BE – CD – Sem VII – CBSG 3

DSP

23/11/15

(3 Hours) [Total Marks :80

N.B. : (1) Question **No 1** is **compulsory**
(2) Attempt **any three** Questions out of remaining **five** questions.
(3) Assume suitable data wherever required and clearly specify it,
(4) **Figures** to the **right** indicate **full** marks.

1. (a) State the condition for stability of LTI system, determine the range of values of a and b for which the impulse time -invariant system with following given impulse response is stable. 5

$$h(n) = \begin{cases} a^n & n \leq 0 \\ b^n & n < 0 \end{cases}$$

(b) Find the Energy of the signal $x(n) = 0.5^n u(n) + 8^n u(-n-1)$ 5

(c) Find the value of $x(n) = \cos(0.25\pi n)$ for n= 0, 1, 2, 3. Compute the DFT of x(n) using FFT flow graph. 5

(d) Find the cross correlation of the sequences $x(n) = \{1, 2, 3, 4\}$ and $h(n) = \{2, 4, 6\}$ 5
$$\uparrow \qquad\qquad\qquad \uparrow$$

2. (a) Determine whether or not the following signals are periodic If periodic specify its fundamental period. 10
     (i) $x_1(n) = \cos(0.5\pi n + 0.3)$
     (ii) $x_2(n) = \cos(0.3\pi n) + 10\sin(0.25\pi n)$

(b) Compute Linear convolution of causal x(n) and h(n) using overlapp add method in time domain 10
$$x(n) = \{1, 2, 3, 4, 5, 6, 7, 8\}, \quad h(n) = \{1, 1, 1\}$$

3. (a) Check whether the given system $y(n) = x(2n) - x(n-1)$ is : 10
     (i) Static or Dynamic   (ii) Linear or non -linear
     (iii) Shift invariant or variant   (iv) Causal or non causal
     (v) Stable or unstable.

(b) State the following DFT properties : 10
     (i) Linearity property
     (ii) Periodicity
     (iii) Time shift
     (iv) Convolution
     (v) Time Reversal

MD-Con. 7987 -15. [TURN OVER]

4. (a) For the causal LTI digital filter with impulse response given by $h(n) = 0.3\ \delta(n) - \delta(n-1) + 0.38\ \delta(n-3)$ sketch the magnitude spectrum of the filter. Using DFT. **10**

   (b) Let $X(K) = \{20, 0, -4+4j, 0, -4\}$ is the 8 point DFT of a real valued sequence $x(n)$ **10**
       (i)   Find $X(K)$ for K=5, 6, 7.
       (ii) Find the 8 point DFT $P(K)$ such that $p(n) = (-1)^n x(n)$ Using DFT property.

5. (a) Find circular convolution and linear using circular convolution for the following sequences $x_1(n) = \{1, 2, 3, 4\}$ and $x_2(n) = \{1, 2, 1, 2\}$. Using Time Domain formula method. **10**

   (b) Derive radix 2 DIT FFT flow graph and find the DFT of the sequence $x(n) = \{0, 1, 2, 3\}$ **10**

6. (a) Write a detailed note on DSP Processor.
   (b) Write a detailed note on Carls'Correlation Coefficient Algorithm. Justify the necessary of Algorithm by given suitable example. **10**

Course: B.E. (Sem VII) (REV. -2012) (CBSGS) (Computer Engg.) (Prog T2827)

QP Code: 5863

Correction:

Q1(a) State the condition for Stability of LTI System, determine the range of values of   a   and b for which the impulse time invariant system with the following given impulse response is stable.

$$h[n] = \begin{cases} a^n & n \geq 0 \\ b^n & n < 0 \end{cases}$$

Q5(a) Find Circular Convolution and Linear Convolution using Circular Convolution for the following sequences

$x_1[n]$= { 1, 2, 3, 4 } and $x_2[n]$= { 1, 2, 1, 2, } using the time domain formula method.

Q6 Weightage for Q6(a) is 10 Marks and weightage for Q6(b) is 10 marks

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