Code: R7320201 **R07**

B.Tech III Year II Semester (R07) Supplementary Examinations December/January 2015/2016

DIGITAL SIGNAL PROCESSING

(Common to EEE, E.Con.E, ECE & EIE)

(For 2008 Regular admitted batch only)

Time: 3 hours Max. Marks: 80

Answer any FIVE questions
All questions carry equal marks

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1 (a) Check whether the following systems are linear or not.
(i) $y(n) = n^2\,\mathrm{x(n)}$.
(ii) $y(n) = \mathrm{x(n)} + \frac{1}{2\mathrm{x(n-2)}}$.

(b) Determine whether the following systems are causal or not.
(i) $y(n) = \mathrm{x(n)} + \mathrm{x(n-2)}$.
(ii) $y(n) = \mathrm{x(2n)}$.

2 State and prove the following DFT properties:
(a) Linearity.
(b) Periodicity.
(c) Time reversal.
(d) Frequency shifting.

3 Find the circular convolution of the following sequence and compare it with the linear convolution.
$\mathrm{x}_1(n) = \{1, 2, 0, 1\}$ and $\mathrm{x}_2(n) = \{2, 2, 1, 1\}$

4 The transfer function of the following system is given by:
$$H(z) = \frac{(1+z^{-1})^3}{\left[1-\left(\frac{1}{2}\right)z^{-1}\right]\left[1+z^{-1}+\left(\frac{1}{3}\right)z^{-2}\right]}$$
Realize the system in cascade and parallel forms.

5 Determine the order of a Butterworth low pass filter satisfying the following specifications:
$f_p = 0.10\ Hz,\ \alpha_p = 0.5\ dB$
$f_s = 0.15\ Hz,\ \alpha_s = 15\ dB,\ f = 1\ Hz$

6 (a) Compare FIR and IIR filters.
(b) Discuss in brief about Kaiser window.

7 (a) Discuss the applications of multirate digital signal processing.
(b) Obtain the necessary expression for interpolation process.

8 (a) What are the different stages in pipelining? Explain.
(b) Discuss the advantages of DSP processors over conventional processors.

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