National Institute of Technology Delhi

Name of the Examination: B.Tech.

**Branch: ECE,CSE,EEE**
Course Title: Signals and Systems
Time: **2 Hours**

Semester: 3rd
Course Code: ECB 204
Maximum Marks: 25

Note:

1. Answers should be CLEAR, TO THE POINT AND LEGIBLE.

2. All parts of a single question must be answered together and in the same sequence as given in question paper. ELSE QUESTION SHALL NOT BE EVALUATED.

3. Q.1 to Q.3 are 3 marks each and Q.4 to Q.7 are 4 marks each, if the question is divided in to parts then marks are equaly divided into all parts.

Q. 1. For the given signal $x(t)$ sketch the signal $y(t) = x(t) * \delta(t-2) + x(t) * \delta(t-3)$, where $*$ denote convolution between given signals.
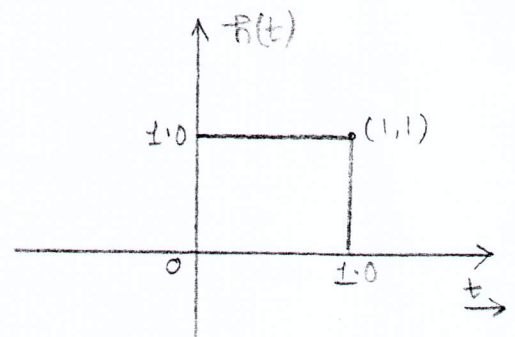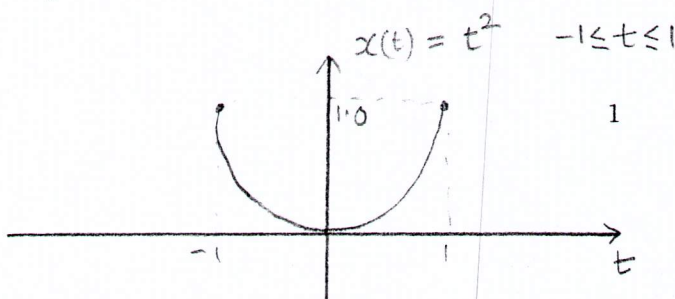

FIG.1
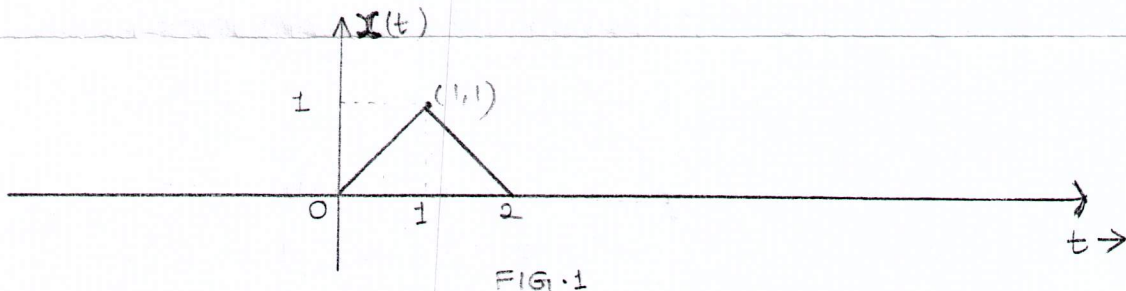
Q. 2. Determine whether or not the signal $x(t)$ is periodic. If the signal is periodic, determine its fundamental period.

$$x(t) = cos(3.1t) + sin(2.5t)$$

Q. 3. Determine the range of α so that given $h(t)$ represent a BIBO stable LTI system impulse response.

$$h(t) = e^{(-\alpha+3)t}u(-t)$$

Q. 4. Find the output $y(t)$ for the given LTI system if input $x(t)$ and impulse response $h(t)$ are given as:-

FIG 2.a.

FIG. 2b.

Q. 5. The continuous time Fourier Series for periodic signal (with period T) $x(t)$ is given by a_k. Find Fourier Series b_k for the signal $y(t)$ in term of a_k:

$$y(t) = x(2t - 6) + x(-\frac{t}{2} + 4)$$

Find the relationship between fundamental frequency of $y(t)$ and $x(t)$.

Q. 6. Find the discrete time Fourier Series for the given signal $x[n]$.

$$x[n] = sin(\frac{2\pi}{5}n) + sin(\frac{6\pi}{5}n) + sin(\frac{8\pi}{5}n)$$

Q. 7. Find the discrete time Fourier Series for the LTI system output signal $y[n]$ if input to the system $x[n]$ is given by

$$x[n] = 1 + sin(\frac{2\pi}{5}n) + sin(\frac{6\pi}{5}n) + sin(\frac{8\pi}{5}n)$$

input $x[n]$ and output $y[n]$ of the system are related by

$$y[n] = x[5n]x[n]$$

End of Question Paper