Total No. of Questions : 6]

SEAT No. :

P3689

[Total No. of Pages :2

Engg.-27
T.E (E & TC) (Semester-I)
DIGITAL SIGNAL PROCESSING (In Sem.)
(2012 Pattern)

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

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary***

Q1) a) An analog signal contains frequencies upto 10KHz. **[6]**

i) What range of sampling frequencies allows exact reconstruction of this signal from its samples?

ii) If this signal is sampled with a sampling frequency Fs = 8 KHz.

What is the folding frequency?

Examine what happens to the frequency F1 = 5 KHz.

Examine what happens to the frequency F2 = 9 KHz.

b) State the advantages of digital signal processing over analog signal processing. **[4]**

OR

Q2) a) Draw the block diagram of a digital signal processing system and explain the operation of each block. What additional component is required to prevent aliasing? **[4]**

b) Determine the fundamental period of the following sinusoidal signals. **[6]**

i) $\cos 0.01\pi n$ ii) $\cos(62\pi n/10)$ iii) $\sin(2\sqrt{2}\pi n/5)$

Q3) a) x (n) = {1 2 1 2} h (n) = {1 -1 2 1} **[6]**

Compute circular convolution using DFT-IDFT method.

b) State and prove the time shifting property of DFT. **[4]**

OR

P.T.O.

Q4) a) Compute 8 - point DFT of the following sequence using radix 2 DIT-FFT algorithm. **[8]**

x(n) = {1 2 3 4 4 3 2 1}

b) State the DFT symmetry property for a real sequence. **[2]**

Q5) a) Compute the Z transform and ROC of following sequence. **[4]**

$x(n) = (½)^n u(n+2) + (3)^n u(-n-1)$

b) State the different sequences having Z transform given by **[6]**

$$X(z) = \frac{1 - 2z^{-1}}{1 - \frac{7}{12}z^{-1} + \frac{1}{12}z^{-2}}$$

Also state the ROC of each sequence.

OR

Q6) a) A causal discrete-time LTI system has an input x(n) and output y(n) given by: **[6]**

$$x(n) = \left(\frac{1}{2}\right)^n u(n) - \left(\frac{1}{4}\right)\left(\frac{1}{2}\right)^{n-1} u(n-1)$$

$$y(n) = \left(\frac{1}{3}\right)^n u(n)$$

Determine the impulse response h(n) and the system function H(z) of the system.

b) A discrete- time LTI system is characterized by **[4]**

$$H(z) = \frac{3 - 4z^{-1}}{1 - 3.5z^{-1} + 1.5z^{-2}}$$

Determine h(n)for

i) Causal system

ii) Stable system

iii) Anti-causal system