

G 1409

(Pages : 3)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2016

Sixth Semester

Branch : Applied Electronics and Instrumentation/Electronics and Communication/
Electronics and Instrumentation Engineering (AI, EC, EI)

AI 010 602/ EC 010 602 and EI 010 602—DIGITAL SIGNAL PROCESSING

(New Scheme—2010 Admission onwards)

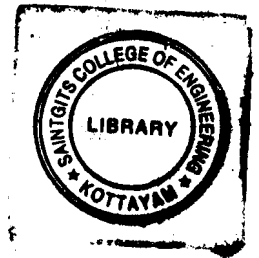
[Regular/Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

*Answer all questions.
Each question carries 3 marks.*



1. List out any four properties of z-transform.
2. Distinguish between minimum and non-minimum phase system.
3. Physically realizable and stable IIR filters cannot have linear phase. Why?
4. What is frequency warping?
5. List out any four comparison between linear convolution and circular convolution.

(5 × 3 = 15 marks)

Part B

*Answer all questions.
Each question carries 5 marks.*

6. Determine the z-transform and region of convergence of the sequence.

(a) $\left(\frac{1}{2}\right)^n u[-n]$.

(b) $\delta[n+1]$.

7. Determine the frequency response of a system with single zero and pole.

8. Realize $y(n) + y(n+1) + \frac{1}{4}y(n-2) = x(n)$ in cascade form.

Turn over

9. Convert the analog filter with system function $H_a(s)$ into digital filter using impulse invariance method. Assume $T = 0.2S$.

$$H_a(s) = \frac{16(s+2)}{(s+3)(s^2+2s+5)}$$

10. Determine the response of the LTI system whose input $x(n)$ and impulse response $h(n)$ are given by :

$$x(n) = \{4, 3, 2, 1\} ; h(n) = \{1, 2, 3, 4\}.$$

(5 × 5 = 25 marks)

Part C

Answer all questions.

Each full question carries 12 marks.

11. Explain the process of changing the sampling rate in the discrete-time operation.

Or

12. What is aliasing? Explain the reconstruction of a band limited signal from its samples.
13. A discrete-time causal LTI system has the system function.

$$H(z) = \frac{(1 + 0.2z^{-1})(1 - 9z^{-2})}{(1 + 0.81z^{-2})}$$

- (a) Is the system stable.
- (b) Find expression for a minimum phase system $H_1(z)$ and an all pass system $H_{ap}(z)$ such that $H(z) = H_1(z) H_{ap}(z)$.

Or

14. Explain the properties of minimum phase system.
15. Obtain an analog Chebyshev filter transfer function that satisfies the constraints :

$$\frac{1}{\sqrt{2}} \leq |H(j\Omega)| \leq 1 ; 0 \leq \Omega \leq 4$$

$$|H(j\Omega)| < 0.1 ; \Omega \geq 4.$$

Or



16. A causal linear time invariant system is given by :

$$H(z) = \frac{1 + 2z^{-1} + z^{-2}}{1 - \frac{3}{4}z^{-1} + \frac{1}{8}z^{-2}}$$

Draw the signal flow graphs for implementation of the system in each of the forms :

- (i) Direct form I.
 - (ii) Direct form II.
 - (iii) Cascade of first order systems.
17. Design a Chebyshev low pass filter with the specifications $\alpha_p = 1$ dB ripple in the passband $0 \leq \omega \leq 0.2\pi$, $\alpha_s = 15$ dB ripple in the stop band $0.3\pi \leq \omega \leq \pi$ using bilinear transformation.

Or

18. Design a band stop filter to reject frequencies in the range 1 to 2 rad/sec using rectangular window with $N = 7$.
19. Compute 8 point DFT of : $x(n) = \{2, 2, 2, 2, 1, 1, 1, 1\}$ using radix - 2 DIT FFT.

Or

20. Perform linear convolution of the following sequences by : (i) Overlap add method ; and (ii) Overlap save method.

$$x[n] = \{-1, 1, 2, -1, 1, 2, -1, 1, -1\} \text{ and } h[n] = \{2, 3, -2\}.$$

(5 × 12 = 60 marks)

