|  |  |
| --- | --- |
| **Name** | **Hatim Sawai** |
| **UID no.** | **2021300108** |

|  |  |
| --- | --- |
| **Experiment 2** | |
| **AIM:** | The aim of this experiment is to study mathematical operation Correlation and measure degree of similarity between two signals. |
| **OBJECTIVE:** | * Write a function to find Correlation Operation * Calculate correlation of a DT signals and verify the results using mathematical formula |
| **PROBLEM DEFINITION:** | 1. Find auto correlation of input signal and find the significance of value of output signal at n=0.  Let y[n] = x[n] O x[n]  Classify the resultant signal Even / Odd ). Calculate the energy of the signal .  Q. What is the significance of value of y[0].    2. Find auto correlation of delayed input signal.  Let p[n]= x[n-1] O x[n-1].  Compare the resultant signal p[n] with y[n]. Give your conclusion.    3. Find cross correlation of input signal and delayed input signal  q[n] = x[n] 0 x[n-1].  Compare the resultant signal q[n] with p[n] and y[n]  Give your conclusion.    4. Find cross correlation of input signal and scaled input signal.  Let s[n] = x[n] O a x[n-2] where “a” is any constant.  Compare the resultant signals.  Give your conclusion. |
| **RESULT:** | 1. **To find y[n] = x[n] o x[n]**   Let y[n] = {40, 83, 128, 174, 128, 83, 40}  By comparing y[n] with y[-n] we get,  Now y[n] = y[-n]     1. **To find p[n] = x[n-1] o x[n-1]**     Let p[n] = {0, 40, 83, 128, 174, 128, 83, 40, 0}  By comparing y[n] with p[n] we get,  Here, p[n] = y[n]  Signals with some delay also have the same correlation     1. **To find q[n] = x[n] o x[n-1]**     Let p[n] = {40, 83, 128, 174, 128, 83, 40, 0, 0]  By comparing y[n] with p[n] we get,  p[n] = y[n+1]     1. **To find s[n] = x[n] o (a \* x[n-2])**     Let p[n] = {40, 83, 128, 174, 128, 83, 40, 0, 0, 0, 0}  Here, p[n] = 2\*y[n + 2] |
| **CONCLUSION:**  1. Autocorrelation signal is an even function, meaning it is symmetric around the vertical axis (y[n] = y[-n]).  2. When input signals are delayed, the autocorrelation of the delayed input signal remains the same as the autocorrelation of the original signal.  3. The cross-correlation of an input signal with a delayed version of itself is equivalent to the advanced autocorrelation of the input signal. | |