

R09**Code: 9A04603**

B.Tech III Year II Semester (R09) Supplementary Examinations December/January 2015/2016

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

- 1 Whether the following systems are invertible or not? If invertible find the inverse system:
 - (a) $y(n) = x(n) - x(n-1)$.
 - (b) $y(n) = [x(n) + x(n-1) + x(n-2)]/3$.
 - (c) $y(n) = e^{x(n)}$.
- 2
 - (a) Determine the DFT of 4-point sequence $x(n) = \{0, 1, 2, 3\}$.
 - (b) Find inverse DFT of $X(k) = \{4, 1-j, -2, 1+j\}$.
- 3
 - (a) Compare DIT-FFT and DIF-FFT algorithms.
 - (b) Find DFT of sequence using DIT – FFT, the sequence is $x(n) = \{1, 1, 1, 1, 1, 1, 1, 1\}$.
- 4 Determine z-transform, ROC and pole-zero locations of:
 - (i) $\alpha^n u(n)$. (ii) $-\alpha^n u(-n-1)$.
- 5 Determine the $H(z)$ for a Butter worth filter satisfying following frequency specifications:
$$\begin{array}{ll} 0.9 \leq |H(e^{j\omega})| \leq 1 & 0 \leq \omega \leq \pi/2 \\ |H(e^{j\omega})| \geq 0.22 & 3\pi/4 \leq \omega \leq \pi \end{array}$$
Assume $T = 1$ Sec. Use Bilinear Transformation method.
- 6
 - (a) Discuss about characteristics linear phase FIR filters.
 - (b) What are the effects of windowing?
- 7 Discuss the concept of interpolation in detail.
- 8 Discuss the following:
 - (a) Spectral analysis of sinusoidal signals.
 - (b) Multiple Echo filter.
