

## Lab Report # 09



### **CSE301 - L Signals & Systems Lab**

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Class Section: **"A"**

Submitted to:

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**301L: Signals & Systems Lab****LAB ASSESSMENT RUBRICS**

Marking Criteria	Exceeds expectation (5-4)	Meets expectation (3-2)	Does not meet expectation (1)	Score
<b>1. Realization of Experiment</b>	Program compiles (no errors and no warnings).  Program always works correctly and meets the specification(s).  Completed between 71-100% of the requirements.	Program compiles (no errors and some warnings).  Some details of the program specification are violated, program functions incorrectly for some inputs.  Completed between 41-70% of the requirements.	Program fails to or compile with lots of warnings.  Program only functions correctly in very limited cases or not at all.  Completed less than 40% of the requirements.	30%
<b>2. Ability to apply required code utility or data structure</b>	Able to apply required data type or data structure and produce correct results. Familiarize and selects proper functions for simulation of given problem using software tools like MATLAB.	Able to apply required data type or data structure but does not produce correct results. Need guidance to select proper functions for simulation of given problem using software tools like MATLAB.	Unable to identify required data type or data structure.  Incapable of selecting proper functions for simulation of given problem using software tools like MATLAB.	20%
<b>3. Documentation</b>	Clearly and effectively documented including descriptions of all variables/functions. Specific purpose is noted for each function, control structure, input requirements and output results.	Basic documentation including descriptions of all variables/functions. Specific purpose is noted for each function and control structure.	No documentation included.	10%

<b>4. Ability to run/debug</b>	Executes Matlab codes without errors, excellent user	Executes Matlab codes without errors. User prompts are	Does not execute Matlab codes due to errors.	20%
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	prompts, good use of symbols, spacing in output.  Thorough and organized testing has been completed and output from test cases is included.	understandable, minimum use of symbols or spacing in output.  Some testing has been completed.	User prompts are misleading or nonexistent.  No testing has been completed.	
<b>5. Results compilation</b>	Show processed results effectively by conducting simple computations and plotting using collected data	Show processed results effectively by conducting simple computations and plotting using collected data with minor error	Unable to show processed results effectively by conducting simple computations and plotting using collected data with minor error	10%
<b>6. Efficiency</b>	Excellent use of CPU and Memory.	Good but not smart use of CPU and Memory.	Inefficient use of CPU and Memory.	10%
<b>7. Lab Performance (Team work and Lab etiquettes)</b>	Actively engages and cooperates with other group members in an effective manner. Respectfully and carefully observes safety rules and procedures	Cooperates with other group members in a reasonable manner. Observes safety rules and procedures with minor deviation.	Distracts or discourages other group members from conducting the experiment. Disregards safety rules and procedures.	10%

**Instructor:**

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

## Signals & Systems Laboratory

### SIGNAL POWER:

signal power is the average of the squared magnitude of a signal over a given time interval. It is a measure of the strength of the signal and is used to quantify the quality of a communication channel.

### FOURIER SERIES:

Fourier series theory states that a periodic wave can be represented as a summation of sinusoidal waves with different frequencies, amplitudes and phase values.

### OBJECTIVES OF THE LAB

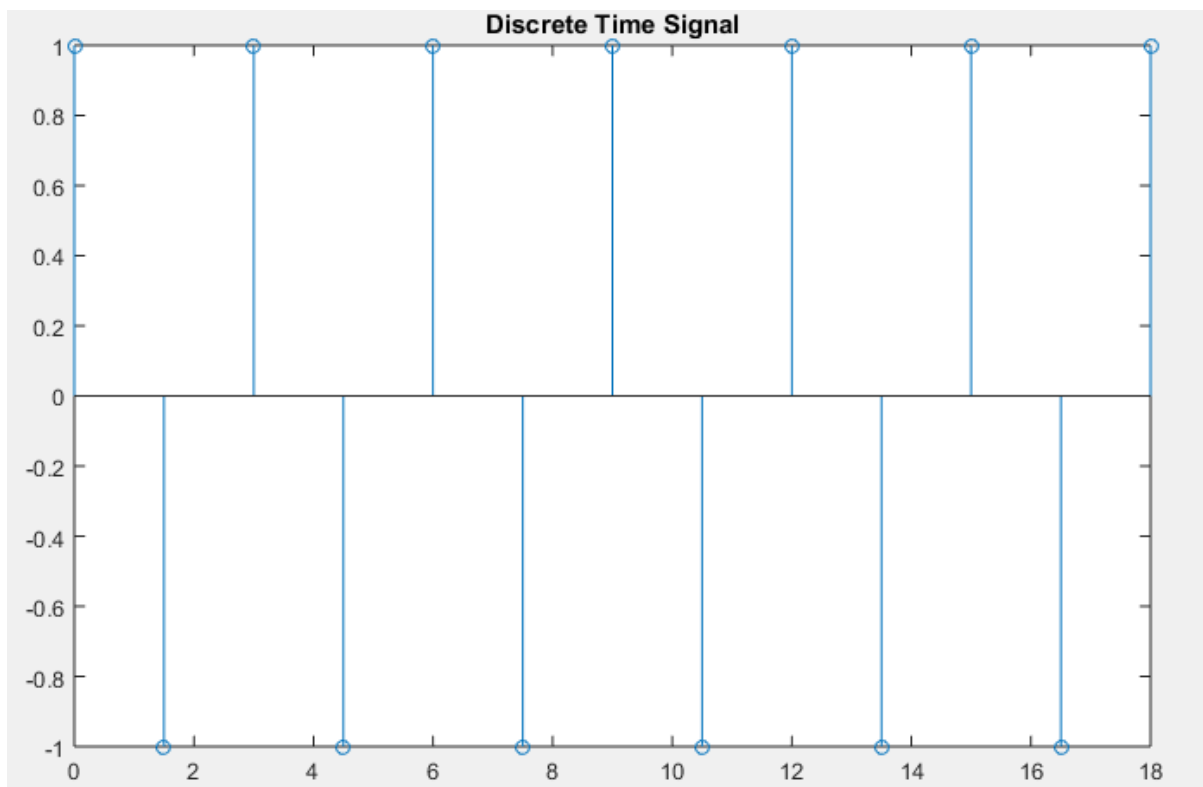
- Power of Continuous & Discrete time Signals
  - Application of Fourier Series
  - Synthesis of Square Wave
  - Synthesis of Triangular Wave
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## TASK 01

## CODE:

```
Editor - E:\Computer_System-Engineering\Fourth Semester\Signal and System Lab\Lab-09\Task1.m
Task1.m x Task2.m x Task3.m x Task4.m x +
1 %Task-1
2 - clc
3 - clear all
4 %Power of DTS
5 - n = 0:1.5:19;
6 - N=20;
7 - X_n=cos(2*pi*n);
8 - stem(n, X_n);
9 - title('Discrete Time Signal');
10 - p=(1/N)*sum(abs(X_n).^2)*1/N
```

## OUTPUT:

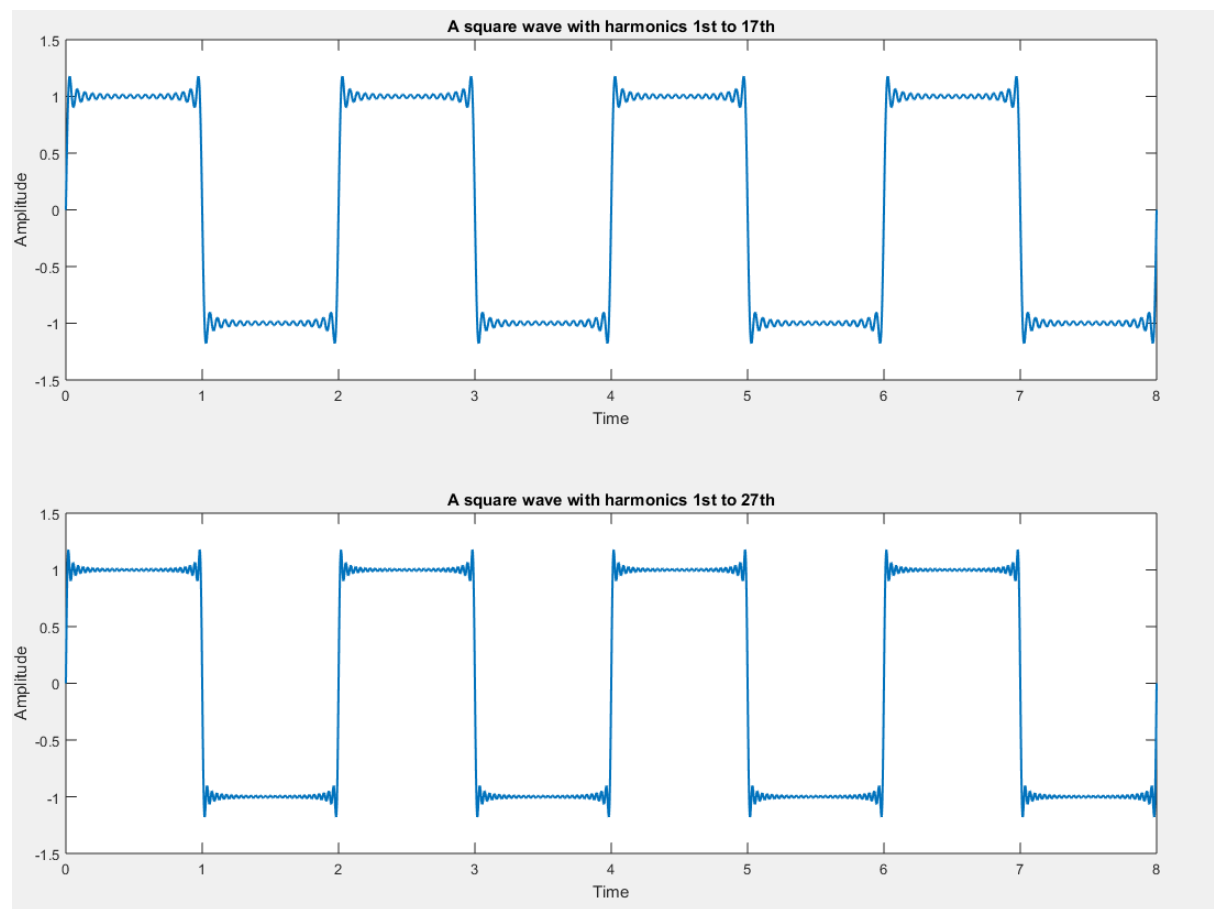


## TASK 02

### CODE:

```
Editor - E:\Computer_System-Engineering\Fourth Semester\Signal and System Lab\Lab-09\Task2.m
Task1.m Task2.m Task3.m Task4.m +
1 % Task 2
2 clc
3 clear all
4 t=0:0.0001:8;
5 ff=0.5;
6 y1 = (4/pi)*sin(2*pi*ff*t);
7
8 for k = 3:2:35
9     fh=k*ff;
10    x = (4/(k*pi))*sin(2*pi*fh*t);
11    y1=y1+x;
12 end
13 subplot(2,1,1);
14 plot(t,y1,'linewidth',1.5);
15 title('A square wave with harmonics 1st to 17th');
16 xlabel('Time');
17 ylabel('Amplitude');
18
19 y2 = (4/pi)*sin(2*pi*ff*t);
20 for k = 3:2:55
21     fh=k*ff;
22     x = (4/(k*pi))*sin(2*pi*fh*t);
23     y2=y2+x;
24 end
25 subplot(2,1,2);
26 plot(t,y2,'linewidth',1.5);
27 title('A square wave with harmonics 1st to 27th');
28 xlabel('Time');
29 ylabel('Amplitude');
```

## OUTPUT:

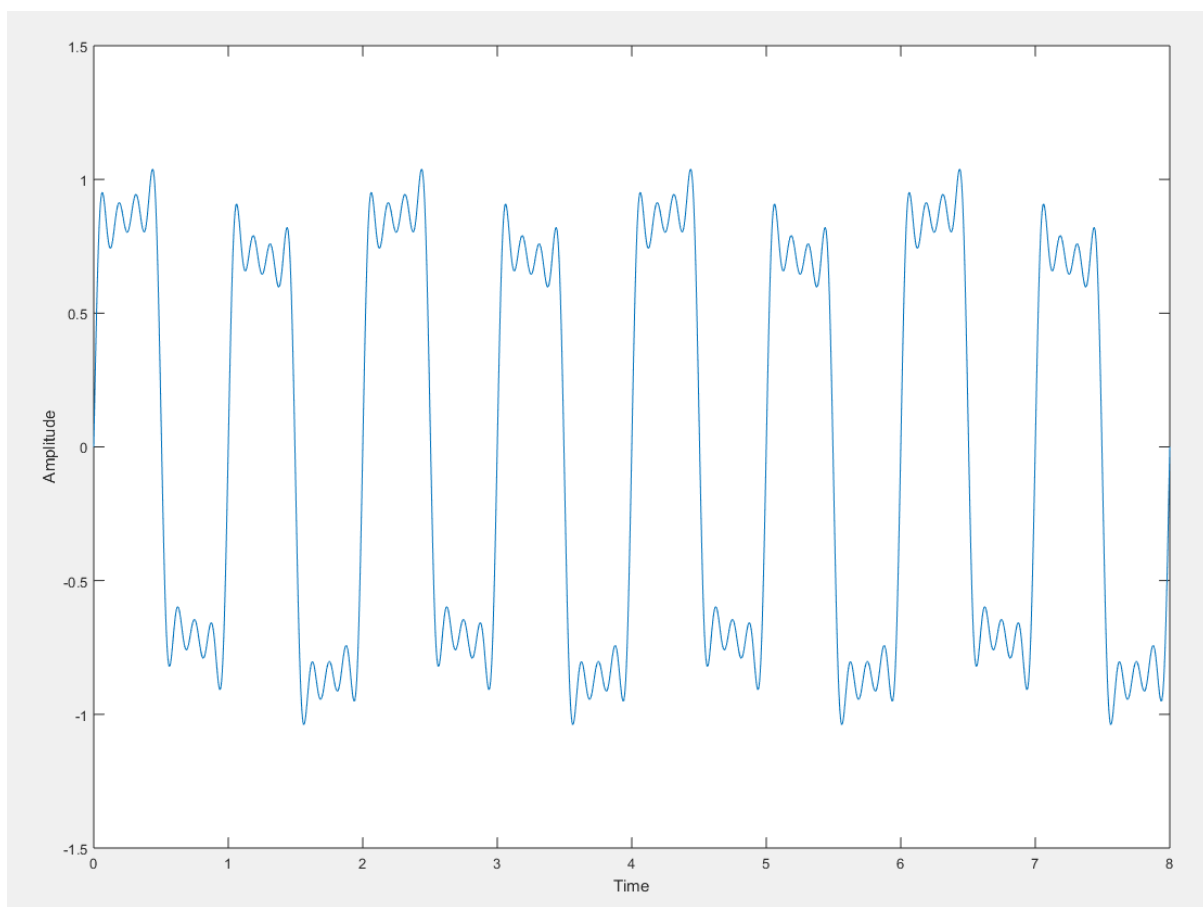


## TASK 03

## CODE:

```
Editor - E:\Computer_System-Engineering\Fourth Semester\Signal and System Lab\Lab-09\Task3.m
Task1.m Task2.m Task3.m Task4.m +
1 % Task 3
2 clc
3 clear all
4 t=0:0.005:8;
5 s=sin(2*pi*t)+sin(6*pi*t)/3+sin(10*pi*t)/5+sin(14*pi*t)/7+sin(1*pi*t)/9;
6 plot(t,s);
7 xlabel('Time');
8 ylabel('Amplitude');
9
```

## OUTPUT:





## TASK 04

## CODE:

```
Editor - E:\Computer_System-Engineering\Fourth Semester\Signal and System Lab\Lab-09\Task4.m
Task1.m Task2.m Task3.m Task4.m +
1 % Task4
2 clc;
3 clear all
4 t=0:0.001:5;
5 ff=25;
6 x1=(-8/(pi^2))*exp(1i*(2*pi*0.5*t));
7 for k=1:2:11
8     x=(-8/(pi^2*k^2))*exp(1i*(2*pi*k*t));
9     y=x1+x;
10 end
11 plot(t,real(y),'linewidth',3);
12 title('Triangular Wave with N=11');
13 ylabel('Amplitude');
14 xlabel('Time');
15 grid on
```

## OUTPUT:

