

Code: R7311902

B.Tech III Year I Semester (R07) Supplementary Examinations December 2015

DIGITAL SIGNAL PROCESSING
(Electronics and Computer Engineering)
(For 2008 regular admitted batch only)

Time: 3 hours

Max Marks: 80

Answer any FIVE questions
All questions carry equal marks

- 1 (a) You are given with the input and output relations of two systems. State whether the systems are linear, time – invariant and stable:
(i) $y(n) + y(n - 1) = x(n) + x(n - 2)$.
(ii) $y(n) = x(n^2) + x(-n)$.
(b) Define the terms “Impulse response” & “Unit step response.” Give the relationship between them.
- 2 (a) State and prove the circular time shifting and frequency shifting properties of DFT.
(b) What is “Padding with zeros”? Explain with an example. Write the effect of padding a sequence of length N with L zeros (or frequency resolution).
- 3 Compute 8-point DFT for the following sequence:
$$x(n) = 1 \quad 0 \leq n \leq 7$$
$$= 0 \quad \text{otherwise}$$
using DIT, DIF algorithms.
- 4 Realize a system given by the difference equation:
 $y(n) = -0.1y(n - 1) + 0.71 y(n - 2) + 0.7x(n) - 0.252 x(n - 2)$ in Cascade and Parallel form.
- 5 (a) Design an Analog Butterworth filter that has a $-2db$ Pass band attenuation at a frequency of 20 rad/sec and at least $-10db$ stop band attenuation at 30 rad/sec.
(b) Explain the steps to design an Analog Chebyshev Low Pass Filter.
- 6 Using a rectangular windowing technique, design a low pass filter with pass band gain of unity, cutoff frequency of 1000 Hz and working at a sampling frequency of 5 kHz. The length of impulse response should be 7.
- 7 (a) Obtain the necessary expression for Interpolation process.
(b) What is the need for anti-aliasing filter after down sampling a signal? Explain.
- 8 Explain with the help of block diagram the architecture of TMS320C5X processor.
