value is obtained and it is verified with results obtained in MATLAB.

Task 2

Aim:

Implementing a FIR filter that filters a single input sample at a time using a circular state vector with a function header.

Objective:

The function is float myFIR(float insample, float \* state, int \* index, const float \* coeff, const int length);

The input parameters are:

* **insample**: the current input sample
* **state**: the filter state, i.e., memory of previous input samples same length as number of coefficients
* **index**: index pointer to the position in the state-vector where the new sample should be inserted.
* **coeff**: FIR filter coefficients as a constant vector of length length.
* **length**: the length of the FIR filter.

Conclusion:

The resulting output is obtained and are verified with the results obtained in MATLAB.

Task 3:

Aim:

Implementing a FIR filter that filters a vector of input samples at a time with the function header:

Objective:

The function is float myFIR(float \* insamples, const int numsamples,

float \* state, int \* index, const float \* coeff, const int length);

The input parameters are:

* **insamples**: a vector of current input samples, the oldest sample in the vector is at index 0
* **numsamples**: number of current input samples in the insamples vector
* **state**: the filter state, i.e., memory of previous input samples same length as number of coefficients
* **index**: index pointer to the position in the state-vector where the new sample should be inserted.
* **coeff**: FIR filter coefficients as a constant vector of length.
* **length**: the length of the FIR filter.

Conclusion:

The resulting output is obtained and it is verified by using MATLAB.