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| **Course Name:** | **Networks, Signals and Systems** | **Semester:** | **III** |
| **Date of Performance:** |  | **Batch No:** | **A - 3** |
| **Faculty Name:** |  | **Roll No:** | **16014022050** |
| **Faculty Sign & Date:** |  | **Grade/Marks:** | **\_\_\_ / 25** |

**Experiment No: 8**

**Title: Study of Convolution and Correlation of Signals**

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| **Aim and Objective of the Experiment:** |
| Convolution and Correlation of Signals. |

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| **COs to be achieved:** |
| **CO4:** Understand operations of continuous signals and systems |

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| **Theory:** |
| 1. **Convolution:** |

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| **Stepwise-Procedure:** |
| 1. **Convolution** 2. Obtain the Discrete signals from the application from the case study selected by the student 3. Perform the following operations on the selected signal: 4. Convolution 5. Auto Convolution of any one of the signals 6. Obtain simulations result of step 2 7. Upload the results in the experiment document   % experiment 8\_convolution  % finding convolution of two discrete-time signals  clc; close all;  x = input('enter sequence 1: ');  h = input('enter sequence 2: ');  Nx = length(x); Nh = length(h);  Ny = Nx + Nh - 1;  newx = [x, zeros(1, Ny-Nx)];  newh = [h, zeros(1, Ny-Nh)];  for n=0:Ny-1  sum=0;  for k=0:n  sum = sum + newx(k+1)\*newh(n-k+1);  end  y(n+1) = sum;  end  autoConv = conv(x, x);  nx=0:1:Nx-1;  subplot(4,1,1); stem(nx,x);  title('Discrete Signal 1 (ketaki)');  xlabel('discrete time n'); ylabel('amplitude');  axis([min(nx)-0.5 max(nx)+0.5 0 max(x)+1]);  nh=0:1:Nh-1;  subplot(4,1, 2); stem(nh,h);  title('Discrete Signal 2 (ketaki)');  xlabel('discrete time n'); ylabel('amplitude');  axis([min(nh)-0.5 max(nh)+0.5 0 max(h)+1]);  ny=min(nx)+min(nh):max(nx)+max(nh);  subplot(4,1,3); stem(ny,y);  title('Convoluted Graph (ketaki)');  xlabel('discrete time n'); ylabel('amplitude');  axis([min(ny)-0.5 max(ny)+0.5 0 max(y)+1]);  % auto-convolution of sequence 1  nAutoConv = 0:1:length(autoConv)-1;  subplot(4,1,4); stem(nAutoConv, autoConv);  title('Auto Convolution Graph of Signal 1 (ketaki)');  xlabel('discrete time n'); ylabel('amplitude');  axis([min(nAutoConv)-0.5 max(nAutoConv)+0.5 0 max(autoConv)+1]);  disp(y)     1. **Correlation** 2. Obtain the Discrete signals from the application from the case study selected by the student 3. Perform the following operations on the selected signal: 4. Correlation 5. Auto Correlation of any one of the signals 6. Obtain simulations result of step 2 7. Upload the results in the experiment document   % experiment 8\_correlation  % finding correlation and autocorrelation of sequences  % signal 1  n1 = 0:1:10;  signal1 = sin(n1);  % signal 2  n2 = 0:1:3;  signal2 = [1 2 3 4];  % correlation  correlation\_result = xcorr(signal1, signal2);  % auto correlation of any one of the signals  auto\_correlation\_result = xcorr(signal1);  subplot(4,1,1);  stem(n1, signal1);  xlabel('discrete time n'); ylabel('amplitude');  title('Discrete Signal 1 (ketaki)');  subplot(4,1,2);  stem(n2, signal2);  xlabel('discrete time n'); ylabel('amplitude');  title('Discrete Signal 2 (ketaki)');  subplot(4,1,3);  stem(correlation\_result);  xlabel('discrete time n'); ylabel('amplitude');  title('Correlation of Signal 1 and Signal 2 (ketaki)');  subplot(4,1,4);  stem(auto\_correlation\_result);  xlabel('discrete time n'); ylabel('amplitude');  title('Auto-correlation of Signal 1 (ketaki)'); |

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| **Observations** |
| **Signal 1:** |
| **Signal 2:** |
| **Convolution:** |
| **Auto Convolution:** |
| **Signal 1:** |
| **Signal 2:** |
| **Correlation:** |
| **Auto Correlation:** |

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| **Conclusion:** |
| In this experiment, we utilized MATLAB to explore the fundamental concepts of signal processing, specifically focusing on Convolution and Correlation of Signals. Through the implementation of these operations, we gained insights into the interrelationship and transformation of signals, thereby enhancing our understanding of their behavior in various applications. |

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| **Signature of faculty in-charge with Date:** |