Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Sem-II Remedial Examination December 2010

Subject code: 720702

Subject Name: Digital Signal Processing

Date: 20 /12 /2010 **Time: 02.30 pm – 05.00 pm**

Total Marks: 60

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Explain block diagram of a typical DSP system. Differentiate between digital signal processing and analog signal processing. State various application of DSP. **06**

(b) Explain with example **06**

(i) Impulse Response

(ii) dynamic discrete time system

(iii) causal discrete time system

Q.2 **(a)** Find whether following systems are Linear Time Invariant or not. **06**

(i) $Y(n)= Ax(n)+B$

(ii) $Y(n)= x(-n)$

(iii) $Y(n)=x^2(n)$

(b) The impulse response of the LTI system is **06**

h(n)=	1 when n=-1	and x(n)=	1 when n=0
	2 when n=0		2 when n=1
	1 when n=1		3 when n=2
	-1 when n=2		1 when n=3

Determine the response of the system to input x(n) using graphical convolution method.

OR

(b) The difference equation satisfied by the input and output of the system is **06**

$Y(n)= ay(n-1)+x(n)$

Consider the input $x(n)=k\delta(n)$ where K is any number and the auxiliary condition $y(-1)=C$. determine the response of the system.

Q.3 **(a)** Explain region of convergence in Z-transform. Explain and prove following properties of Z Transform. **06**

(i) Time shifting property

(ii) frequency shifting property

(b) State various method to find inverse Z transform. Find inverse Z transform using partial fraction expansion method of **06**

$X(z)= (z+1)/(3z^2-4z+1)$ ROC $|z|>1$

OR

Q.3 **(a)** State various non parametric methods. Explain any one of them. **06**

(b) Differentiate between microprocessor and DSP processor Write short note on General purpose DSP Processor. **06**

Q.4	**(a)**	Draw direct form I and II realization of a system described by $y(n)=y(n)-3/4y(n-1)+1/8y(n-2)=x(n)+1/2x(n-1)$	**06**
	(b)	Write short note on digital filter bank	**06**

OR

Q.4	**(a)**	Explain cascade and parallel FIR filter structure with example	**06**
	(b)	Find four point Discrete Fourier transform of the sequence $x(n)=\cos n\pi/4$	**06**
Q.5	**(a)**	Differentiate between DFT and FFT. Draw Decimation in Time 8 point FFT flowchart.	**06**
	(b)	Design a single pole low pass digital filter with 3 dB bandwidth of 0.2π,using the bilinear transformation applied to the analog filter. $$H(s) = \frac{\Omega_c}{S + \Omega_c}$$ Where Ω_c is the 3dB bandwidth of the analog filter.	**06**

OR

Q.5	**(a)**	Find circular convolution of $x(n)=(4,3,2,1)$, and $h(n)=(3,2,1,0)$	**06**
	(b)	Compare FIR filter with IIR filter	**06**

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