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

Question Paper Code : 11206

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Fifth Semester

Electronics and Communication Engineering

EC 1302 – DIGITAL SIGNAL PROCESSING

(Regulations 2008)

Time : Three Hours **Maximum : 100 Marks**

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. Distinguish between DFT and DTFT.
2. What is radix-2 FFT ?
3. Prove that filter with the following response has linear phase response and find the expression for phase response h(n) = {2, 1, 1, 2}.
4. State the drawbacks of impulse invariance method.
5. What is overflow error ?
6. Represent 1/16 as a binary floating point number.
7. Find the auto correlation sequence for the power spectral density

   $P_X(e^{jw}) = 2 + \cos \omega$.
8. Mention the significance of modified periodogram.
9. What is pipelining ?
10. Mention the arithemetic instructions of C54 × processor.

PART – B (5 × 16 = 80 marks)

11. (a) (i) Determine the 6-point DFT of the signal **(10)**

$x(n) = \{3, 2, 1, 0, 1, 2\}$.

(ii) Represent DFT and IDFT in matrix form. **(6)**

OR

(b) Develop 8-point radix-2 decimation in time algorithm with input in normal order and output in digit reversed order. Derive the necessary equations and show the flow diagrams. **(16)**

12. (a) (i) Find the impulse response h(n) of the following system

$$Hd(e^{jw}) = \begin{cases} e^{-3w} & \text{for} \quad 0 \le |w| \le \pi/2 \\ 0 & \text{for} \quad \pi/2 < |w| < \pi \end{cases}$$

use frequency sample method and N = 7. **(10)**

(ii) Explain the different types of window functions. **(6)**

OR

(b) Design the Butterworth digital filter using bilinear transformation to meet the following specifications

$0.8 < |H(e^{jw})| \le 1 \quad \text{for} \quad 0 \le w \le 0.2\pi$

$|H(e^{jw})| \le 0.2 \quad \text{for} \quad 0.6\pi \le w \le \pi$ **(16)**

13. (a) The input to the system $y[n] = 0.625\, y[n-1] + x[n]$ is applied to an ADC. What is the power produced by the quantization noise at the output of the filter if the input is quantized to (i) 8 bits (ii) 16 bits. **(16)**

OR

(b) (i) Explain the signal scaling to prevent overflow limit cycle oscillations in the second order digital filter implementation. **(8)**

(ii) With an example explain fixed and floating representation of binary numbers. **(8)**

14. (a) (i) Explain the use of DFT in power spectrum estimation. **(6)**

(ii) Describe the Bartlett and Welch methods of power spectrum estimation. **(10)**

OR

(b) (i) Define energy density spectrum and explain how it can be computed for deterministic signals. **(8)**

(ii) Explain the Blackman and Turkey method of power spectrum estimation. Compare its features with the other Non parametric methods. **(8)**

15. (a) Describe in detail about the architecture of TMS320C54*x* Digital Signal Processor. **(16)**

OR

(b) (i) State and explain the peripheral function available in the TMS320C54*x* DSP chip. **(8)**

(ii) Explain in detail, any six instructions used in TMS320C5X processors. **(8)**