Total No. of Questions : 12]

SEAT No. :

P2333

[Total No. of Pages : 4

[4758]-68

T.E. (Electronics)

DISCRETE TIME SIGNAL PROCESSING

(2008 Pattern) (Semester - II) (304211) (Theory) (BOS)

Time : 3 Hours] *[Max. Marks :100*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of electronic pocket calculator is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Two signals $x_1(t) = \cos(20\pi t)$ and $x_2(t) = \cos(100\pi t)$ with sampling frequency 40 Hz. Obtain the associated discrete time signals & comment on result. **[8]**

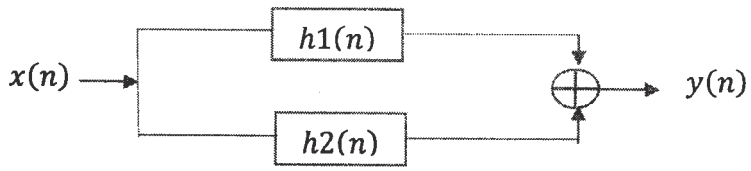
b) Explain Stability & causality of LTI system is terms of its impulse Response. **[8]**

OR

Q2) a) Find out the particular solution for **[6]**

$y(n) + 3y(n-1) = x(n)$ Assume $x(n) = u(n)$

b) If LTI system is described as **[6]**



If x(n) = {1, 2, 4} & $h_1(n)$ = {1, 2, 0, 1}, $h_2(n)$ = {2, 1, 1, 2}

c) Explain the basic elements of DSP with the help of block diagram. **[4]**

P.T.O.

Q3) a) Explain the Relation between DTFT & DFT. **[4]**

b) Determine 2-point & 4-point DFT of $x(n) = u(n) - u(n-2)$ **[6]**

c) Explain overlap save method in detail. **[8]**

OR

Q4) a) Compute the DFT $x(n) = \cos(n\pi/2)$ for N=4 using DIF-FFT Algorithm. **[8]**

b) Obtain the Circular convolution of $x_1(n) = \{1, 2, 3, 1\}$ & $x_2(n) = \{4, 3, 2, 2\}$ By using matrix multiplication method. **[4]**

c) Explain cyclic Property of Twiddle Factor for N=4. **[6]**

Q5) a) If $x(z) = 2 + 3z^{-1} + 4z^{-2}$ find the initial & final values of the cross ponding sequence $x(n)$. **[6]**

b) Given that **[10]**

$H(z) = \dfrac{-4+8z^{-1}}{1+6z^{-1}+8z^{-2}}$ is casual system find

i) Transfer function Representation

ii) Difference Equation Representation

iii) Impulse Response Representation.

OR

Q6) a) Determine the Z-transform of the following sequence using Properties only **[10]**

i) $u(n-4)$

ii) $\delta(n-5)$

iii) $e^{jn\pi/4}\ u(n)$

iv) $(1/3)^n\ u(-n)$

v) $3^n\ u(n-2)$

b) Find the convolution of x(n) = {1, 2, 3, 1, –1, 1} & h(n) = {1, 1, 1} using Z-Transform. **[6]**

SECTION - II

Q7) a) Define the terms Related to FIR filter **[6]**

i) Phase Delay

ii) Group Delay

iii) Symmetric filter

iv) Antisymmetric filter

v) Linear phase filter

vi) Order of filter

b) Design an FIR Digital filter to approximate an LPF with Pass band gain unity, cut of frequency of 850 HZ and working at a sampling frequency of 5000HZ. The length of impulse response should be 5. use Hamming Window. **[12]**

OR

Q8) a) For the analog filter $H(S) = \frac{1}{(S+1)(S+2)}$. Convert above analog filter into Digital Filter by using **[10]**

i) Impulse invariance method.

ii) BLT method

b) Prove along with mathematical expression "*Stable Analog filter is converted into stable Digital Filter using BLT method*". **[8]**

Q9) a) Explain the Application of Multirate sampling in Data Acquisition System along with Block diagram. **[8]**

b) Explain the Role of Antialiasing Filter in Decimator & Role of Anti-imaging filter in interpolator in Detail. **[8]**

OR

Q10)a) Design two stage decimator with sampling rate to be reduced from 10KHz to 500 Hz. Passband edge of 150 Hz, stopband edge of 180 Hz, Passband ripple 0.002 & stopband ripple 0.001 & $D_1 = 10$, $D_2 = 2$. **[10]**

b) Explain sampling rate conversion By I/D factor. **[6]**

Q11)a) Explain the architecture of TMS320C28XX in detail. **[8]**

b) Differentiate between General Purpose Microprocessor & DSP processor. **[8]**

OR

Q12)a) Explain Related to DSP processor. **[8]**

i) DAG

ii) Barrel Shifter

b) Explain any four addressing Modes of for DSP processor in detail. **[8]**

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