B.Tech. SEM -VI (Computer) 2014 Course (CBCS) : WINTER - 2018

SUBJECT : DIGITAL SIGNAL PROCESSING

Day : Thursday
Date : 15/11/2018

W-2018-2462

Time : 10.00 AM TO 01.00 PM
Max. Marks : 60

N. B. :

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Draw neat and labeled diagram **WHEREVER** necessary.
4) Assume suitable data, if necessary.

Q. 1 Analyze the following systems are causal, linear and time invariant: **(10)**

i) $y(n) = ax(n) + 10.$

ii) $y(n) = x(n) + nx(n+1).$

OR

State and prove the condition for causality and linearity of LTI system. **(10)**

Q. 2 Distinguish between linear and circular convolution. Determine circular convolution between $x(n) = \{1, 2, 1, 2\}$ and $h(n) = \{1, 0, 1, 2\}$. **(10)**

OR

State and prove properties of twiddle factor. Calculate 4 point DFT of **(10)**

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

Q. 3 State and prove linearity and time shifting properties of ZT and determine ZT of: **(10)**

i) $x(n) = (n-1)\,u(n)$

ii) $x(n) = \delta(n+2)$

OR

Determine Inverse Z-Transform of: **(10)**

i) $x(z) = \dfrac{1 - \frac{1}{2} z^{-1}}{1 - \frac{1}{4} z^{-2}}$ for $|z| > 1/2$

ii) $x(z) = \dfrac{z}{z-1}$ for $|z| > 1$

P. T. O.

Q. 4 Develop direct form II realization of the transfer function: **(10)**

$$H(Z) = \frac{3 + 3.6\, z^{-1} + 0.6\, z^{-2}}{1 + 0.1\, z^{-1} - 0.2\, z^{-2}}$$

OR

Describe direct form I and II IIR filter structures and compare with respect to memory requirements and computational complexity. **(10)**

Q. 5 Describe Gibb's phenomenon and explain Rectangular window in FIR filter design. **(10)**

OR

Compare Impulse Invariance method with Bilinear transformation method. An analog filter has the system transfer function $H(s) = \frac{1}{s+1}$. **(10)**

Determine the transfer function $H(Z)$ of digital filter using Bilinear Transformation.

Q. 6 Draw and explain the architecture of TMS 320 C64X **(10)**

OR

Describe following applications of DSP in: **(10)**

i) Speech Recognition

ii) Echo cancellation

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