

Reg. No. :

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Question Paper Code : 51216

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2014.

Sixth Semester

Electrical and Electronics Engineering

080280051 — DIGITAL SIGNAL PROCESSING

(Common to B.E. (Part Time) Fifth Semester Electrical and Electronics Engineering)

(Regulation 2008)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define linear convolution.
2. What is the quantization step of a 10 bit digital system?
3. Determine the Fourier transform of the unit impulse sequence.
4. Write the time shifting property of discrete time Fourier transform.
5. Define DFT of a sequence.
6. Write the significance of wavelet transform.
7. What are the advantages of linear phase characteristics?
8. What do you mean by prewarping in IIR filter design?
9. What is circular addressing mode?
10. What is the use of MAC unit?

PART B — (5 × 16 = 80 marks)

11. (a) Determine the energy and power of the following signals

(i) $x(n) = e^{j\left[\frac{\pi}{4}n + \frac{\pi}{8}\right]}$

(ii) $x(n) = \sin\left(\frac{\pi}{2}\right)n$ (16)

Or

- (b) Determine whether the systems described by the following input-output equations are linear and time invariant.

(i) $y(n) = 2x(-n - 2)$

(ii) $y(n) = n^2x(n) + 5$ (16)

12. (a) Determine the Z transform and ROC of the following,

(i) $x(n) = (-1)^n \cos\left(\frac{\pi}{4}n\right)u(n)$

(ii) $x(n) = -0.5^n u(-n-1)$. (16)

Or

(b) Using Z transform determine the response of the given system, $y(n) - 0.8y(n-1) + 0.15y(n-2) = x(n-1) + x(n-2)$ to input $x(n) = u(n)$ is the system stable. (16)

13. (a) Compute the 8 point DFT of the sequence, $x(n) = \{1, 1, 1, 1, 1, 2, 3, 4\}$ using DIF algorithm. (16)

Or

(b) Compute IDFT of the sequence,

$x(k) = \{12, 1 - j2.4142, 0, 1 - j0.4142, 0, 1 + j0.4142, 0, 1 + j2.4142\}$ Using DIT algorithm. (16)

14. (a) (i) Convert the analog filter with system transfer function, $H_a(s) = \frac{4}{(s+2)(s+5)}$ into a digital filter using impulse invariance method Use $T=1$ Sec. (10)

(ii) Realize the given HR filter, $H(z) = \frac{3 - 1.4z^{-1} + 0.1z^{-2}}{1 - 0.7z^{-1} + 0.1z^{-2}}$ in parallel form structure. (6)

Or

(b) Design a filter with $H(e^{j\omega}) = 1$ for $-\frac{\pi}{2} \leq \omega \leq \frac{\pi}{2}$ = 0 for $\frac{\pi}{2} \leq |\omega| \leq \pi$ Use rectangular window with $N = 7$. (16)

15. (a) (i) Discuss the important features of TMS320C54 DSP. (10)

(ii) Compare Von Neumann and Harvard architecture. (6)

Or

(b) With a neat functional block diagram, explain the architecture of TMS320C54DSP. (16)