Code: 9A04603

R09

B.Tech III Year II Semester (R09) Supplementary Examinations December/January 2014/2015

DIGITAL SIGNAL PROCESSING

(Common to EIE, E.Con.E, ECC and ECE)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

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1 Determine the sequence corresponding to following frequency domain representation.

e $X(e^{j\omega}) = 1 \quad |\omega| \le W$ or $-W \le \omega \le W$

$= 0 \quad W \le \omega \le \pi$

2 (a) State and prove following properties of DFT:
(i) Linearity. (ii) Circular shift.

(b) Give the comparison between DTFT and DFT.

3 (a) Find the 4-point real sequence x(n) if its 4-point DFT samples are: X(0) = 6, X(1) = -2+j2, X(2) = -2. Use DIF-FFT algorithm.

b) (Find the 4-point DFT of the sequence, $x(n) = \sin(n\pi/4)$ using DIF – FFT algorithm.

4 Consider an LTI system, initially at rest, described by the difference equation:

$y(n) = (1/4)\, y(n-2) + x(n)$

(i) Determine the impulse response of the system.

(ii) Realize the system in Direct form-II and in Cascade form.

5 Determine the H(z) for a Butter worth filter satisfying following frequency specifications

95 0. $\le |H(e^{j\omega})| \ge 1 \quad 0 \le \omega \le \pi/2$

$|H(e^{j\omega})| \ge 0.15 \quad 3\pi/4 \le \omega \le \pi$

Assume T = 1 Sec. Use Impulse Invariant method.

6 (a) Compare features of different windowing functions.

(b) Justify that FIR filter is linear phase filter.

7 Consider x(n) = tri (n/4).Sketch the following signals and describe how they differ.
(i) x(2n/3), using zero interpolation followed by decimation.
(ii) x(2n/3), using step interpolation followed by decimation.

8 (a) Explain commonly used time domain operations in musical sound processing.

(b) Write short notes on coding redundancy.

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