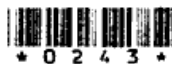


B.E. Seventh Semester (Computer Science & Engineering) (CGS)
10340 : Digital Signal Processing : 7 KS 01

P. Pages : 3

Time : Three Hours



AU - 2890

Max. Marks : 80

- Notes : 1. All question carry equal marks.
2. Assume suitable data wherever necessary.

1. a) Explain following 6
i) Continuous & Discrete Time Signal
ii) Even and Odd Signal
iii) Deterministic & Random signal

- b) Consider a discrete Time system excited by sequence, 8
 $x(n) = \begin{cases} 1; & 0 \leq n \leq 3 \\ 0; & \text{elsewhere} \end{cases}$
find,
i) $y(n) = x(-n+1)$
ii) $y(n) = x(n-1) + x(2-n)$
iii) $y(n) = 2x(n)$
iv) $y(n) = 2x(n) + x(n+1)$

OR

2. a) Find $x(n) = \{1, 2, 3, 4, 5\}$ 8
find.
i) $x(n-4)$
ii) $x(-2+n)$
iii) $x(n) \cdot u(n)$
iv) $x(n-1) \cdot \delta(n)$.

- b) What is system? Explain Linear and Non Linear system with example. 6

3. a) Find the convolution of two sequences, 7
 $h(n) = a^n u(n)$ for all n
 $x(n) = b^n u(n)$ for all n
for
i) $a=b$ ii) $a \neq b$

- b) Determine the unit step response of system, 6
 $y(n) + y(n-1) = x(n) - 2x(n-1)$.

OR

4. a) Perform Cross-Correlation of 6
 $x(n) = \{1, 0, 0, 1\}$
 $y(n) = \{4, 3, 2, 1\}$
- b) Determine the unit step response of system represented by, 7
 $y(n) - \frac{1}{6}y(n-1) - \frac{1}{6}y(n-2) = x(n)$ with $y(-1) = 1$ and $y(-2) = -1$.
5. a) Explain the following properties of Z-Transform. 13
 i) Linearity property ii) Time Shifting property
 iii) Convolution property

OR

6. a) Find Z-transform of following sequence with R.O.C. 6
i) $x(n) = \{1, -1, 2, 3\}$
 $\uparrow$
ii) $x(n) = \{1, -1, 2, 3\}$
 $\uparrow$
b) Determine Z-transform of following $x(n) = a^n u(n)$. 7
7. a) Find $X[k]$ using DITFFT algorithm If $x(n) = \{1, 1, 1, 1, 1, 1, 1, 1\}$. 7
b) Determining 4 point Inverse DFT of $X[k] = \{2, 1-j, 0, 1+j\}$. 6

OR

8. a) Compute 8 point DFT of sequence $x(n) = \left\{ \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, 1, 1, 1, 1 \right\}$ using Radix-2 Decimation in Time Algorithm. 7
- b) Compute 4 point DFT of sequence $x(n) = \{1, 2, 3, 4\}$. 6
9. a) Convert the analog bandpass filter with system function.
$$H_a(S) = \frac{1}{(S+0.1)^2 + 9}$$
into a digital IIR Filter using the approximation of derivative. 7
- b) Explain procedure of designing the IIR filter. 6
10. a) If $H_a(S) = \frac{S+2}{(S+1)(S+3)}$, Find $H(z)$ by match Z-transformation and realize if using Direct-II form for $T=1$ sec. 6

- b) Design a digital filter using bilinear Z-Transform if 7
- $$H_a(S) = \frac{S+0.1}{(S+0.1)^2+9}$$
- resonating at $\omega = \frac{\pi}{2}$.

11. a) Obtain direct form I & II for a system described by. 7
- $$y(n) - \frac{3}{4}y(n-1) + \frac{1}{8}y(n-2) = x(n) + \frac{1}{2}x(n-1).$$

- b) Realize Cascade form, 6
- $$H(z) = \frac{(1 + 1/5z^{-1})}{\left(1 - \frac{1}{2}z^{-1}\right)\left(1 + \frac{1}{4}z^{-1}\right)}$$

OR

12. Obtain the cascade and parallel form realization of following: 13
- $$y(n) = -0.1y(n-1) + 0.2y(n-2) + 3x(n) + 3.6x(n-1) + 0.6x(n-2).$$

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