Total No of Questions : 8 | Pages : 3 680

EI-28

B.E. (VIth Sem.) (CGPA) (El. & Comm. Engg.) Exam.-2015

DIGITAL SIGNAL PROCESSING

Paper - EI-603

Time Allowed : Three Hours

Maximum Marks : 60

Note : Attempt all questions. Question number 2 to 6 have internal choice.

Q.I Write short note on following : 2×5=10

(a) Define ROC in z transform.

(b) Determine the Z transform of the signal :

$x(n) = a^n u(n) + b^n u(-n-1)$

(c) What do you mean by DFS and DFT?

(d) Define Hamming window technique.

(e) Prove this $W_N = W_{N/2}$

Q.II (a) Check whether the following are linea stable and time invariant or not :

(1) $y(n) = x(3n)$

(2) $y(n) = ax(n) + b$

(3) $y(n) = \sin(x(n))$

(b) Enlist the advantages of Digital Syst over Analog system.

Or

(a) Compute the convolution $y(n) = x(n) * h(n)$ of the signal : 6

$X(n) = (1, 1, 0, 1, 1)$ and

$h(n) = (1, -2, -3, -4)$

(b) Explain the classification of signal in dsp. 4

Q.III (a) A L.T.I. system is characterized by the system function : 6

$$H(z) = \frac{3 - 4z^{-1}}{1.3.5z^{-1} + 1.5z^{-2}}$$

Find $h(n)$ by using Long Division Method if the given signal is Anti-causal.

(b) Calculate z-transforms and ROC for the following : 4

(i) $x(n) = \{1, 2, 3, 0, 4, 5\}$

(ii) $x(n) = 2^n u(n-2)$.

Or

(a) Use the Z-transform to perform the convolution of the following two sequences : 6

$h(n) = (1/2)^n 0 \le n \le 2$

$x(n) = \delta(n) + \delta(n-1) + 4\delta(n-2)$

(b) Write the Properties of Z-transform. (Any Four). 4

Q.IV (a) Find the response of the following difference equation : 6

$y(n) - 5y(n-1) + 6y(n-2) = x(n)$, for $x(n) = u(n)$.

(b) Draw the direct forms structure of IIR Structure. 4

Or

(a) D ... s IIR filter.

(b) What is the condition for impulse response of fir filter to satisfy for constant group and phase delay for only constant group delay.

Q.V (a) For given $x(n) = \{1, 2, 3, 4, 4, 3, 2, 1\}$, find $X(k)$ using DIF FFT algorithm. 6

(b) Find the N-point DFT for $x(n) = n$ for $0 < a < 1$. 4

Or

(a) Draw DIT-FFT signal flow chart for $N = 8$. 6

(b) Find $x(n)$ for the sequence $X(k) = \{0, 1 + 2j, 2, 1-2j\}$. 4

Q.VI (a) Apply bilinear transformation to : 6

$$H(s) = \frac{s+0.3}{\{(s+0.3)^2 + 6\}}$$

with a resonant frequency $\pi/8$.

(b) Write short note on Rectangular window technique. 4

Or

(a) Determine $H(z)$ using impulse invariant technique for the analog system function :

$$H(s) = \frac{2s+3}{(s+0.3)(s^2+0.3s+6)}$$ 6

(b) Define Hamming window technique. 4