

B.E. Eighth Semester (Electrical Engineering) (CGS)
10470 : Digital Signal Processing : 8 EE / 8 EP / 8 EL 03

P. Pages : 2

Time : Three Hours



AU - 3025

Max. Marks : 80

- Notes : 1. Assume suitable data wherever necessary.
2. Use of pen Blue/Black ink/refill only for writing the answer book.

SECTION - A

1. a) Explain with examples, classification of systems. 8
b) Derive the BIBO stability criterion for LIT Discrete system. 6

OR

2. a) Perform discrete time convolution of the signals where. 7
 $x(n) = 1, n = -2, 0, 1$
 $= 2, n = -1$
 $= 0$ elsewhere
 $h(n) = \delta(n) - \delta(n-1) + \delta(n-4) + \delta(n-5).$

- b) A second order system is described by following difference equation. 7
 $y(n) = \frac{3}{4}y(n-1) - \frac{1}{8}y(n-2) + x(n) + x(n-1).$

Find system's response to the input $x(n) = \left(\frac{1}{2}\right)^n u(n)$ with zero initial conditions.

3. a) Find DTFT of following signals 8
i) $x(n) = \left(\frac{1}{2}\right)^{|n|}$ ii) $x(n) = u(n) - u(n-4)$
iii) $x(n) = r^n \cos(\omega_0 n) u(n)$ iv) $x(n) = a^n u(n) + a^{-n} u(-n-1).$
b) State and explain following properties of DTFT 5
i) Time shifting. ii) Convolution
iii) Time scaling.

OR

4. a) Obtain 8 pt DFT using Radian 2, WIT Algorithm. 9
 $x(n) = [1, 2, 4, 1, 3, 5, 2, 1].$
b) State and explain Parseval's theorem. 4
5. a) Explain quantization and coding process in A/D converter. 8
b) Explain the role of sample and Hold in A/D conversion process. 5

OR

6. a) Explain Antialiasing filter. 6
- b) A sampled signal that varies between $-2V$ to $+2V$ is quantized using B bits what value of B will ensure an rms quantized error less than $5mV$? 7

SECTION – B

7. Obtain direct, form I, form II cascade and parallel realization of filter described by 14
- $$H(z) = \frac{1 - z^{-1}}{1 - 0.2z^{-1} - 0.15z^{-2}}$$

OR

8. a) Obtain filter coefficients for FIR filter with frequency response. 8
- $$H(\omega) = e^{-j3\omega} - \frac{\pi}{4} \leq |\omega| \leq \frac{\pi}{4}$$
- Using Hamming window of length 7.
- b) Explain window based approach of FIR filter design. 6
9. a) Design digital IIR filter using impulse invariant transformation with transfer function. 7
- $$H(s) = \frac{2}{(s+2)(s+1)} \quad T = 1 \text{ sec.}$$
- b) Explain frequency wrapping effect in Bilinear transformation. 6

OR

10. Design digital Butterworth low pass filter for following specifications using Bilinear transformation. 13
- Pass band gain $\rightarrow 0.89$
- Pass band frequency cutoff at 0.3π .
- Stop band attenuation at 0.1778 stop band frequency cutoff at 0.6π .
11. State different Architectures of DSP processor and explain any one in detail. 13

OR

12. a) Compare digital signal processor and microprocessor. 7
- b) Explain algorithm design and data conversion using DSP. 6

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