Duration: 3hrs **[Max Marks:80]**

N.B.: (1) Question No 1 is Compulsory.
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.
(4) Assume suitable data, if required and state it clearly.

1		Attempt any FOUR	[20]
	a	Find the convolution between the sequences $x_1(n)=\{1,2,3,4\}$ and $x_2(n)=\{4,3,2,1\}$	
	b	Determine the energy of the signal $x(n)= (1/2)^n$, $n>=0$.	
	c	Define the properties Time invariance, Causality, stability.	
	d	Briefly explain the differences between FIR and IIR systems.	
	e	Derive the convolution formula in time domain.	
2	a	Determine the ZT of $a^n u(n)+b^n u(-n-1)$. Mark the ROC.	[10]
	b	Determine the Inverse ZT of $X(z)= 1/(1-1.5z^{-1}+0.5z^{-2})$ for ROC mod(z)>1, mod(z) < 0.5, 0.5<mod(z)<1.	[10]
3	a	Determine the DTFT of $x(n)=2^n u(-n)$.	[10]
	b	Explain any 2 applications of DSP.	[10]
4	a	Find the DFT of the sequence $x(n)=\{1+5j,2+6j,3+7j,4+8j\}$.	[10]
	b	Find the circular convolution of the sequences $x(n) = \{0,1,2,3,4\}$ and $h(n)= \{2,1,1,2\}$.	[10]
5	a	Design a digital low pass Butterworth filter for the following specifications using bilinear transformation. Passband=0-500 Hz, stopband= 2-4KHz, PB ripple=3db SB attenuation =20db, Sampling frequency=8KHz.	[12]
	b	Find the DFT of $x(n)= \{1,2,3,4\}$ using decimation in time FFT algorithm.	[8]
6	a	Design an FIR low pass filter with 11 coefficients for the following specifications. Pass band edge frequency=0.25 KHz Sampling frequency =1kHz.Use hamming window.	[12]
	b	Find the DFT of $x(n)= \{4,3,2,1\}$ using decimation in frequency FFT algorithm.	[8]

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