B.Tech. SEM -VI (Computer) 2014 Course (CBCS) : SUMMER - 2019

SUBJECT : DIGITAL SIGNAL PROCESSING

Day : Monday
Date : 27/05/2019

S-2019-2727

Time : 02.30 PM TO 05.30 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 Determine linear convolution of following sequence using graphical method. **(10)**

$x(n) = \{1, 2, -2, 1\}$ and $h(n) = \{1, 0, 1\}$.

OR

Determine whether following systems are static, causal, linear and time invariant: **(10)**

i) $y(n) = 3\left[x(n) + x(n-1)\right]$

ii) $y(n) = x(n) + u(n-1)$.

Q. 2 Draw signal flow graph for Rodix-2 DIT FFT algorithm with required equations. **(10)**

OR

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

$x(n) = \{1, 2, 0, 1\}$ and verify your answer using IDFT.

Q. 3 State and prove scaling properties of Z Transform. Determine Z Transform of : **(10)**

$x(n) = \left(\frac{1}{2}\right)^n u(n)$ and draw ROC.

OR

Analyze how characteristic behavior of causal discrete time signals depend on pole-zero location with respect to unit circle. **(10)**

P. T. O.

Q. 4 Realize direct form I and II structures of a system described by: **(10)**

$$y(n) - \frac{3}{4}\ y(n-1) + \frac{1}{8}\ y(n-2) = x(n) + \frac{1}{2}\ x(n-1)$$

OR

Derive direct form structures for IIR systems from general difference equation. **(10)**

Q. 5 Write design steps for Impulse invariance method and determine. **(10)**

$H(Z)$ from $H(s) = \dfrac{2}{(s+1)(s+2)}$ if sampling frequency is 10 Hz.

OR

Compare FIR filters with IIR filters. What are the desirable features of window functions to improve frequency response of FIR filters? **(10)**

Q. 6 Describe Multirate signal processing and state its advantages. **(10)**

OR

Describe any two applications of DSP in Image processing. **(10)**

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