Program: BTECH (Electrical)
Semester – Spring 2018

ETSS-314 Signal & Systems

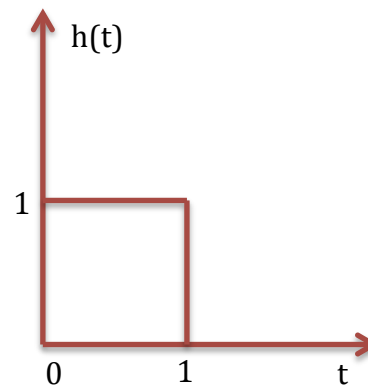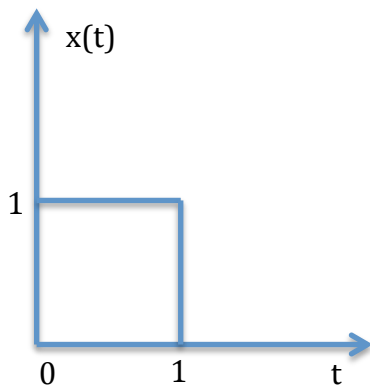**Assignment – 4 & 5**   **Due Date: 20/06/2018**
Marks: 50   **Handout Date: 29/05/2018**

Question # 1:
Graphically convolve the two signals shown below:

(Marks 10)

Question # 2:
Find the Fourier Series Coefficients of the following signals:

1. $x[n] = sin(\omega_0 n)$, $where$ $\omega_0 = \frac{2\pi}{N}$
2. $x[n] = 1 + 3\cos\frac{2\pi n}{N}$

(Marks 07)

Question # 3:
Determine system function of a system having impulse response of $h(t) = e^{-3t}u(t)$. If the input to this system is $x(t) = e^{-2t}u(t)$, find its output y(t) using Fourier transform.

(Hint: $e^{-at}u(t) = \frac{1}{a+j\omega}$)

(Marks 07)

Question # 4:

Consider a discrete-time LTI system with impulse response:

$$h[n] = \left(\frac{1}{2}\right)^n u[n]$$

Use the Fourier transforms to determine the response y [n] to the given input:

$$x[n] = \left(\frac{3}{4}\right)^n u[n]$$

(Marks 06)

Question # 5:

Using partial fraction expansion and the fact that:

$$(a)^n u[n] \leftrightarrow \frac{1}{1-az^{-1}} \;, \; |z| > |a|$$

Find the inverse z-transform of:

$$X(z) = \frac{1-\frac{1}{3}z^{-1}}{(1-z^{-1})(1+2z^{-1})} \;, \; |z| > 2$$

(Marks 10)

Question # 6:

Using the partial fraction expansion, determine the sequence x [n] that goes with the following z-transform:

$$X(z) = \frac{3z^{-1}}{\left(1-\frac{1}{2}z^{-1}\right)\left(1+\frac{1}{4}z^{-1}\right)}$$

(Marks 10)

Good Luck