Paper / Subject Code: 88923 / Signal Processing

10-Dec-2019 1T00826 - T.E.(Electiral Engineering)(SEM-VI)(Choice Base) / 88923 - Signal Processing 78958

[Time: 3 Hours]

[Marks:80]

Please check whether you have got the right question paper.

N.B: 1. Question.No.1 is compulsory.

- 2. Attempt any three from the remaining.
- 3. Assume suitable data if required.
- Q.1 a) Write properties of DFT. Explain any two in detail. (05)
 - b) Determine the periodicity of the following continuous time signal (05) $x(t) = 5\cos 4\pi t + 3\sin 8\pi t$
 - c) State sampling theorem and explain how aliasing error occurs. (05)
 - d) Find x(n) considering all possible region of convergence. (05) $x(z) = \frac{10z}{(z-1)(z-2)}$
- Q.2 a) Design a linear phase FIR low pass filter a length seven with cut-off frequency 1rad/sec using rectangular window. (10)
 - b) Determine whether the system is static causal, time invariant, linear and stable (10)
 - i) $y(t) = x(t+1) + x(t^2)$
 - ii) y(t) = x(t-5) x(2-t)
- Q.3 a) The system transfer function of analog filter is given by $H(S) = \frac{S+0.1}{(S+0.1)^2+16}$ (10)

Obtain the system transfer function of digital filter using BLT which is resonant at $Wr = \frac{\pi}{2}$.

b) Sketch the following signal:-x(t) = 2u(t) + tu(t) - (t-1) u(t-1) - 3u(t-2)(05)

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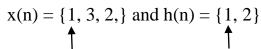
c) Separate out the even and odd component of:-

(05)

$$x(n) = \{1, 3, 2, 1, -2\}$$

Q.4 a) Obtain linear convolution using circular convolution for:-





b) What is ROC? How stability can be obtained by ROC, explain with example.



c) Determine the inverse Z-transform y:-

$$X(Z) = \frac{Z^{-1}}{\left(1 - \frac{1}{2}Z^{-1}\right)\left(1 - \frac{1}{3}Z^{-1}\right)}$$

for the following condition:-

- 1. Causal
- 2. Anti-causal
- 3. Stable
- Q.5 a) A LTI system is described by the difference equation:-

$$y(n) = x(n)+2x(n-1)-6y(n-1)-8y(n-2)$$

Find Impulse response.

(10)

b) A 8 point sequence is given by
$$x(n) = \{2, 2, 2, 2, 1, 1, 1, 1\}$$

(10)

Compute radix x-2 DITFFT.

Q.6 Write short notes on any two.

(10)

1. properties of Z transform

(05)

- 2. advantages and disadvantages of FIR system
- 3. energy / power signal

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