Experiment No. 04

4.1 Experiment Name

Study of convolution using Python Code

4.2 Objectives

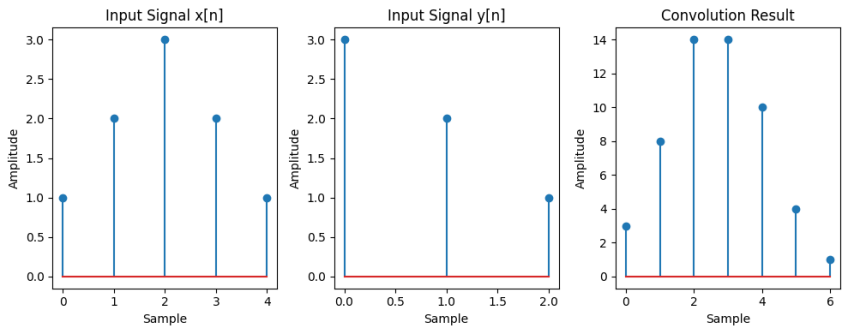
- To get a better understanding of convolution of the given signals

4.3 Apparatus

- Jupyter Notebook

4.4 Python code & graph

```
import numpy as np
import matplotlib.pyplot as plt

# Define the input signals
x = np.array([1, 2, 3, 2, 1])
y = np.array([3, 2, 1])

# Length of the input signals
M = len(x)
N = len(y)

# Convolution result
conv_result = np.zeros(M + N - 1)

# Perform convolution using a for loop
for n in range(M + N - 1):
    for k in range(M):
        if n - k >= 0 and n - k < N:
            conv_result[n] += x[k] * y[n - k]

# Plot the input signals
plt.figure(figsize=(10, 4))
plt.subplot(131)
plt.stem(range(len(x)), x)
plt.xlabel('Sample')
plt.ylabel('Amplitude')
plt.title('Input Signal x[n]')
plt.subplot(132)
plt.stem(range(len(y)), y)
plt.xlabel('Sample')
plt.ylabel('Amplitude')
plt.title('Input Signal y[n]')

# Plot the convolution result
plt.subplot(133)
plt.stem(range(len(conv_result)), conv_result)
plt.xlabel('Sample')
plt.ylabel('Amplitude')
plt.title('Convolution Result')
plt.tight_layout()
plt.show()
```



4.5 Discussion & Conclusion

In this experiment, we used the python to analyze convolution of the signals. Through this experiment, we got a better understanding of the convolution process and its' practical use and understood the scope of improvements in the regarding field.