Assignment – 3   **Due Date: 02/01/2017**
Marks: 20   **Handout Date: 26/12/2016**

Question # 1:

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:

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

Question # 2:

Determine the z-transform for each of the following sequences. Sketch the pole-zero plot and indicate the ROC:

   i. $\delta[n-5]$
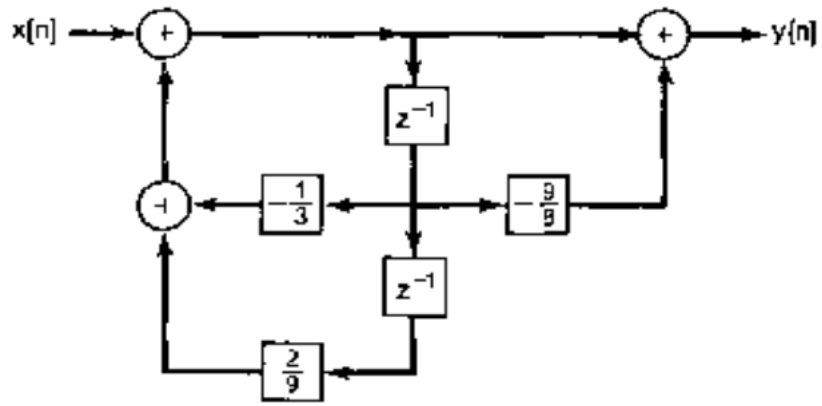 ii. $(-1)^n u[n]$
 iii. $\left(\frac{1}{2}\right)^n u[n]$

Question # 3:
Using the partial fraction expansion, determine the sequence x [n] that goes with the following z-transform:

$$X(z) \frac{3}{z - \frac{1}{4} - \frac{1}{8}z^{-1}}$$

Question # 4:
The input x [n] and output y [n] of a causal LTI system are related through the block diagram representation shown below:

$x[n] \longrightarrow (+) \longrightarrow \longrightarrow (+) \longrightarrow y[n]$

z^{-1}

$-\dfrac{1}{3}$ $-\dfrac{9}{9}$

z^{-1}

$\dfrac{2}{9}$

a) Determine a difference equation relating y [n] and x [n].

b) Is this system stable?

Good Luck