40 + 37 + 11

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[3 Hours] **Total Marks: 80**

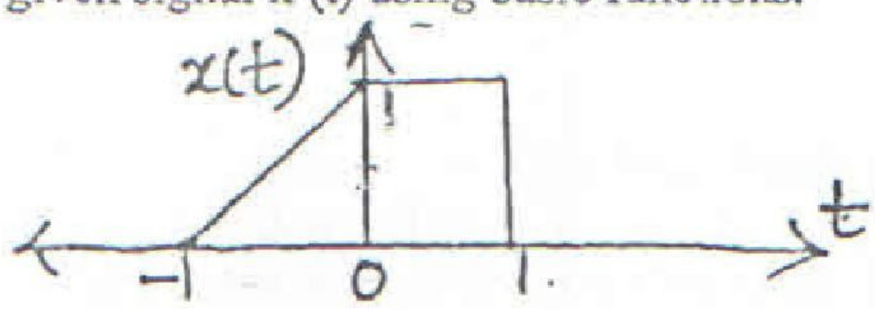
N: B 1) Q1 is compulsory.

2) Attempt any three questions from remaining questions

3) Assume suitable data wherever required.

Q1) a) State and prove differentiation property of z-transform.

b) Express the given signal x (t) using basic functions. [5*4]



c) Determine the stability and causality of the system described by

$$H(z) = \frac{1}{1-0.5z^{-1}} + \frac{1}{1-2z^{-1}} \text{ for ROC } 0.5 < |z| < 2$$

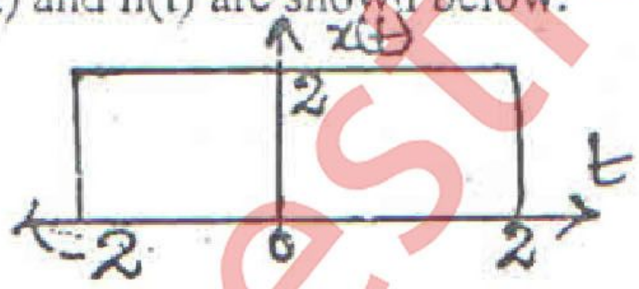
d) Check the stability and Time invariance property of the system y[n] = x [-n]

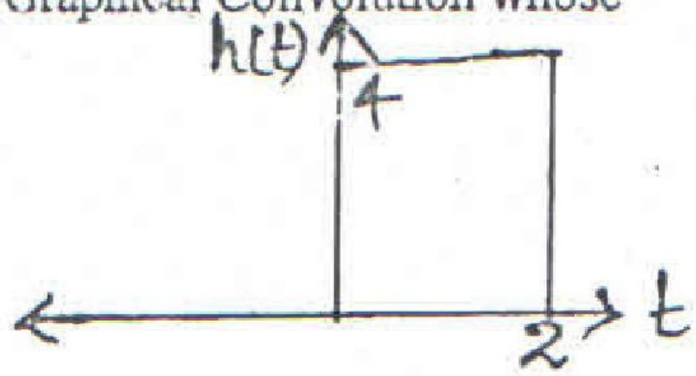
Q2) a) Find the even and odd components of x[n] = {-1, 7,-2, 3,-7, 6} [05]

b) Find the initial value and final value of

$$X(z) = \frac{z}{4z^2-5z-1} \quad \text{ROC } |z| > 1$$ [05]

c) Find the response y (t) of an LTI system by Graphical Convolution whose x (t) and h(t) are shown below: [10]





Q3) a) What do you mean by ROC? Mention the significance. Find the ROC of infinite duration Left sided signal.

b) Find the Fourier transform of $x(t) = e^{-3t} u(t-2)$ [5*4]

c) Check whether the given signal $x(t) = \sin^2 w_o t$ is power signal or not.

d) Obtain the z-transform of x (n) = (n-3) u (n)

[TURN OVER]

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Q4 a) Find the phase and magnitude response of the system h(n)= [1, -1/2] (10M)

b) A causal LTI system is described by the difference equation. (10M)

y (n)-3/4y(n-1)+1/8y(n-2)=u(n)+u(n-1) .Find the forced response of the system due to step input.

Q5 a) Find the Z transform of the given signal x(n) $= 1 \quad n \geq 0$ $= 3^n \quad n < 0$ (10M)

b)An discrete time LTI system governed by the difference equation; (10M)

Y (n) = x (n) + 0.8 x (n-1) + 0.8 x (n-2) - 0.49 y(n-2).

Determine the transfer function. Sketch the pole zero plot on the Z plane.

Q6 a)An 8 point sequence is given by x(n)={1,2,3,4,4,3,2,1}.Compute 8 point DFT of x(n) by radix -2 DIT – FFT method. (10M)

b) Perform the circular convolution using DFT. $X_1(n)=\{2,1,2,1\}$ $X_2(n)=\{1,2,3,4\}$ (10M)

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