Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 11241

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 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. Show that the discrete time system described by the input-output relationship $y[n] = nx[n]$ is linear?

2. Determine the convolution sum of two sequences $x(n) = \{3,2,1,2\}$ and $h(n) = \{1,2,1,2\}$.

3. State Parseval relation in z transform.

4. What is zero padding? What are its uses?

5. What is bit reversal in FFT?

6. Find the IDFT of $Y(k) = (1,0,1,0)$.

7. Write the two concepts that lead to the Fourier series or Window method of designing FIR filters.

8. Compare Rectangular and Hamming window.

9. What is Pipelining?

10. List out the four operation blocks involved in C5X processors.

PART B — (5 × 16 = 80 marks)

11. (a) (i) State and proof of sampling theorem. (8)

(ii) What are the advantages of DSP over analog signal processing? (8)

Or

(b) Check for following systems are linear, causal, time in variant, stable, static. (16)

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

(ii) $y(n)=\cos(x(n))$

(iii) $y(n)=x(n)\cos(x(n)$

(iv) $y(n)=x(-n+2)$

(v) $y(n)=x(n)+n\,x(n+1)$.

12. (a) (i) Find the Z transform of the following sequence and ROC and sketch the pole zero diagram. (8)

(1) $x(n)=a_n\,u(n)+b_n\,u(n)+c_n\,u(-n-1), |a|<|b|<|c|$

(2) $x(n)=n^2\,a_n\,u(n)$.

(ii) Find the convolution of using z transform. (8)

$x_1(n)=\{(1/3)^n, n>=0$

$(1/2)^{-n}, n<0\}$

$x_2(n)=(1/2)^n$.

Or

(b) State and prove important properties of the z-transforms. (16)

13. (a) Explain in detail about Multi-Resolution Analysis using Wavelet method. (16)

Or

(b) In an LTI system the input $x(n)=\{1,1,1\}$ and the impulse response $h(n)=\{-1,-1\}$ determine the response of LTI system by radix –2 DIT FFT. (16)

14. (a) For the constraints

$0.8 \leq \left|H\left(e^{jw}\right)\right| \leq 1, 0 \leq \omega \leq 0.2\pi$

$\left|H\left(e^{jw}\right)\right| \leq 0.2,\ 0.6\pi \leq \omega \leq \pi$

With T = 1 sec. Determine system function $H(z)$ for a Butterworth filter using Bilinear transformation. (16)

Or

(b) Design a HPF of length 7 with cut off frequency of 2 rad/sec using Hamming window. Plot the magnitude and phase response. (16)

15. (a) Explain in detail about the addressing modes of TMS 320C54. (16)

Or

(b) Explain briefly :

(i) Von Neumann architecture (4)

(ii) Harvard architecture (6)

(iii) VLIW architecture. (6)
