Total No. of Questions : 6]

SEAT No. :

P43

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APR - 18/TE/Insem. - 45

T.E. (Computer Engineering)

DIGITAL SIGNAL PROCESSING APPLICATIONS

(2012 Pattern) (Semester - II) (310253)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates:

1) ***Attempt Q1 or Q2, Q 3 or Q4, and Q5 or Q6.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) A CT signal having frequency 75 Hz is sampled at a rate of 1500 samples/sec. Obtain- **[5]**

i) Number of samples per cycle.

ii) Digital/Discrete frequency f and ω.

iii) Minimum sampling rate to avoid aliasing effect.

iv) Period of a DT signal

b) Classify DT systems as Recursive v/s Non-Recursive and FIR v/s IIR system with suitable example. **[5]**

OR

Q2) a) Why the problem of aliasing is observed in sampling process? Why quantization is required after sampling process? **[5]**

b) Obtain the linear convolution of following DT signals-

$x(n) = \delta(n) - 2\delta(n-2)$ and $h(n) = \delta(n+1) + 2\delta(n-1)$ **[5]**

Q3) a) State and prove the periodicity property of Fourier Transform(FT). What is the necessary and sufficient condition for the existence of FT? **[5]**

b) Draw the basic butterfly structure for DIT FFT and DIF FFT algorithm. From this, estimate the total number of multiplications and additions involved in the computation of N point DFT. **[5]**

OR

P.T.O.

Q4) a) Use Linear Transformation Matrix to obtain 4 point DFT of **[5]**

$x(n) = \{1, -2, 2, 1\}$

b) How DFT is obtained from FT? What is the significance of N in N-point DFT? Define DFT in terms of twiddle factor W. **[5]**

Q5) a) Using Power series method, obtain the IZT of $X(Z) = \frac{1}{(1 - aZ^{-1})}$ (left sided sequence) **[5]**

b) Obtain ZT of a DT signal using ZT properties where, $x(n) = n.u(n-1)$ specify the ROC. **[5]**

OR

Q6) a) Define ROC. State its properties. **[5]**

b) What is a pole zero plot of ZT? Obtain it for a system having impulse response- $h(n) = (2)^n u(n)$. **[5]**

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