Total No. of Questions : 6]

SEAT No. :

P207

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APR - 17/TE/Insem. - 43

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, Q3 or Q4, Q5 or Q6.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***

Q1) a) State the mathematical models used to represent a DT system. Define these models with mathematical form. **[5]**

b) Define the Impulse Response of a DT system and show that for a causal system

$h(n) = 0$ for $n < 0$ **[5]**

OR

Q2) a) A CT signal having frequency 50 Hz is sampled at a rate of 1200 samples/sec. Obtain -

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. **[5]**

b) State the Linearity, causality and stability properties of a DT system. **[5]**

Q3) a) State and prove the time reversal property of Fourier Transform(FT). **[5]**

b) What do you understand by 'Indexing in Bit-Reversal' in FFT? Draw the basic butterfly structure for DIF FFT algorithm and hence obtain the computational complexity of N point DFT. **[5]**

OR

P.T.O.

Q4) a) Perform following circular shifting operations on a given DT signal $x(n)=\{4,2,-1,3\}$ with N = 4 and N = 5.

i) $x((n-2))_N$

ii) $x((n+1))_N$ **[5]**

b) What is the significance of 'N' in N point DFT? Define N point DFT by means of twiddle factor W and compute twiddle factors for N = 4. **[5]**

Q5) a) Define ROC of ZT. How many possible ROCs a single ZT may have? Give one example. **[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) Draw a Pole Zero plot for a system described as-

$y(n) = x(n) - x(n-1) + 0.2y(n-1) + 0.15y(n-2)$ **[5]**

b) Define the term system function H(Z). Express it in the form of pole zero system and define it for FIR and IIR system. **[5]**

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